SWEET'S
ARCHITECTURAL
CATALOGUES

VOLUME D

SWEET'S ARCHITECTURAL CATALOGUES

(REG. U. S. PAT. OFF.)

A File of Catalogues
on
Building Products and Services

FOR THE YEAR 1932
IN FOUR VOLUMES

Edited, Classified, Indexed, Published and Distributed
by
SWEET'S CATALOGUE SERVICE
DIVISION OF F. W. DODGE CORPORATION

Dodge Reports
General Building Contractor

F.W. DODGE CORPORATION

Architectural Record
Sweet's Engineering Catalogues

119 WEST FORTIETH STREET, NEW YORK, N. Y.

Printed in the United States of America

Established 1906

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PLUMBING

FOUNDED 1850

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS

Jones & Laughlin Building, PITTSBURGH, PA.

DISTRICT SALES OFFICES

ATLANTA, GA., 1313-14 Healey Building
Telephone, Walnut 6805

BOSTON, MASS., 131 State Street
Telephone, Hubbard 5151

BUFFALO, N. Y., Liberty Bank Building
Telephone, Washington 0268

CHICAGO, ILL., 111 W. Washington Street
Telephone, Franklin 2522

CINCINNATI, OHIO, Carew Tower
Telephone, Main 2324

CLEVELAND, OHIO, Union Trust Building
Telephone, Main 7866

DALLAS, TEX., Magnolia Building
Telephone, 2-8678

DENVER, COLO., First National Bank Building
Telephone, Main 2449

DETROIT, MICH., Fisher Building
Telephone, Empire 9010-11-12-13

ERIE, PA., Erie Trust Building
Telephone, C 54146

LOS ANGELES, CAL., 416 Roosevelt Building
Telephone, Vandike 6178

MEMPHIS, TENN., 1 Auction Avenue
Telephone 6-4836

MILWAUKEE, WIS., 1410 The Bankers' Building
Telephone, Daly 4418

MINNEAPOLIS, MINN., 1030 Rand Tower Building
Telephone, Atlantic 5048

NEW YORK, N. Y., 500 Fifth Avenue
Telephone, Lackawanna 4-8010

PHILADELPHIA, PA., Broad Street Station Building
Telephone, Rittenhouse 0750

PITTSBURGH, PA., Jones & Laughlin Building
Telephone, Court 3240

ST. LOUIS, MO., Boatmen's Bank Building
Telephone, Garfield 4075

SAN FRANCISCO, CAL., Standard Oil Building
Telephone, Douglas 1776

CANADIAN REPRESENTATIVES: JONES & LAUGHLIN STEEL PRODUCTS COMPANY

PITTSBURGH, PA., U. S. A., Jones & Laughlin Building
Telephone, Court 3240

TORONTO, ONT., CANADA, Toronto Daily Star Building
Telephone, Adelaide 0022

WAREHOUSES

CHICAGO, ILL.—Telephone, Virginia 1600
CINCINNATI, OHIO—Telephone, Main 2324
DETROIT, MICH.—Telephone, Melrose 6650
LOUISVILLE, KY.—Telephone, Magnolia 1639
MEMPHIS, TENN.—Telephone, 6-4836
NEW ORLEANS, LA.—Telephone, Franklin 1131
PITTSBURGH, PA.—Telephone, Hemlock 1000

Products

J & L Tubular Products, Standard Weight, Extra Strong, and Double Extra Strong Pipe, Black and Galvanized, for steam, gas, air, water, refrigeration and sprinkler work, fences, railing, etc.

J & L Copper-bearing Steel Pipe, when specified, can be supplied in standard weight, or extra strong, black or galvanized. Recommended where piping is to be exposed to the atmosphere.

J & L Seamless Tubular Products for oil and gas well drilling, pipe line construction, etc.

Also J & L Structural Shapes and Fabricated Structural Work, Columns, Girders, Trusses, Plate Work, Tanks, Mill and Factory Buildings; J & L Wire Products.

For J & L Bars for Concrete Reinforcement, Junior Beams and Light Weight Channels for Stair Stringers and other uses, see Manufacturers' Index.

Description

Jones & Laughlin Steel Pipe is made of soft weldable steel rolled from solid ingots made to a special analysis which checked over a period of years has proven to be very uniform in quality. The steel pipe produced from this special grade of J & L Steel is soft and ductile, free cutting, strong at the welds, and free from excess scale. J & L Pipe is reasonably straight and free from blisters, cracks or other injurious defects and is well within the allowable tolerances as to dimensions and weights, and true to round in the outside diameter.

Vast resources and complete ownership-control of every manufacturing process from the iron ore in the ground to the finished products of the tube mills, under an organization which has been producing iron and steel for over three-quarters of a century, assure the production of steel pipe of exceptional quality.

Uniform Quality

Self-owned basic materials and control under one organization of every process from the mining of the ore to the final testing of the finished pipe, result in a high degree of uniformity in the quality of J & L Pipe that could not otherwise be maintained.

Threading

A pipe installation cannot be stronger than the joint. Careful attention is therefore given the threading of the pipe with good clean-cut threads fitted with sound couplings correctly tapped to give a tight joint. Soft ductile steel of free cutting quality enables the contractor to cut clean, sound threads on the job.

Galvanized Pipe

The Jones & Laughlin process of galvanizing assures a thorough coating and insures against pipe being clogged with spelter. The surface of the pipe is carefully cleaned so that when the galvanized coating is applied it adheres strongly and does not tend to flake off.

Identifying Marks

"Jones & Laughlin" is rolled in each piece of pipe, identifying a quality product carefully made and finished, rigidly tested and inspected before shipment. Specify J & L Pipe and have a satisfied clientele.

Specifications for J & L Welded Steel Pipe

(1) **Material**—J & L Welded Pipe shall be made from a uniformly good quality of soft weldable steel rolled from solid ingots from which sufficient crop has been cut to insure sound metal in the skelp.

(2) **Process of Manufacture**—Pipe 3 in. and smaller may be made by the butt-welding process. Pipe over 3 in. shall be lap-welded; also smaller sizes as listed, when ordered as lap-welded pipe.

The welding shall be performed in accordance with the best practice in heating and rolling.

(3) Physical Properties—The steel used in the manufacture of the pipe shall show the following physical characteristics:

Tensile strength per sq. in.—minimum 50,000 lb.

Yield point per sq. in.—30,000 lb.

Elongation in 8 in.—20%.

(4) Finish—The finished pipe shall be commercially straight and free from injurious defects. All burrs at the ends of the pipe shall be removed.

Threads shall be in accordance with Briggs standard, and cut so as to make a tight joint when the pipe is tested at the mill to the specified internal hydrostatic pressure. The variation from standard, when tested with a standard working gage, shall not exceed a maximum of one and one-half turns either way.

Couplings shall be of sound metal, free from injurious defects, and tapped to such pitch diameter as to make a tight joint.

Galvanized pipe shall be coated with zinc by the hot-dipping process. The coating on the inside and the outside of the pipe shall be free from injurious defects. excessive roughness, or lumps.

Solid tapped rings or split couplings shall be provided as thread protectors on each length of pipe 4 in. and larger.

(5) Tests—Each length of pipe shall be subjected at the mill to the hydrostatic test pressures per square inch as shown in the appended table.

For lap-welded pipe, a flattening test on standard weight and extra strong pipe in sizes over 2 in. shall be made by taking a section of pipe 6 in. long, which shall be flattened between parallel plates until the distance between the plates is one-third the outside diameter of the pipe, with the weld located 45° from the line of direction of the applied force, without developing cracks.

Tension test specimens shall consist either of pieces of pipe in full cross-sections, or of sections machined longitudinally from the walls of the pipe.

One tension test, and one flattening test as specified for the respective sizes, may be made on a length of pipe in each lot of 500 lengths or less of each size.

(6) Size Variation—Pipe 1½ in. or under shall not vary at any point more than $\frac{1}{64}$ in. over nor more than $\frac{1}{32}$ in. under the nominal outside diameters as shown in the table. For pipe in sizes 2 in. and over, the outside diameter shall not vary more than 1 per cent over or under the standard dimension shown in the table.

(7) Inspection—When so desired, pipe may be inspected at the mill, in which event the inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the pipe ordered. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the pipe is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

Material which shows injurious defects subsequent to acceptance at the manufacturer's works, or which proves defective when properly applied in service, may be rejected and the manufacturer shall be notified.

J & L FULL STANDARD WEIGHT PIPE, BLACK AND GALVANIZED

All weights and dimensions are nominal

Size, in.	Diameters, in.		Thickness, in.	Weight per ft., lb.		Threads per in.	Mill test, lb.	
	External	Internal		Plain ends	Threads and couplings		Butt weld	Lap weld
⅛	.405	.269	.068	.244	.245	27	700	.....
¼	.540	.364	.088	.424	.425	18	700	.....
⅜	.675	.493	.091	.567	.568	18	700	.....
½	.840	.622	.109	.850	.852	14	700	.....
¾	1.050	.824	.113	1.130	1.134	14	700	.....
1	1.315	1.049	.133	1.678	1.684	11½	700	.....
1¼	1.660	1.380	.140	2.272	2.281	11½	700	1000
1½	1.900	1.610	.145	2.717	2.731	11½	700	1000
2	2.375	2.067	.154	3.652	3.678	11½	700	1000
2½	2.875	2.469	.203	5.793	5.819	8	800	1000
3	3.500	3.068	.216	7.575	7.616	8	800	1000
3½	4.000	3.548	.226	9.109	9.202	8	.....	1000
4	4.500	4.026	.237	10.790	10.889	8	.....	1000
4½	5.000	4.506	.247	12.538	12.642	8	.....	1000
5	5.563	5.047	.258	14.617	14.810	8	.....	1000
6	6.625	6.065	.280	18.974	19.185	8	.....	1000
8	8.625	8.071	.277	24.696	25.000	8	.....	800
8	8.625	7.981	.322	28.554	28.809	8	.....	1000
10	10.750	10.192	.279	31.201	32.000	8	.....	600
10	10.750	10.136	.307	34.240	35.000	8	.....	800
10	10.750	10.020	.365	40.483	41.132	8	.....	900
12	12.750	12.090	.330	43.773	45.000	8	.....	600
12	12.750	12.000	.375	49.562	50.706	8	.....	800

The permissible variation in weight is 5 per cent above and 5 per cent below.

Furnished with threads and couplings and in random lengths unless otherwise ordered.

J & L EXTRA STRONG PIPE, BLACK AND GALVANIZED

All weights and dimensions are nominal

Size, in.	Diameters, in.		Thickness, in.	Weight per ft., plain ends, lb.	Mill test, lb.	
	External	Internal			Butt weld	Lap weld
⅛	.405	.215	.095	.314	700	.....
¼	.540	.302	.119	.535	700	.....
⅜	.675	.423	.126	.738	700	.....
½	.840	.546	.147	1.087	700	.....
¾	1.050	.742	.154	1.473	700	.....
1	1.315	.957	.179	2.171	700	.....
1¼	1.660	1.278	.191	2.996	1500	2500
1½	1.900	1.500	.200	3.631	1500	2500
2	2.375	1.939	.218	5.022	1500	2500
2½	2.875	2.323	.276	7.661	1500	2000
3	3.500	2.900	.300	10.252	1500	2000
3½	4.000	3.364	.318	12.505	.....	2000
4	4.500	3.826	.337	14.983	.....	2000
4½	5.000	4.290	.355	17.611	.....	1800
5	5.563	4.813	.375	20.778	.....	1800
6	6.625	5.761	.432	28.573	.....	1800
8	8.625	7.625	.500	43.388	.....	1500
10	10.750	9.750	.500	54.735	.....	1200
12	12.750	11.750	.500	65.415	.....	1100

The permissible variation in weight is 5 per cent above and 5 per cent below.

Furnished with plain ends and in random lengths, unless otherwise ordered.

J & L DOUBLE EXTRA STRONG PIPE, BLACK AND GALVANIZED

All weights and dimensions are nominal

Size, in.	Diameters, in.		Thickness, in.	Weight per ft., plain ends, lb.	Mill test, lb.	
	External	Internal			Butt weld	Lap weld
½	.840	.252	.294	1.714	700	.....
¾	1.050	.434	.308	2.440	700	.....
1	1.315	.599	.358	3.659	700	.....
1¼	1.660	.896	.382	5.214	2200	.....
1½	1.900	1.100	.400	6.408	2200	3000
2	2.375	1.503	.436	9.029	2200	3000
2½	2.875	1.771	.552	13.695	2200	3000
3	3.500	2.300	.600	18.583	2200	3000
3½	4.000	2.728	.636	22.850	.....	2500
4	4.500	3.152	.674	27.541	.....	2500
4½	5.000	3.580	.710	32.530	.....	2000
5	5.563	4.063	.750	38.552	.....	2000
6	6.625	4.897	.864	53.160	.....	2000
8	8.625	6.875	.875	72.424	.....	2000

The permissible variation in weight is 10 per cent above and 10 per cent below.

Furnished with plain ends and in random lengths, unless otherwise ordered.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES AND TUBE WORKS
YOUNGSTOWN, OHIO

DISTRICT SALES OFFICES

BIRMINGHAM, ALA., Empire Building
BOSTON, MASS., Chamber of Commerce Building
BUFFALO, N. Y., Liberty Bank Building
CHICAGO, ILL., McCormick Building
CINCINNATI, OHIO, Carew Tower
CLEVELAND, OHIO, Union Trust Building
DALLAS, TEX., Republic Bank Building
DENVER, COLO., Continental Oil Building
DETROIT, MICH., Fisher Building
GRAND RAPIDS, MICH., Grand Rapids Press Building
INDIANAPOLIS, IND., Circle Tower
LOS ANGELES, CALIF., Edison Building
MILWAUKEE, WIS., First Wisconsin National Bank Building
NEW YORK, N. Y., Lincoln Building
PHILADELPHIA, PA., Fidelity-Philadelphia Trust Building
PITTSBURGH, PA., Oliver Building
ST. LOUIS, MO., Paul Brown Building
ST. PAUL, MINN., Merchants Bank Building
SAN FRANCISCO, CALIF., Rialto Building
SEATTLE, WASH., Smith Tower Building
TOLEDO, OHIO, Ohio Bank Building
TULSA, OKLA., 405 Thompson Building
YOUNGSTOWN, OHIO, Central Tower Building

Products

TONCAN COPPER MOLYBDENUM IRON PIPE.

REPUBLIC COPPER BEARING STEEL PIPE.

REPUBLIC WROUGHT STEEL PIPE—Butt and Lap Welded.

For Enduro Stainless Steel and Metal Roofing Sheets, see Manufacturers' Index.

From Mine to Consumer

This company controls and operates the manufacture of its products from the mines to the consumer, therefore is able to produce a commodity that is of a high standard and uniform quality. Republic's metallurgical laboratories—famed for their contributions to the art of alloy iron and steel making—are always at your service.

WHERE AND WHEN REPUBLIC PIPE SHOULD BE USED

It is rather difficult to recommend uses of tubular products that will hold true in all localities because of the varying degrees of corrosive action. In addition, some jobs are of a less permanent character and the additional cost of a better material is not warranted. However, in general, the following uses are suggested to the architect who has a pipe installation problem.

Heating

Excessive Corrosion—Where excessive corrosion will be encountered, black standard weight Toncan Copper Mo-lyb-den-um Iron Pipe or black extra strong wrought steel pipe should be used and will justify the slightly higher cost.

Ordinary Conditions—Where all piping, risers and returns are subjected to ordinary conditions, black standard weight wrought steel pipe is suggested.

Plumbing

Excessive Corrosion—Where hot and cold water lines and general plumbing installations are subjected to high corrosive action, galvanized standard weight Toncan Copper Mo-lyb-den-um Iron Pipe is most suitable.

Atmospheric Corrosion—Where atmospheric conditions cause corrosion on tubular products, it is suggested that galvanized standard weight copper bearing steel pipe be used.

Ordinary Conditions—Where pipe is subjected to ordinary usage and corrosion is light, black standard wrought steel pipe will ordinarily be satisfactory.

Vents, Drainage and Down-spouts—Tubular products for such uses are subjected to atmospheric corrosive action which suggests the use of galvanized standard weight copper bearing steel pipe. When such corrosive action is light, galvanized standard weight wrought steel pipe will usually suffice.

Fire Lines—Where water pressures are not excessive, black standard weight wrought steel pipe is recommended. Where water pressure is heavy and fire laws demand, black extra heavy weight wrought steel pipe is suggested.

Sprinker Systems—Black standard weight wrought steel pipe for all piping.

Gas Lines—Black standard weight wrought steel pipe for all piping.

Toncan Copper Mo-lyb-den-um Iron Pipe

Toncan Iron is primarily a corrosion resistant material, being a highly refined iron alloyed with copper and molybdenum. Better grain refinement can be secured in iron when a small amount of molybdenum is present. This improvement in grain structure has an important bearing on strength and ductility and has been proven a definite aid to corrosion resistance. Toncan Iron threads, bends, flanges and coils easily.

TONCAN COPPER MO-LYB-DEN-UM IRON PIPE

Toncan Iron Pipe is recommended where corrosive conditions are such that ordinary ferrous pipe is not economical. In such cases the slightly higher cost of Toncan Iron is justified by the longer life it brings to the piping installation.

Identification—Every length of Toncan Iron Pipe is painted blue, and is marked with the name Republic in raised letters. Couplings are blue and stamped RT.

Literature—The 64-page second edition of "Toncan Iron Pipe for Permanence" contains interesting and valuable facts concerning the remarkable performance of this rust-resisting pipe. Write for a copy.

Republic Copper Bearing Steel Pipe

This type of material is suggested for installations where corrosive conditions similar to atmospheric are encountered. The slightly increased cost is a sound investment which yields increased life of installation.

Identification—Each length is properly identified "Republic Copper Bearing Steel Pipe," with no possibility of confusion at the time of installation or inspection by the architect.

Republic Wrought Steel Pipe—Butt and Lap Welded

This pipe is made from uniformly good quality soft weldable wrought steel, rolled from solid ingots. Sufficient crop is cut from the ends to insure sound material, and the steel is given the most approved treatment in heating and rolling. Every piece is carefully inspected and tested. Republic Wrought Steel Pipe threads, flanges and bends easily.

Identification—Each length of pipe is identified with the name "Republic" rolled in raised letters every 3 ft. of length.

REPUBLIC STANDARD WEIGHT WROUGHT STEEL PIPE, BLACK AND GALVANIZED

All Weights and Dimensions Are Nominal

Size	Diameters, in.		Thickness, in.	Wt. per ft., lb.		Thds. per in.	Pipe length in ft., per sq. ft. of surface		Test pressure, lb.		Couplings			List price per ft.
	External	Internal		Plain ends	Thds. and couplings		External	Internal	Butt weld	Lap weld	Diam., in.	Lgth., in.	Wt., lb.	
⅛	.405	.269	.068	.244	.245	27	9.431	14.199	700	.....	.562	⅞	.030	$0.05½
¼	.540	.364	.088	.424	.425	18	7.073	10.493	700	.....	.685	1	.044	.06
⅜	.675	.493	.091	.567	.568	18	5.658	7.747	700	.....	.848	1⅛	.072	.06
½	.840	.622	.109	.850	.852	14	4.547	6.141	700	.....	1.024	1⅜	.118	.08½
¾	1.050	.824	.113	1.130	1.134	14	3.637	4.635	700	.....	1.281	1⅝	.214	.11½
1	1.315	1.049	.133	1.678	1.684	11½	2.904	3.641	700	.....	1.576	1⅞	.350	.17
1¼	1.660	1.380	.140	2.272	2.281	11½	2.301	2.767	700	1000	1.950	2⅛	.546	.23
1½	1.900	1.610	.145	2.717	2.731	11½	2.010	2.372	700	1000	2.218	2⅜	.758	.27½
2	2.375	2.067	.154	3.652	3.678	11½	1.608	1.847	700	1000	2.760	2⅝	1.233	.37
2½	2.875	2.469	.203	5.793	5.819	8	1.328	1.547	800	1000	3.276	2⅞	1.755	.58½
3	3.500	3.068	.216	7.575	7.616	8	1.091	1.245	800	1000	3.948	3⅛	2.549	.76½
3½	4.000	3.548	.226	9.109	9.202	8	.954	1.076	.....	1000	4.591	3⅝	4.328	.92
4	4.500	4.026	.237	10.790	10.889	8	.848	.948	.....	1000	5.091	3⅝	5.410	1.09
*4½	5.000	4.506	.247	12.538	12.642	8	.763	.847	.....	1000	5.591	3⅝	5.984	1.27
5	5.563	5.047	.258	14.617	14.810	8	.686	.756	.....	1000	6.296	4⅛	9.158	1.48
6	6.625	6.065	.280	18.974	19.185	8	.576	.629	.....	1000	7.358	4⅛	10.823	1.92
*7	7.625	7.023	.301	23.544	*23.769	8	.500	.543	.....	1000	8.358	4⅛	12.390	2.38
8	8.625	8.071	.277	24.696	25.000	8	.442	.473	.....	800	9.420	4⅝	15.843	2.50
8	8.625	7.981	.322	28.554	28.809	8	.442	.478	.....	1000	9.420	4⅝	15.843	2.88
*9	9.625	8.941	.342	33.907	34.188	8	.396	.427	.....	900	10.420	5⅛	19.752	3.45
10	10.750	10.192	.279	31.201	32.000	8	.355	.374	.....	600	11.721	6⅛	33.923	3.20
10	10.750	10.136	.307	34.240	35.000	8	.355	.376	.....	800	11.721	6⅛	33.923	3.50
10	10.750	10.070	.365	40.483	41.132	8	.355	.381	.....	900	11.721	6⅛	33.923	4.12
*11	11.750	11.000	.375	45.557	46.247	8	.325	.347	.....	800	12.721	6⅛	36.970	4.63
12	12.750	12.090	.330	43.773	45.000	8	.299	.315	.....	600	13.958	6⅛	48.266	4.50
12	12.750	12.000	.375	49.562	50.706	8	.299	.318	.....	800	13.958	6⅛	48.266	5.07

*Item now obsolete.

The permissible variation in weight is 5% above and 5% below.

Furnished with threads and couplings and in random lengths unless otherwise ordered.

For cut lengths, an extra charge will be made above random lengths.

For pipe smoothed on the inside, known as reamed and drifted, an extra charge will be made above standard pipe.

For galvanized or coated, an extra charge will be made above black.

Taper of threads is ¾ in. diam. per ft. length for all sizes.

Specifications Under Which Republic Wrought Steel Welded Pipe Is Manufactured

The manufacturers of Republic Pipe have adopted a rigorous system of testing and inspection, which insures the best material and workmanship. A most rigid inspection is made after the welding of the skelp into the pipe.

In order to insure first class product without necessarily increasing the cost of manufacture, we have adopted and recommend the following specifications:

Process of Manufacture—All pipe shall be made either by the lap or butt-weld process as specified on order, according to the best methods and practice.

Surface Inspection—The pipe must be reasonably straight and free from blisters, cracks or other injurious defects. Liquor marks incidental to the manufacture of lap-welded pipe will not be considered as surface defects. The pipe shall not vary more than 1% either way from being perfectly round or true to the standard outside diameter, except on the small sizes (1½ in. and smaller) where a variation of $\frac{1}{64}$ in. will be accepted. The pipe must not vary more than 5% either way from standard weight.

Threading and Reaming—When required, the pipe must have a good Briggs standard thread. The threads must not vary more than 1½ turns either way when tested with a Pratt & Whitney Briggs standard gauge. All burrs at ends to be removed.

Internal Pressure Test—The test pressures will be applied to the respective sizes of standard butt and lap-weld pipe as indicated in tables.

Testing of Material—The steel from which the pipe is made must show the following physical properties:

Tensile strength..... 52,000 to 62,000 lb. per sq. in.
Elastic limit..... not less than 30,000 lb. per sq. in.
Elongation in 8 in..... not less than 20%
Reduction of area..... not less than 50%

A test piece cut lengthwise from the pipe and filed smooth on the edges shall bend, without fracture, through 180 degrees with an inner diameter at the bend equal to the thickness of the material.

Couplings—The material to be sound and free from injurious defects. Threads must be clean cut, tapped straight through, and of such pitch diameter as will make a tight joint. Ends must be countersunk.

Thread Protection—Solid tapped rings or split couplings will be provided as thread protectors on all sizes 3½-in. diam. or larger. Protection will be provided for smaller sizes when called for on order.

Additional Specifications—In addition to the above, Republic Pipe is manufactured in accordance with all standard specifications such as, A.S.T.M., A.P.I., etc.

REPUBLIC EXTRA STRONG WROUGHT STEEL PIPE BLACK AND GALVANIZED

All Weights and Dimensions Are Nominal

Size	Diameters, in.		Thickness, in.	Weight per ft., lb., plain ends	Pipe length in ft., per sq. ft. of surface		Test pressure, lb.		List price per ft.
	External	Internal			External	Internal	Butt weld	Lap weld	
⅛	.405	.215	.095	.314	9.431	17.766	700	.....	$0.12
¼	.540	.302	.119	.535	7.073	12.648	700	.....	.07½
⅜	.675	.423	.126	.738	5.658	9.030	700	.....	.07½
½	.840	.546	.147	1.087	4.547	6.995	700	.....	.11
¾	1.050	.742	.154	1.473	3.637	5.147	700	.....	.15
1	1.315	.957	.179	2.171	2.904	3.991	700	.....	.22
1¼	1.660	1.278	.191	2.996	2.301	2.988	1500	2500	.30
1½	1.900	1.500	.200	3.631	2.010	2.546	1500	2500	.36½
2	2.375	1.939	.218	5.022	1.608	1.969	1500	2500	.50½
2½	2.875	2.323	.276	7.661	1.328	1.644	1500	2000	.77
3	3.500	2.900	.300	10.252	1.091	1.317	1500	2000	1.03
3½	4.000	3.364	.318	12.505	.954	1.135	.....	2000	1.25
4	4.500	3.826	.337	14.983	.848	.998	.....	2000	1.50
*4½	5.000	4.290	.355	17.611	.763	.890	.....	1800	1.80
5	5.563	4.813	.375	20.778	.686	.793	.....	1800	2.08
6	6.625	5.761	.432	28.573	.576	.663	.....	1800	2.86
*7	7.625	6.625	.500	38.048	.500	.576	.....	1500	3.81
8	8.625	7.625	.500	43.388	.442	.500	.....	1500	4.34
*9	9.625	8.625	.500	48.728	.396	.442	.....	1500	4.90
10	10.750	9.750	.500	54.735	.355	.391	.....	1200	5.48
*11	11.750	10.750	.500	60.075	.325	.355	.....	1100	6.10
12	12.750	11.750	.500	65.415	.299	.325	.....	1100	6.55

*Item now obsolete.

Furnished with plain ends and in random lengths, unless otherwise ordered. Random lengths of extra strong pipe are considered to be 12 to 22 ft. We have the privilege, however, of supplying not exceeding 5% of total order in lengths from 6 to 12 ft.

For pipe fitted with threads and couplings, an extra charge will be made above plain ends.

For cut lengths, an extra charge will be made above random. For galvanized or coated pipe, an extra charge will be made above black.

The permissible variation in weight is 5% above and 5% below for extra strong pipe.

SPANG, CHALFANT & CO., INC.

Manufacturers of Welded and Seamless Steel Pipe

GENERAL OFFICES

Clark Building, PITTSBURGH, PA.

WELDED MILLS: ETNA, PA. AND SHARPSBURG, PA.

SEAMLESS MILL: AMBRIDGE, PA.

SALES OFFICES

PITTSBURGH, PA., Clark Building
ST. LOUIS, MO., Boatmen's Bank Building
NEW YORK, N. Y., Vanderbilt Avenue Building
LOS ANGELES, CALIF., Transamerica Building
SAN FRANCISCO, CALIF., Russ Building
CHICAGO, ILL., McCormick Building
TULSA, OKLA., Exchange Bank Building

SALES REPRESENTATIVES

BOSTON, MASS.

DALLAS, TEX.

Products and Facilities

SPANG CHALFANT WELDED and SEAMLESS TUBULAR STEEL PRODUCTS, including Standard, Extra Strong and Double Extra Strong Pipe, both black and galvanized, for all purposes and Spang "Copper-Clude" Pipe.

This company is the oldest pipe mill operating in America and has a record of many years of satisfactory service to users of tubular products of all kinds and for all purposes. Its present facilities include plants for the manufacture of butt weld ⅛ to 3-in. inside diameter, lap weld 1¼-in. inside diameter to 24-in. outside diameter, inclusive, and seamless 1¼-in. inside diameter to 16-in. outside diameter, inclusive, pipe.

"Spang" Welded Pipe

"Standard" Seamless Pipe

Spang "Copper-Clude" Pipe

Inspection

Every piece of pipe, tubing or casing is carefully inspected during process of manufacture and is tested and inspected after all the operations are finished. All imperfections that are possible to detect are therefore found and eliminated.

Guarantee

We guarantee to replace such goods as prove defective, or allow credit for same, at our option. No claim for damages beyond the price of the tubular goods will be considered and no charge for labor or expense of repair will be allowed.

Identification of Pipe

All Spang Chalfant Pipe, whether welded or seamless, carry the following identifying marks:

Welded Pipe—All welded pipe, in sizes ½ in. and larger is marked with the name "Spang" rolled into every length during the process of manufacture.

Seamless Pipe—"Standard" seamless pipe is marked with a designating mark "Standard" stamped into the finished product.

"Copper-Clude" Pipe—Spang "Copper-Clude" is a new trade-name for steel pipe which has a percentage of pure copper added. This pipe is soft, easy to work, but highly resistant to corrosion, making it ideal for exposed piping jobs where severe atmospheric conditions are present (alternate wet and dry, etc.)

To identify—Spang Black "Copper-Clude" is solidly enameled maroon; Galvanized "Copper-Clude" carries two bright maroon stripes the entire length of each piece of pipe.

CHEMICAL AND PHYSICAL PROPERTIES

Data	Bessemer steel	Open hearth steel	Rephosphorized steel
Chemical Properties			
Manganese	.30 to .60	.30 to .60	.30 to .60
Phosphorus, not over	.11	.045	.08
Phosphorus, not less than			.045
Sulphur, not over	.065	.06	.06
Physical Properties*			
Tensile strength, lbs. per sq. in.	50,000	45,000	48,000
Yield point, lbs. per sq. in.	30,000	25,000	28,000
Elongation in 8 in.	20%	22%	20%

*The material shall conform to the minimum requirements as to tensile properties as shown here.

BUNDLING SCHEDULE

Pipe, in.	Standard			Extra Heavy			Double Extra Heavy		
	Number pieces	Ft.	Wt., lb.	Number pieces	Ft.	Wt., lb.	Number pieces	Ft.	Wt., lb.
⅛	30	500	122	30	14–16	141			
¼	24	440	137	24	15–17	205			
⅜	18	350	200	18	15–17	226	12	14–16	200
½	12	240	205	12	19–21	254	7	16–18	205
¾	7	140	160	7	19–21	200	5	16–18	220
1	5	105	180	5	19–21	220	3	18–20	200
1¼	3	61	140	3	19–21	180	3	18–20	285
1½	3	62	169	3	19–21	220	3	18–20	352

Information of Value When Specifying or Ordering

The following information, some of which pertains to the tables below, will be found of value when specifying or ordering pipe.

All weights given in tables are limited to three decimal points and are figured on the basis of 1 cu. in. of steel weighing .2833 lb.

All material will be cut to length, when so ordered, with extreme variation not exceeding ⅛ in. over or under, unless otherwise arranged. All pipe is threaded to American Standard (Briggs) working gages as made by Pratt & Whitney Co.

Pipe and tubing are known and spoken of by their nominal inside diameters from ⅛ to 12 in., inclusive and by their nominal outside diameters above 12 in. inside diameter. Where pipe and tubing, heavier than standard, are specified the extra thickness is on the inside reducing the inside diameter of the pipe. All dimensions are subject to change without notice.

Where ⅛ to 12-in. pipe is to be finished with threads and couplings and where orders specify quantity in lineal feet, random lengths fitted with threads both ends and coupling one end will be shipped and measurement charge from end to end, including coupling. Where cut lengths are specified order must state whether plain ends, threads only or threads and couplings are required. Sizes from 14 in. up are customarily held in stock in plain ends and orders should specify whether plain ends, threads only or threads and couplings are desired.

When figuring on lineal feet of pipe for long lines allowance should be made, on pipe fitted with threads and couplings, for the distance pipe is screwed into coupling, when assembling, usually one-half length of coupling.

"SPANG" STANDARD PIPE—BLACK AND GALVANIZED

All Weights and Dimensions Are Nominal

Size	List price per foot	Diameters, in.		Thickness, in.	Weight per foot, lb.		Threads per inch	Test pressure, lb.		Couplings		
		External	Internal		Plain ends	Threads and couplings		Butt	Lap	Diameter, in.	Length, in.	Weight, lb.
⅛	$ .05½	.405	.269	.068	.244	.245	27	700	....	.562	⅞	.030
¼	.06	.540	.364	.088	.424	.425	18	700	....	.685	1	.044
⅜	.06	.675	.493	.091	.567	.568	18	700	....	.848	1⅛	.072
½	.08½	.840	.622	.109	.850	.852	14	700	....	1.024	1⅜	.118
¾	.11½	1.050	.824	.113	1.130	1.134	14	700	....	1.281	1⅝	.214
1	.17	1.315	1.049	.133	1.678	1.684	11½	700	....	1.576	1⅞	.350
1¼	.23	1.660	1.380	.140	2.272	2.281	11½	700	1000	1.950	2⅛	.546
1½	.27½	1.900	1.610	.145	2.717	2.731	11½	700	1000	2.218	2⅜	.758
2	.37	2.375	2.067	.154	3.652	3.678	11½	700	1000	2.760	2⅝	1.233
2½	.58½	2.875	2.469	.203	5.793	5.819	8	800	1000	3.276	2⅞	1.755
3	.76½	3.500	3.068	.216	7.575	7.616	8	800	1000	3.948	3⅛	2.549
3½	.92	4.000	3.548	.226	9.109	9.202	8	...	1000	4.591	3⅝	4.328
4	1.09	4.500	4.026	.237	10.790	10.889	8	...	1000	5.091	3⅝	5.410
*4½	1.27	5.000	4.506	.247	12.538	12.642	8	...	....	5.591	3⅝	5.984
5	1.48	5.563	5.047	.258	14.617	14.810	8	...	1000	6.296	4⅛	9.158
6	1.92	6.625	6.065	.280	18.974	19.185	8	...	1000	7.358	4⅛	10.823
*7	2.38	7.625	7.023	.301	23.544	23.769	8	...	....	8.358	4⅛	12.390
8	2.50	8.625	8.071	.277	24.696	25.000	8	...	800	9.420	4⅝	15.843
8	2.88	8.625	7.981	.322	28.554	28.809	8	...	1000	9.420	4⅝	15.843
*9	3.45	9.625	8.941	.342	33.907	34.188	8	...	....	10.420	5⅛	19.752
10	3.20	10.750	10.192	.279	31.201	32.000	8	...	600	11.721	6⅛	33.923
10	3.50	10.750	10.136	.307	34.240	35.000	8	...	800	11.721	6⅛	33.923
10	4.12	10.750	10.020	.365	40.483	41.132	8	...	900	11.721	6⅛	33.923
*11	4.63	11.750	11.000	.375	45.557	46.247	8	...	....	12.721	6¼	36.970
12	4.50	12.750	12.090	.330	43.773	45.000	8	...	600	13.958	6⅛	48.266
12	5.07	12.750	12.000	.375	49.562	50.706	8	...	800	13.958	6⅛	48.266

"SPANG" EXTRA STRONG AND DOUBLE EXTRA STRONG PIPE—BLACK AND GALVANIZED

All Weights and Dimensions Are Nominal

Size	List price per foot	Diameters, in.		Thickness, in.	Weight per foot plain ends, lb.	Test pressure, lb.	
		External	Internal			Butt	Lap
Extra Strong							
⅛	$0.12	.405	.215	.095	.314	700	.....
¼	.07½	.540	.302	.119	.535	700	.....
⅜	.07½	.675	.423	.126	.738	700	.....
½	.11	.840	.546	.147	1.087	700	.....
¾	.15	1.050	.742	.154	1.473	700	.....
1	.22	1.315	.957	.179	2.171	700	.....
1¼	.30	1.660	1.278	.191	2.996	1500	2500
1½	.36½	1.900	1.500	.200	3.631	1500	2500
2	.50½	2.375	1.939	.218	5.022	1500	2500
2½	.77	2.875	2.323	.276	7.661	1500	2000
3	1.03	3.500	2.900	.300	10.252	1500	2000
3½	1.25	4.000	3.364	.318	12.505	.....	2000
4	1.50	4.500	3.826	.337	14.983	.....	2000
*4½	1.80	5.000	4.290	.355	17.611	.....	1800
5	2.08	5.563	4.813	.375	20.778	.....	1800
6	2.86	6.625	5.761	.432	28.573	.....	1800
*7	3.81	7.625	6.625	.500	38.048	.....	1500
8	4.34	8.625	7.625	.500	43.388	.....	1500
*9	4.90	9.625	8.625	.500	48.728	.....	1500
10	5.48	10.750	9.750	.500	54.735	.....	1200
Extra Strong (Continued)							
*11	6.10	11.750	10.750	.500	60.075	.....	1100
12	6.55	12.750	11.750	.500	65.415	.....	1100
Double Extra Strong							
½	$0.32	.840	.252	.294	1.714	700	.....
¾	.35	1.050	.434	.308	2.440	700	.....
1	.37	1.315	.599	.358	3.659	700	.....
1¼	.52½	1.660	.896	.382	5.214	2200	.....
1½	.65	1.900	1.100	.400	6.408	2200	3000
2	.91	2.375	1.503	.436	9.029	2200	3000
2½	1.37	2.875	1.771	.552	13.695	2200	3000
3	1.86	3.500	2.300	.600	18.583	.....	3000
3½	2.30	4.000	2.728	.636	22.850	.....	2500
4	2.76	4.500	3.152	.674	27.541	.....	2500
*4½	3.26	5.000	3.580	.710	32.530	.....	2000
5	3.86	5.563	4.063	.750	38.552	.....	2000
6	5.32	6.625	4.897	.864	53.160	.....	2000
*7	6.35	7.625	5.875	.875	63.079	.....	2000
8	7.25	8.625	6.875	.875	72.424	.....	2000

*These sizes eliminated from general production September 1, 1927.

Permissible variation in weight is 5% above and 5% below for extra strong pipe; 10% above and 10% below for double extra strong pipe.

Furnished with plain ends and in random lengths, unless otherwise ordered. Random length of extra strong and double extra strong pipe is considered to be 12 to 22 ft.; we have the privilege, however, of supplying not exceeding 5% of total order in lengths from 6 to 12 ft. For pipe fitted with threads and couplings, an extra charge will be made above plain ends. For cut lengths, an extra charge will be made above random lengths. For galvanized, or coated pipe, an extra charge will be made above black. Taper of threads (when threaded) is ¾ in. diameter per foot length for all sizes.

WHEELING STEEL CORPORATION

Member of the Producers' Council

Manufacturers of COP-R-LOY

GENERAL OFFICES

WHEELING, W. VA.

DISTRICT OFFICES

ATLANTA, GA., Healey Building
BOSTON, MASS., Statler Building
BUFFALO, N. Y., Rand Building
CHICAGO, ILL., Peoples Gas Building
CINCINNATI, OHIO, Carew Tower
DALLAS, TEX., Dallas National Bank Building
DETROIT, MICH., Fisher Building
LOS ANGELES, CAL., Washington Building
NEW ORLEANS, LA., Whitney Building
NEW YORK, N. Y., Equitable Building
PHILADELPHIA, PA., Franklin Trust Building
ST. LOUIS, MO., Paul Brown Building
SAN FRANCISCO, CAL., Rialto Building
SEATTLE, WASH., Skinner Building

Products

WHEELING "COP-R-LOY" supplied in Standard Black and Galvanized Pipe, Black and Galvanized Sheets, Special Finished Sheets; WHEELING STEEL PIPE; WHEELING WELDED WIRE FABRIC. Also Wheeling Black and Galvanized Steel Sheets, Long Terne Sheets, Locker Sheets, etc.

"Cop-R-Loy" Pipe

"Cop-R-Loy" Pipe provides the composite of all steel pipe qualities and advantages. In addition, it has a copper content by admixture which metallurgical science has established as a means to maximum pipe durability under the majority of, if not all, service conditions. It is pipe you hear discussed frequently and used extensively by request of architects, building and industrial engineers. As a rust retardant under atmospheric conditions it has won distinction under the most treacherous conditions to which pipe can be subjected.

Baltimore Life Insurance Company's New Building, Baltimore, Md.

MOTTER AND WHITE, Architects
REEDER, EISER AND AKERS, Consulting Engineers
Installation by JOHNSON SERVICE COMPANY, all of Baltimore

In this fine example of modern architecture, Cop-R-Loy is depended upon for the faithful performance of the heating system

"Cop-R-Loy" Pipe averages approximately 56,000 lbs. tensile strength and provides all the structural strength of steel pipe so necessary to present day piping installations. It cuts easily and threads readily without filling dies. Also it is quite readily bent cold. No better pipe for any plumbing, heating or waste lines need be desired.

Cost of "Cop-R-Loy" Pipe — It has been variously estimated that "Cop-R-Loy" Pipe delivers from 50% more service under the most trying conditions to more than double the service in normal usage, based on experience of users.

Its cost represents only a slight advance over that of standard steel pipe, so that in consideration of its qualities and its performance, it is an economical pipe. To use it anywhere for building purposes is to obtain perfect combination of pipe qualities without extravagance in price per foot, in the cost of fitting or the sacrifice of desirable results in plumbing or heating efficiency.

General—"Cop-R-Loy" Pipe has not escaped the inevitable criticism and opposition that spring eternally to meet an innovation of any kind but it is significant that this tubular product, since its introduction to the trade in 1928, has won a wide acceptance and is responsible for a demand that has increased at a rapid rate in every quarter of the country. High pipe quality at a reasonable cost has been recognized with the result that "Cop-R-Loy" Pipe is specified for the largest as well as for the smallest installation.

Identification — Substitutes and imitations are avoided by insisting upon the pipe that has the name "Cop-R-Loy" rolled in the pipe wall. Genuine "Cop-R-Loy" Pipe, in the black finish, has a maroon coating; galvanized "Cop-R-Loy," a maroon stripe, in addition to the name.

"Cop-R-Loy" Nipples—Nipples for "Cop-R-Loy" Pipe installations are made of "Cop-R-Loy" Pipe by leading nipple manufacturers. Names on request. Specify "Cop-R-Loy Nipples" throughout.

Full Standard Weight—"Cop-R-Loy" Pipe is available black or galvanized, in standard weights and sizes ⅛ to 12 ins.

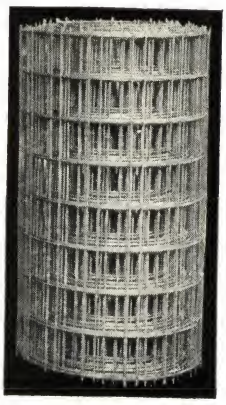
Wheeling Steel Pipe

Wheeling Steel Pipe is supplied in the same weights and sizes.

Wheeling Welded Wire Fabric

Wheeling Welded Wire Fabric is an electrically welded wire fabric furnished in rolls or flat sheets in various gauges and spacing of wires.

The wire is manufactured to American Society of Testing Materials Specifications.



THE CENTRAL FOUNDRY COMPANY

SUBSIDIARY OF THE UNIVERSAL PIPE AND RADIATOR COMPANY

GENERAL OFFICES

Graybar Building, 420 Lexington Avenue, at 43rd Street
NEW YORK, N. Y.

BRANCH OFFICES

BESSEMER, ALA., Central Foundry Building
BOSTON, MASS., 105 Cummings Street
BROOKLYN, N. Y., 9628 Metropolitan Avenue
CHICAGO, ILL., 332 So. Michigan Avenue
DALLAS, TEX., Praetorian Building
HOUSTON, TEX., 4111 Conner Street
LOS ANGELES, CAL., 214 No. Alameda Street
NEW YORK, N. Y., 420 Lexington Avenue
NEWARK, N. J., 131 Lockwood Street
PHILADELPHIA, PA., 2401 Chestnut Street
ST. LOUIS, MO., 4451 Duncan Avenue
SAN FRANCISCO, CAL., 100 Potrero Avenue

NUHUB

TRADE-MARK REG. U. S. PAT. OFF.

SOIL PIPE

Products

NUHUB TRADE-MARK CAST IRON SOIL PIPE and FITTINGS.

Also F. & W. Trade-Mark Cast Iron Combination Vent, Revent and Drainage Fittings; Universal Cast Iron Pressure Pipe and Fittings; Monitor Service, Curb and Roadway Boxes with "Stay-on" Covers; Central Drain Traps; Silver King Stainless Steel Radiators.

For our page on Solus Oil and Gasoline Separators, see Manufacturers' Index.

Structural Advantages of Nuhub Trade-mark Soil Pipe

THE CENTRAL FOUNDRY COMPANY, one of the largest foundry organizations in the world, has produced what is claimed by architects, engineers, builders and plumbing contractors as the most perfect pipe ever offered the building industry for vertical and horizontal lines in buildings and under the ground—soil lines, waste lines, leader lines, vent lines, house drains and house sewers.

NUHUB is a cast iron soil pipe designed especially to overcome all shortcomings of old style soil pipe. It embodies strength where strength is most needed. The accompanying illustrations show how NUHUB is strengthened at the exact location where old style soil pipe is weakest—at the base of the hub.

Note the bead at the base of the hub. This bead assures double strength where the hub and the barrel of the pipe meet. This hub meets all requirements for proper pipe hanging in steel and reinforced buildings.

The Led-LoK groove inside of the hub is another successful improvement in soil pipe design. The lead, poured in the usual manner, becomes locked in this groove upon cooling and cannot work loose. NUHUB lead joints can be thoroughly calked without splitting the hubs. No gaskets to eat away and cause settlement of stack and breakage of branches.

Dimensions, Diameters and Thicknesses

The dimensions, the diameter and the wall thickness of NUHUB Soil Pipe and NUHUB Fittings are strictly in accordance with "Naco" specifications, the recognized and accepted standards for soil pipe and fittings the country over.

Strength Where Strength Is Needed Most

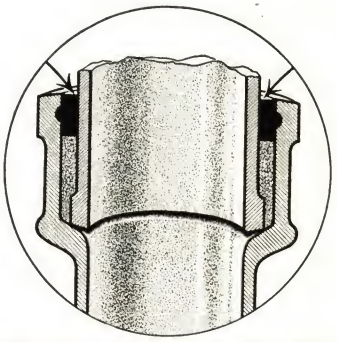
Protected by Patents

Every length of NUHUB Soil Pipe is tested under 50-lb. hydrostatic pressure.

Made in extra heavy, medium and standard weights.

Price is no higher than that asked for old style pipe.

Handled by wholesalers of plumbing supplies.



Reinforced Hub Takes No More Wall Coverage Than Ordinary Soil Pipe

No. 1 Nuhub Soil Pipe

The Led-LoK is the one lead groove worthy of NUHUB Soil Pipe and Fittings. The lead cannot work loose. No gaskets to eat away and cause settlement of stack and branches

No. 2. Old Style Soil Pipe

Compare No. 2 with No. 1. Note thin easily broken wall at base of hub in old style pipe. See how this glaring weakness has been eliminated in NUHUB Pipe and Fittings

Identification

The bead at the base of the hub on NUHUB Pipe and Fittings is a protection against error and substitution and a distinctive and permanent mark of identification that can always be seen after the pipe is installed.

Specifications

Soil pipe and fittings for soil lines, vent lines, waste lines, leader lines, house drains and house sewers shall be NUHUB Trade-Mark Soil Pipe and Fittings (weight of pipe in accordance with plumbing code requirements) as manufactured by THE CENTRAL FOUNDRY COMPANY.

ESTABLISHED 1864

A. M. BYERS COMPANY

Manufacturers of Genuine Wrought Iron Pipe, Couplings, Nipples, Plates and Rolled Stock for Forging

PITTSBURGH, PA.

SALES OFFICES

BOSTON, MASS. PHILADELPHIA, PA. CHICAGO, ILL. PITTSBURGH, PA. HOUSTON, TEX. NEW YORK, N. Y. SAN FRANCISCO, CALIF.

SALES REPRESENTATIVES

BALTIMORE, MD. CINCINNATI, OHIO CLEVELAND, OHIO DALLAS, TEX. DETROIT, MICH. INDIANAPOLIS, IND. KANSAS CITY, MO. LOS ANGELES, CALIF. MILWAUKEE, WIS. ST. LOUIS, MO. SAN ANTONIO, TEX. SEATTLE, WASH. SYRACUSE, N. Y.

Specifications

Byers Genuine Wrought Iron conforms to this definition of the American Society for Testing Materials for wrought iron. (See A.S.T.M. Designation A81-30):

Wrought Iron—A ferrous material, aggregated from a solidifying mass of pasty particles of highly refined metallic iron, with which, without subsequent fusion, is incorporated a minutely and uniformly distributed quantity of slag. (All Byers Genuine Wrought Iron Products are guaranteed to be produced from such a material.)

Byers Genuine Wrought Iron Pipe and Plates meet these A.S.T.M. Standard Specifications:

Standard Specifications for Welded Wrought Iron Pipe. A.S.T.M. Designation: A72:30.

Standard Specifications for Welded Wrought Iron Plates. A.S.T.M. Designation: A42:30 Class A Plates.

Policy Recommendations

Byers Genuine Wrought Iron Pipe has rendered satisfactory service in many varying applications since 1864. Accepting the preservation of wrought iron's traditional superiority in its proven fields of service as a business responsibility, A. M. Byers Company recommends that Byers Pipe be used only in the services for which it is best suited. Actual service records which point out those applications and operating conditions under which its superior performance has dictated its use are available for your inspection. Write A. M. Byers Company, Clark Building, Pittsburgh, Pa.

Manufacturing Facilities

Metallurgical and chemical research laboratories and the largest and most modern iron mill in the country, for making genuine wrought iron, are located at Economy Township, Beaver County, Pa. Pipe mills are maintained at South Side, Pittsburgh, Pa.

Distribution Facilities

An extensive jobber organization makes available a complete stock of pipe, both black and galvanized, standard and extra strong in all distribution centers. In addition, mills' stocking facilities permit quick shipment of unusually large orders.

BYERS GENUINE WROUGHT IRON PIPE

Applications

Blanket recommendations affecting the selection of piping materials and accessories in water, plumbing or heating services are basically unsound. Corrosion conditions, the single greatest factor in piping, vary in intensity. The degree of corrosion differs not only between cities but between services in the same building. There is one right kind of piping material for each water, plumbing or heating line. The specification of piping materials for such services can only be justified through known service records. The fundamental shortcoming of laboratory or accelerated tests lies in the practical impossibility of duplicating all conditions of service to which the material may be subjected.

The selection of the right piping material for a given process line does not vary with the geographical location since the corrosion reagents are constants. Service experience under one set of process conditions determines the one best material for all similar conditions. Nothing can or should change an architect's or engineer's experience. In cases where service data is lacking, the facilities of A. M. Byers Company Engineering Department are available without charge to any architect or engineer.

Outstanding Advantages

Corrosion Resistance—Byers Genuine Wrought Iron possesses unusual corrosion resisting properties due to the purity of the base metal and the presence of resistant planes of non-corrodible iron silicate. In addition, the laminar structure of the material causes it to take and securely hold in a thin continuous film any carbonate scales precipitated from the water, forming a protective coating against corrosive reagents.

Vibration Fracture Resistance—Vibration caused by pulsation of machinery, street traffic or other factors lead toward ultimate fracture of piping materials. Byers Pipe, because of its structure, is much less susceptible to failure from such causes than ordinary pipe. Wrought iron consists of a multitude of independent fibres of iron silicate embedded in a matrix of pure iron. This content gives Byers Pipe a structure comparable to that of a stranded wire cable. As with the wire cable, the breaking process must be repeated many times before all the strands or fibres in a length of Byers Pipe are parted—resulting in a complete fracture.

Threading Quality—The obtaining of good threads with Byers Pipe is an easy matter if dies that are in good operating condition are used. Genuine wrought iron is so uniform in texture and so free from segregation of carbon as to present no difficulties in the presence of "hard spots." Splitting, due to weak welds, is a rare occurrence. Most important is the fact that the metal is fibrous; the thread being cut at right angles to the direction of the fibre, causes the chip to crumble freely and fall out of the chip space without creating undue friction on the die.

Welding Quality—Welded piping systems are fast finding favor in the construction of certain lines in large buildings. Byers Genuine Wrought Iron possesses an exceptional welding quality due to its iron silicate content which provides a natural welding flux. Wrought iron pipe when properly welded will have a strength in the weld zone fully equal to that of the body metal of the pipe. Welding elbows made of Byers Genuine Wrought Iron are available. They should always be used where the piping material is wrought iron.

Galvanizing and Coating Quality—Byers Genuine Wrought Iron possesses a slightly roughened surface to which paint and other protective coatings, especially galvanizing, adhere very firmly. Byers Pipe is galvanized by the hot metal process, using the highest grade prime western spelter. The resulting coating is about 25% heavier than is found on other ferrous piping materials and does not flake off during cutting or threading.

Byers Special Bending Pipe

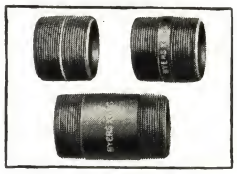
Recognizing the need for a piping material that possesses a greater adaptability to installations where intricate bends are encountered and difficult hand or machine bending is necessary, A. M. Byers Company devoted several years of research effort to its development. In the making of Byers Genuine Wrought Iron Bending Pipe, all of the fine corrosion and vibration fracture resisting properties of Byers Genuine Wrought Iron Pipe have been retained—an exceptional bending quality has been added. Where close bends are necessary, orders should specify "Byers Special Bending Pipe." Radius of bends should also be given.

Byers Genuine Wrought Iron Plate

Modern rolling and plate mill equipment has enabled A. M. BYERS COMPANY to produce genuine wrought iron plate which in addition to possessing the fine qualities of the wrought iron plate used 50 years ago meets all modern needs. Let our engineering organization suggest the places where wrought iron plates can save you money.

Byers Genuine Wrought Iron Nipples

Nipple joints tend to act as pockets where active steam condensates and other corrosives effect their most serious damage. When improper materials are used in such vital places, failures occur quickly and maintenance costs mount rapidly. Byers Genuine Wrought Iron Nipples will give the same protection against corrosion at these points that is afforded by Byers Genuine Wrought Iron Pipe. Made of the same fibrous wrought iron as Byers Pipe, Byers Nipples should always be used where wrought iron pipe is the selection. By doing so the same strength will be maintained in the nipple joints that is prevalent in the pipe. As an additional precaution Byers Extra Strong Nipples should be used, even with standard pipe, wherever possible.



Byers Genuine Wrought Iron Couplings

Byers Standard Weight Pipe is furnished with threads and couplings unless otherwise ordered. Extra strong and double extra strong pipe is regularly furnished with plain ends and an extra charge is made for threads and couplings when specified. Byers Genuine Wrought Iron Couplings may be purchased separately if desired. Weight and size should be specified.

Identification

Pipe—All Byers Pipe, both black and galvanized, has the name "Byers" rolled in the metal. For identification during installation, a red spiral stripe is painted on every length of pipe.

Couplings—All Byers Couplings are marked with the letter "B" within a keystone.

Nipples—Byers Close Nipples are marked with a red band around the center. Short and long nipples are stamped with the name "Byers" as well as the weight.

DIMENSIONS OF BYERS WROUGHT IRON PIPE

In addition to the sizes shown here, Byers Genuine Wrought Iron Pipe may be secured in diameters up to 20 in. o.d.

Size	Diameter, in.		Thickness, in.	Weight, per ft. lb.		Thr'ds per inch	Test pressure, lb.		Couplings		
	External	Internal		Plain ends	Threads and c'plgs.		Butt	Lap	Diam., in.	Lgth. in.	Wt., lb.
Byers Standard Pipe Black and Galvanized											
1/8	.405	.266	.069	.244	.245	27	750	.....	.640	.937	.053
1/4	.540	.360	.090	.424	.425	18	750	.....	.750	1.000	.059
3/8	.675	.489	.093	.567	.568	18	750	.....	.968	1.343	.156
1/2	.840	.617	.111	.850	.852	14	750	.....	1.078	1.343	.168
3/4	1.050	.819	.115	1.130	1.134	14	750	.....	1.312	1.531	.243
1	1.315	1.043	.136	1.678	1.684	11½	750	.....	1.656	1.718	.425
*1¼	1.660	1.374	.143	2.272	2.281	11½	750	1000	1.984	2.062	.631
*1½	1.900	1.604	.148	2.717	2.731	11½	750	1000	2.281	2.312	.884
*2	2.375	2.060	.158	3.652	3.678	11½	750	1000	2.750	2.500	1.100
2½	2.875	2.450	.212	5.793	5.819	8	.....	1000	3.312	3.125	2.500
3	3.500	3.059	.221	7.575	7.616	8	.....	1000	4.031	3.125	3.025
3½	4.000	3.538	.231	9.109	9.202	8	.....	1000	4.617	3.714	4.986
4	4.500	4.016	.242	10.790	10.889	8	.....	1000	5.106	3.742	5.435
5	5.563	5.036	.263	14.617	14.810	8	.....	1000	6.281	4.125	8.250
6	6.625	6.053	.286	18.974	19.185	8	.....	1000	7.375	4.156	12.000
8	8.625	8.059	.283	24.696	25.000	8	.....	1000	9.596	6.125	26.626
8	8.625	7.967	.329	28.554	28.809	8	.....	1000	9.596	6.125	26.626
10	10.750	10.181	.284	31.201	32.000	8	.....	750	11.958	6.625	44.156
10	10.750	10.124	.313	34.240	35.000	8	.....	750	11.958	6.625	44.156
10	10.750	10.005	.372	40.483	41.132	8	.....	1000	11.958	6.625	44.156
12	12.750	12.077	.336	43.773	45.000	8	.....	750	13.958	6.625	51.991
12	12.750	11.985	.382	49.562	50.706	8	.....	750	13.958	6.625	51.991

All weights and dimensions are nominal.
*Can be furnished in both butt weld and lap weld.

Specifications—"All piping, nipples, and couplings required in (state installations whether steam, air, boiler heating, water supply, etc.) shall be of Byers Genuine Wrought Iron (state whether standard weight, extra strong or double extra strong). All pipe shall be black or galvanized" (state which).

Size	Diameter, in.		Thickness, in.	Weight per ft. plain ends, lb.	Test pressure, lb.		Couplings		
	External	Internal			Butt	Lap	Diam., in.	Length, in.	Weight, lb.
Byers Extra Strong Pipe									
1/8	.405	.207	.099	.314	750	....	.582	1.125	.045
1/4	.540	.295	.122	.535	750	....	.724	1.375	.073
3/8	.675	.417	.129	.738	750	....	.898	1.625	.133
1/2	.840	.539	.151	1.087	750	....	1.085	1.875	.218
3/4	1.050	.735	.157	1.473	750	....	1.316	2.125	.334
1	1.315	.949	.183	2.171	750	....	1.575	2.375	.470
1¼	1.660	1.269	.195	2.996	1500	2500	2.054	2.875	1.036
1½	1.900	1.491	.204	3.631	1500	2500	2.294	2.875	1.170
2	2.375	1.929	.223	5.022	1500	2500	2.870	3.625	2.174
2½	2.875	2.311	.282	7.661	....	2000	3.389	4.125	3.433
3	3.500	2.887	.306	10.252	....	2000	4.014	4.125	4.131
3½	4.000	3.350	.325	12.505	....	2000	4.628	4.625	6.289
4	4.500	3.811	.344	14.983	....	2000	5.216	4.625	8.155
5	5.563	4.797	.383	20.778	....	1800	6.420	5.125	12.870
6	6.625	5.743	.441	28.573	....	1800	7.482	5.125	15.176
8	8.625	7.604	.510	43.388	....	1500	9.593	6.125	26.626
10	10.750	9.729	.510	54.735	....	1000	11.958	6.625	44.156
12	12.750	11.729	.510	65.415	....	1000	13.958	6.625	51.991
Byers Double Extra Strong Pipe									
1/2	.840	.226	.307	1.714	1500	....	....	....	....
3/4	1.050	.413	.318	2.440	1500	....	....	....	....
1	1.315	.576	.369	3.659	1500	....	....	....	....
1¼	1.660	.874	.393	5.214	1500	....	....	....	....
1½	1.900	1.078	.411	6.408	1500	2500	....	....	....
2	2.375	1.480	.447	9.029	....	2500	....	....	....
2½	2.875	1.742	.565	13.695	....	2500	....	....	....
3	3.500	2.270	.615	18.583	....	2500	....	....	....
3½	4.000	2.697	.651	22.850	....	2500	....	....	....
4	4.500	3.119	.690	27.541	....	2500	....	....	....
5	5.563	4.028	.768	38.552	....	2000	....	....	....
6	6.625	4.857	.884	53.160	....	2000	....	....	....
8	8.625	6.835	.895	72.424	....	2000	....	....	....

LENGTHS OF BYERS STANDARD WEIGHT PIPE NIPPLES

Diameters, in.	Close, in.	Special Short, in.	Short, in.	Long, in.	Extra Long, in.
Galvanized					
1/8	3/4	1	1½	2, 2½, 3, 3½	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
1/4	7/8	...	1½	2, 2½, 3, 3½	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
3/8	1	...	1½	2, 2½, 3, 3½	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
1/2	1⅛	...	1½	2, 2½, 3, 3½	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
3/4	1⅜	1½	2	2½, 3, 3½, 4	4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
1	1½	...	2	2½, 3, 3½, 4	4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
1¼	1⅝	2	2½	3, 3½, 4, 4½	5, 5½, 6, 7, 8, 9, 10, 11, 12
1½	1¾	2	2½	3, 3½, 4, 4½	5, 5½, 6, 7, 8, 9, 10, 11, 12
2	2	...	2½	3, 3½, 4, 4½	5, 5½, 6, 7, 8, 9, 10, 11, 12
2½	2½	...	3	3½, 4, 5	6, 7, 8, 9, 10, 11, 12
3	2⅝	...	3	3½, 4, 4½, 5	6, 7, 8, 9, 10, 11, 12
3½	2¾	...	4	5, 6	7, 8, 9, 10, 11, 12
4	2⅞	...	4	4½, 5, 5½, 6	7, 8, 9, 10, 11, 12
5	3¼	...	4½	5, 5½, 6, 6½	7, 8, 9, 10, 11, 12
6	3¼	...	4½	5, 5½, 6, 6½	7, 8, 9, 10, 11, 12
8	3½	...	5	6	7, 8, 9, 10, 11, 12
Black					
1/8	3/4	1	1½	2, 2½, 3, 3½	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
1/4	7/8	1¼	1½	2, 2½, 3, 3½	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
3/8	1	...	1½	2, 2½, 3, 3½	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
1/2	1⅛	...	1½	2, 2½, 3, 3½	4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
3/4	1⅜	1½	2	2½, 3, 3½, 4	4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
1	1½	...	2	2½, 3, 3½, 4	4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12
1¼	1⅝	2	2½	3, 3½, 4, 4½	5, 5½, 6, 7, 8, 9, 10, 11, 12
1½	1¾	2	2½	3, 3½, 4, 4½	5, 5½, 6, 7, 8, 9, 10, 11, 12
2	2	...	2½	3, 3½, 4, 4½	5, 5½, 6, 7, 8, 9, 10, 11, 12
2½	2½	...	3	3½, 4, 4½, 5	5½, 6, 7, 8, 9, 10, 11, 12
3	2⅝	...	3	3½, 4, 4½, 5	5½, 6, 7, 8, 9, 10, 11, 12
3½	2¾	...	4	4½, 5, 5½, 6	7, 8, 9, 10, 11, 12
4	2⅞	...	4	4½, 5, 5½, 6	7, 8, 9, 10, 11, 12
5	3	4	4½	5, 5½, 6	7, 8, 9, 10, 11, 12
6	3⅛	4	4½	5, 5½, 6	7, 8, 9, 10, 11, 12
8	3½	...	5	6, 7, 8	10, 12
10	3⅞	...	5	6, 7, 8	10, 12
12	4½	....	6	8	10, 12

Note: "Close" and "Short" nipples—assorted "Close" and "Short" nipples will always be shipped unless otherwise specified.
Extra heavy nipples are furnished to order, at double list for black, with additional charge for galvanized equal to difference between black and galvanized lists.
2½ and 3-in. nipples can be furnished with 11½ threads per inch, at special prices.
Sizes 4½, 7, 9 and 11 in. discontinued as stock sizes. Supplied only on special order. Prices on application—state quantity required.
Black or galvanized nipples, threaded one way, always furnished threaded right hand only unless otherwise specified.
R. and L. nipples can be furnished if desired. Size and weight should be specified.

READING IRON COMPANY

World's Largest Manufacturers of Genuine Puddled Iron Pipe

GENERAL OFFICES
401 North Broad Street, PHILADELPHIA, PA.
MILLS: READING, PA.

BRANCH OFFICES

ATLANTA, GA.
BALTIMORE, MD.
BOSTON, MASS.
BUFFALO, N. Y.
CHICAGO, ILL.
CINCINNATI, OHIO
DETROIT, MICH.
HOUSTON, TEX.
KANSAS CITY, MO.
LOS ANGELES, CALIF.
NEW YORK, N. Y.
PITTSBURGH, PA.
ST. LOUIS, MO.
SAN FRANCISCO, CALIF.
SEATTLE, WASH.
TULSA, OKLA.

Products

READING GENUINE *Puddled* IRON PIPE, sizes ⅛ to 24 in., outside diameter.

READING *Puddled* IRON TUBING, CASING, LINE DRIVE and DRILL PIPE.

READING *Puddled* IRON NIPPLES and COUPLINGS.

Also, Reading Charcoal Iron Boiler Tubes; Reading *Puddled* Iron Sucker Rods; Reading Old Hickory Bar Iron and Blooms; Reading Cut Nails.

READING PUDDLED IRON PIPE

Science and invention have never found an all-around satisfactory substitute for Genuine *Puddled* Iron Pipe, made by Reading today as Reading has made it for 83 years.

Thousands upon thousands of *actual service* records show that Reading *Puddled* Iron Pipe resists indefinitely the combined forces of corrosion, vibration, strain and electrolysis. Through four generations, architects have specified Reading *Puddled* Iron Pipe where clean, unfailing flow of water and other liquids, unclogged passage for gases, and freedom from pipe repairs are important.

Reading *Puddled* Iron Pipe usually outlasts the building in which it is installed, cutting down pipe costs year after year. Yet its price is extremely moderate. For example, on a $20,000 residence, the first price of Reading Pipe is only $93.00 more than that of quickly rusting pipe. And Reading Pipe is *proved protection* from pipe troubles—it is the kind of iron that resists red rust for generations—that can not "dezincify" because it contains no foreign metals.

Why Reading Puddled Iron Pipe Lasts Longer

Reading Genuine *Puddled* Iron Pipe, produced by the original puddling process, possesses five specific advantages:

First, this pipe is remarkably resistant to corrosion, due to the siliceous filaments uniformly and minutely distributed throughout every part of its structure. These filaments, overlapping, present a barrier which rust can not penetrate.

Second, Reading Pipe is fibrous in structure—not crystalline—and is therefore resistant to the effects of strain and metal "fatigue."

Third, Reading Pipe makes permanently leakproof joints because of its superior threading ability.

Fourth, in addition, Reading *Puddled* Iron Pipe is remarkably easy to weld.

Fifth, it has a surface texture that holds paint or other coatings permanently.

With a fibrous structure and a melting point approximately 300 degrees higher than that of ordinary pipe, Reading Genuine *Puddled* Iron Pipe possesses a distinct advantage in resisting the destructive effects of high temperatures. Reading *Puddled* Iron Pipe does not oxidize as rapidly as ordinary pipe under excessive heat, and therefore will not scale or be reduced in thickness so quickly.

Made by a Time-tested Process

For more than eighty years, the puddling furnace—where the hot, pure pig iron and silicate are worked together by *constant agitation*—has been the accepted method of manufacturing Genuine *Puddled* Iron.

All Reading Pipe Is Marked with the Reading Name, Date of Manufacture, and the Indented Spiral Mark

It should be noted that the *Puddled* Iron Pipe that is still serving in buildings which have endured for more than half a century was made by the puddling process, which the READING IRON COMPANY has used since 1848.

How to Specify Reading Genuine Puddled Iron Pipe

To assist architects in securing Genuine *Puddled* Iron Pipe, READING IRON COMPANY urges the adoption of the following model specifications where pipe of long life and ultimate economy is desired.

Material

All black and galvanized pipe, nipples and couplings shall be Reading guaranteed quality *puddled iron* standard, full weight, made from best grade pig iron by the process of puddling, and no scrap or cuttings except crop ends from the sheet or crop ends of the pipe shall be used in the manufacture.

Trade or Identification Marks

All pipe, nipples and couplings must bear the spiral diamond design identification mark rolled on the outside surface.

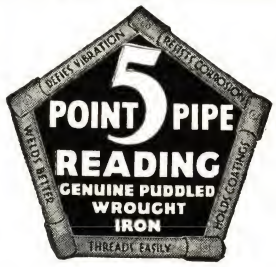
The design shall be so placed that the mark can be quickly identified, regardless of at what angle the pipe, nipple or coupling may be placed.

Nipples

All nipples shall be cut from the same quality and weight as described and specified in the above specification.

Couplings

All couplings shall be the same quality of material and made by the same process as that of Genuine *Puddled* Iron Pipe described above. Couplings for oil country goods must be made from double refined Genuine *Puddled* Iron. Threads must be clean cut, tapped straight through, and of such pitch diameter as will make a tight joint; the ends must be countersunk. All couplings longer than 4 in., and all oil country couplings, must be full taper-tapped on each end, facial and recessed.



READING STANDARD GENUINE PUDDLED IRON PIPE, BLACK AND GALVANIZED

	Size, in.	List price per ft.	Diameters, in. External	Diameters, in. Internal	Thickness, in.	Weight per ft., lb. Plain ends	Weight per ft., lb. Thds. and couplings	Thds. per in.	Lgth. of thread, in.	Taper per ft., in.	Hydrostatic test, lbs.
Buttweld	⅛	$0.05½	.405	.266	.070	.244	.245	27	½	¾	750
	¼	.06	.540	.360	.090	.424	.425	18	½	¾	750
	⅜	.06	.675	.489	.093	.567	.568	18	⅝	¾	750
	½	.08½	.840	.617	.111	.850	.852	14	⅝	¾	750
	¾	.11½	1.050	.819	.115	1.130	1.134	14	¾	¾	750
	1	.17	1.315	1.043	.136	1.678	1.684	11½	1	¾	750
	1¼	.23	1.660	1.374	.143	2.272	2.281	11½	1	¾	750
	1½	.27½	1.900	1.604	.148	2.717	2.731	11½	1	¾	750
	2	.37	2.375	2 060	.158	3.652	3.678	11½	1	¾	1000
Lapweld	1¼	.23	1.660	1.374	.143	2.272	2.281	11½	1	¾	1000
	1½	.27½	1.900	1.604	.148	2.717	2.731	11½	1	¾	1000
	2	.37	2.375	2.060	.158	3.652	3.678	11½	1	¾	1000
	2½	.58½	2.875	2.460	.208	5.793	5.819	8	1½	¾	1000
	3	.76½	3.500	3.059	.221	7.575	7.616	8	1⅝	¾	1000
	3½	.92	4.000	3.538	.231	9.109	9.202	8	1¾	¾	1000
	4	1.09	4.500	4.016	.242	10.790	10.889	8	1¾	¾	1000
	4½	1.27	5.000	4.496	.252	12.538	12.642	8	1¾	¾	1000
	5	1.48	5.563	5.036	.263	14.617	14.810	8	1¾	¾	1000
	6	1.92	6.625	6.053	.286	18.974	19.185	8	1¾	¾	1000
	7	2.38	7.625	7.010	.307	23.544	23.769	8	1¾	¾	1000
	8	2.50	8.625	8.059	.283	24.696	25.000	8	1¾	¾	800
	8	2.88	8.625	7.967	.329	28.554	28.809	8	1¾	¾	1000
	9	3.45	9.625	8.927	.349	33.907	34.188	8	2¼	¾	900
	10	3.20	10.750	10.181	.284	31.201	32.000	8	2¼	¾	600
	10	3.50	10.750	10.124	.313	34.240	35.000	8	2¼	¾	800
	10	4.12	10.750	10.005	.372	40.483	41.132	8	2¼	¾	900
	11	4.63	11.750	10.985	.382	45.557	46.247	8	2¼	¾	800
	12	4.50	12.750	12.077	.336	43.773	45.000	8	2½	¾	600
	12	5.07	12.750	11.985	.382	49.562	50.706	8	2½	¾	800
	14O.D.		14.000	13.250	.375	53.510	55.712	8	3	¾	700
	15O.D.	*Prices*	15.000	14.250	.375	57.437	59.859	8	3	¾	700
	16O.D.	*on*	16 000	15.250	.375	61.364	63.927	8	3	¾	600
	17O.D.	*Appli-*	17.000	16.250	.375	65.292	69.436	8	3	¾	550
	18O.D.		18.000	17 250	.375	69.219	73.681	8	3	¾	550
	20O.D.	*cation*	20.000	19.250	.375	77.073	82.078	8	3	¾	550
	22O.D.		22.000	21.250	.375	84.959	.....	8	3	¾	500
	24O.D.		24.000	23.250	.375	92.816	.....	8	3	¾	500

Furnished with threads and couplings and in random lengths unless otherwise ordered.

Weights and dimensions are nominal.

Weight per foot of pipe with threads and couplings is based on a length of 20 ft., including the coupling, but shipping lengths of small sizes will usually average less than 20 ft.

Permissible variation in weight is 2½% below and 5% above weights given in tables.

All weights are figured on the basis of 1 cu. in. of wrought iron weighing .2778 lb.

All pipe threaded to Briggs' standard gauges as made by Pratt & Whitney Co., Hartford, Conn.

For cut lengths, an extra charge will be made above random lengths.

For pipe smoothed on the inside (known as plugged and reamed) an extra charge will be made above standard pipe.

For galvanized or coated pipe an extra charge will be made above black.

When ordering sizes 8 to 12 in., please state weight of pipe wanted.

READING X STRONG AND XX STRONG GENUINE PUDDLED IRON PIPE, BLACK AND GALVANIZED

	Size, in.	List price per ft.	Diameters, in. External	Diameters, in. Internal	Thickness, in.	Weight, per ft., plain ends, lbs.	Hydrostatic test, lbs.
			Extra Strong				
Buttweld	⅛	$0.12	.405	.210	.098	.314	750
	¼	.07½	.540	.295	.122	.535	750
	⅜	.07½	.675	.417	.129	.738	750
	½	.11	.840	.539	.151	1.087	750
	¾	.15	1.050	.735	.157	1.473	750
	1	.22	1.315	.949	.183	2.171	750
	1¼	.30	1.660	1.269	.195	2.996	1500
	1½	.36½	1.900	1.491	.204	3.631	1500
	2	.50½	2.375	1.929	.223	5.022	2500
Lapweld	1¼	.30	1.660	1.269	.195	2.996	2500
	1½	.36½	1.900	1.491	.204	3.631	2500
	2	.50½	2.375	1.929	.223	5.022	2500
	2½	.77	2.875	2.311	.282	7.661	2000
	3	1.03	3.500	2.887	.306	10.252	2000
	3½	1.25	4.000	3.350	.325	12.505	2000
	4	1.50	4.500	3.811	.344	14.983	2000
	4½	1.80	5.000	4.275	.363	17.611	1800
	5	2.08	5.563	4.797	.383	20.778	1800
	6	2.86	6.625	5.743	.441	28.573	1800
	7	3.81	7.625	6.603	.511	38.048	1500
	8	4.34	8.625	7.604	.510	43.388	1500
	9	4.90	9.625	8.604	.510	48.728	1500
	10	5.48	10.750	9.729	.510	54.735	1200
	11	6.10	11.750	10.729	.510	60.075	1100
	12	6.55	12.750	11.729	.510	65.415	1100
			Double Extra Strong				
Buttweld	½	.32	.840	.226	.307	1.714	750
	¾	.35	1.050	.413	.318	2.440	750
	1	.37	1.315	.576	.369	3.659	750
	1¼	.52½	1.660	.874	.393	5.214	2200
	1½	.65	1.900	1.078	.411	6.408	2200
Lapweld	2	.91	2.375	1.480	.447	9.029	3000
	2½	1.37	2.875	1.742	.567	13.695	3000
	3	1.86	3.500	2.270	.615	18.583	3000
	3½	2.30	4.000	2.697	.651	22.850	2500
	4	2.76	4.500	3.119	.690	27.541	2500
	4½	3.26	5.000	3.546	.727	32.530	2000
	5	3.86	5.563	4.028	.768	38.552	2000
	6	5.32	6.625	4.857	.884	53.160	2000
	8	7.25	8.625	6.835	.895	72.424	2000

Extra strong and double extra strong pipe will be shipped in random lengths and with plain ends unless otherwise ordered.

All weights and dimensions are nominal.

Random lengths extra strong and double extra strong pipe are considered to be 12 to 20 ft.—5% may be 6 to 12 ft.

If fitted with threads and couplings, an extra charge will be made above regular. When extra strong or double extra strong pipe is ordered with threads and couplings, regular line couplings will be furnished, unless otherwise specified.

For cut lengths, an extra charge will be made above random lengths. For galvanized or tar coated pipe, an extra charge will be made above black.

There is 5% permissible variation in weight from above extra strong sizes—10% on double extra strong.

ESTABLISHED 1854

COHOES ROLLING MILL COMPANY

INCORPORATED 1901

COHOES, N. Y.

GENUINE WROUGHT IRON PIPE, COUPLINGS AND NIPPLES

Guarantee

Cohoes pipe is made from all genuine wrought iron guaranteed to conform with the requirements outlined by the various Societies for Testing Materials and is unexcelled by that of any competitor.

Identification

We were the first mill to brand our pipe in the rolling, while the metal is hot. Every piece of pipe bears the trade-mark "Cohoes" and the year it was rolled which insures to the buyer *genuine full weight wrought iron pipe.*

Fabricating Qualities

The fabricating qualities of Cohoes pipe are one of the most important features of its economic installation. Though its fiber is tough and strong enough to resist all shocks and vibrations, the softness of the metal and its freedom from hard spots makes it easy to cut and thread, saving labor and tools. In these days of high labor costs, this is a most important item.

Natural and Galvanized Finish

Cohoes pipe is produced with a natural iron finish, which is called "black pipe." But when used under severe conditions it is a wise precaution to have it galvanized. Because wrought iron is a more porous metal than steel, it takes or absorbs a greater quantity of the molten zinc. As zinc is not subject to corrosion, this thicker coating naturally means a much longer life for Cohoes wrought iron pipe.

Cohoes Genuine Wrought Iron Pipe

*STANDARD FULL WEIGHT GENUINE WROUGHT IRON PIPE

Size, in.	List price, per ft.	Diameters, in.		Thickness, in.	Weight per ft., lb.	Threads per in.
		External	Internal			
⅛	$ .05½	.405	.269	.068	.245	27
¼	.06	.540	.364	.088	.425	18
⅜	.06	.675	.493	.091	.568	18
½	.08½	.840	.622	.109	.852	14
¾	.11½	1.050	.824	.113	1.134	14
1	.17	1.315	1.049	.133	1.684	11½
1¼	.23	1.660	1.380	.140	2.281	11½
1½	.27½	1.900	1.610	.145	2.731	11½
2	.37	2.375	2.067	.154	3.678	11½
2½	.58½	2.875	2.469	.203	5.819	8
3	.76½	3.500	3.068	.216	7.616	8
3½	.92	4.000	3.548	.226	9.202	8
4	1.09	4.500	4.026	.237	10.889	8
5	1.48	5.563	5.047	.258	14.810	8
6	1.92	6.625	6.065	.280	19.185	8
8	2.88	8.625	7.981	.322	28.809	8
10	4.12	10.750	10.020	.365	41.132	8
12	5.07	12.750	12.000	.375	50.706	8
13	5.60	14.000	13.250	.375	55.824	8
14	6.10	15.000	14.250	.375	60.375	8
15	6.50	16.000	15.250	.375	64.500	8

*Any size not listed will be considered "Special."

Inspection and Testing

Every piece of pipe is tested by hydraulic pressure to prove that it is of the Cohoes standard of strength. Several hundred pounds higher pressure than is necessary in actual use is applied to give a reasonable factor of safety.

Exceptional Durability

The more severe the service demanded of pipe, the greater reason to insist upon Cohoes genuine wrought iron pipe. It is built to stand up under conditions where ordinary pipe would quickly deteriorate.

Genuine Wrought Iron Pipe has proved its superiority in use for railroad cars, locomotives, signal pipe and general railroad maintenance.

For the conveyance of gas, water, air, ammonia, salt water and other exceptionally hard usage, Cohoes gives maximum service.

The Service Department

We have a staff of specialists on pipe. They are thoroughly informed by experience and study on the many uses for which pipe is required.

They have at their disposal data that has been gathered from time to time during our seventy-seven years of pipe manufacture. They never work on theory. They know the facts about the actual use of different kinds of pipe by demonstrations that have been years in the making.

The services of these experts are free to any one directly or indirectly interested in the use of pipe.

*EXTRA STRONG GENUINE WROUGHT IRON PIPE

Size, in.	List price, per ft.	Diameters, in.		Thickness, in.	Weight, per ft., lb.
		External	Internal		
¼	$ .07½	.540	.302	.119	.535
⅜	.07½	.675	.423	.126	.738
½	.11	.840	.546	.147	1.087
¾	.15	1.050	.742	.154	1.473
1	.22	1.315	.957	.179	2.171
1¼	.30	1.660	1.278	.191	2.996
1½	.36½	1.900	1.500	.200	3.631
2	.50½	2.375	1.939	.218	5.022
2½	.77	2.875	2.311	.276	7.661
3	1.03	3.500	2.900	.300	10.252
3½	1.25	4.000	3.364	.318	12.505
4	1.50	4.500	3.826	.337	14.983
5	2.08	5.563	4.813	.375	20.778
6	2.86	6.625	5.761	.432	28.573
8	4.34	8.625	7.625	.500	43.388
10	5.48	10.750	9.750	.500	54.735
12	6.55	12.750	11.750	.500	65.415

*DOUBLE EXTRA STRONG GENUINE WROUGHT IRON PIPE

Size, in.	List price, per ft.	Diameters, in.		Thickness, in.	Weight per ft., lb.
		External	Internal		
½	$ .32	.840	.252	.294	1.714
¾	.35	1.050	.434	.308	2.440
1	.37	1.315	.599	.358	3.659
1¼	.52½	1.660	.896	.382	5.214
1½	.65	1.900	1.100	.400	6.408
2	.91	2.375	1.503	.436	9.029
2½	1.37	2.875	1.771	.552	13.695
3	1.86	3.500	2.300	.600	18.583
3½	2.30	4.000	2.728	.636	22.850
4	2.76	4.500	3.152	.674	27.541
5	3.86	5.563	4.063	.750	38.552
6	5.32	6.625	4.897	.864	53.160

*Any size not listed will be considered "Special."

THE AMERICAN BRASS COMPANY

Manufacturers of Anaconda Brass, Copper and Nickel Silver Pipe

WATERBURY, CONNECTICUT

For Manufacturing Plants, Offices and Agencies, see our page on Sheet Copper

Products

ANACONDA "67" BRASS PIPE; ANACONDA "85" RED-BRASS PIPE; ANACONDA NICKEL SILVER PIPE; ANACONDA DEOXIDIZED COPPER WATER TUBES.

"BROWN & BROTHERS" SEAMLESS DRAWN COPPER RANGE BOILERS.

Also Nickel or Chromium Plated Brass Pipe.

For pages on ANACONDA Architectural Extruded Shapes and Drawn Shapes, Sheet, Roll and Strip Copper, and Everdur Metal, see Manufacturers' Index.

Different Water Conditions Require Different Brass Pipe Alloys

The need of going farther afield for water supplies following the growth of urban population, and the growing tendency to treat waters for purity as well as taste, often changes the *character* of the water, which directly affects the durability of pipe materials.

Recognizing that the corrosiveness of water varies greatly, depending on the source and treatment of the supply, THE AMERICAN BRASS COMPANY determined by a series of exhaustive tests and experiments the exact alloys of copper and zinc which most effectively resist various degrees of water corrosion. Many different alloys of pipe, containing from 60% copper and 40% zinc to pure copper, were exposed to the action of highly corrosive water, at a temperature of 70° F. For ten years these pipes remained under the observation of trained metallurgists, and, at the conclusion of the tests, samples were examined and analyzed.

Six years more were spent in checking results by practical tests, and as a result of this 16 years' investigation, THE AMERICAN BRASS COMPANY recommends the use of ANACONDA "85" Red-Brass Pipe for highly corrosive waters and ANACONDA "67" Brass Pipe for normally corrosive waters.

These two grades of brass pipe meet the requirements of U. S. Government Specifications for grades A and B respectively.

Anaconda "67" Brass Pipe

This brass pipe alloy is recommended for distribution lines in the many localities where normal water conditions prevail; that is, when waters are not drawn from peaty sources, shallow wells, tubular wells or filter galleries in lowlands along river beds, and where filtered waters are not of high permanent hardness. ANACONDA "67" Brass Pipe offers permanent immunity to rust-clogged lines which retard the flow of water. Its use for hot and cold water systems effects important economies for the building owner through reduced repair and maintenance expenses.

ANACONDA "67" Brass Pipe meets U. S. Government Specifications for grade B pipe. It contains 67% copper, is semi-annealed, seamless and guaranteed structurally sound and physically perfect.

Anaconda "85" Red-Brass Pipe

The perfect condition of all installations of ANACONDA "85" Red-Brass Pipe substantiates laboratory results, indicating that this is as high a quality of corrosion-resisting pipe as is commercially obtainable. This pipe is unqualifiedly recommended for distribution lines carrying ground waters and colored surface waters, particularly when drawn from sources of peaty origin, and mechanically filtered waters which may be high in carbonic acid content and low in alkalinity. Also for underground service lines with threaded fittings.

ANACONDA "85" Red-Brass Pipe meets every requirement of the U. S. Government Specifications for grade A pipe. It contains 85% copper, is semi-annealed, seamless and guaranteed structurally sound and physically perfect.

Anaconda Nickel Silver Pipe

ANACONDA Nickel Silver is a white metal composed of copper, nickel and zinc. It is furnished in a wide range of alloys, including Benedict Nickel and Ambrac. It is used in preference to plated metal for exposed piping because it is white clear through, rustless, and has no coating to chip, peel or wear off.

Anaconda Deoxidized Copper Water Tubes

Deoxidized Copper Tubes for use with threadless fittings are available in straight lengths of 20 ft. and in coils of 45 and 60 ft.

ANACONDA Copper Tubes are made from specially deoxidized copper which improves the physical qualities and corrosion-resistance. Because of their flexibility and the ease with which they are installed, these tubes are advantageously used for service and other underground lines, sprinkler systems, oil burner installations, industrial and residential piping.

Service to Architects

The Technical Department of THE AMERICAN BRASS COMPANY has on hand reliable data on water conditions in many sections of the country, which is available to interested architects. If specific information on water conditions in any locality is not available, THE AMERICAN BRASS COMPANY is prepared to assist in determining the character of the water and recommend the proper grade of pipe to use.

Permanent Identification

The name "ANACONDA" and the numerals "67" and "85" designating the kind of pipe are rolled in the metal every 12 in. This method of marking affords permanent identification and protection for the architect and owner. In addition, a label is applied to every length. The trademarks "67" and "85" are registered in the United States Patent Office.

Sizes and Deliveries

ANACONDA "67" Brass, "85" Red-Brass and Copper Pipe are made in standard pipe sizes, both regular and extra heavy. Special commercial sizes and gauges can be made to specifications.

ANACONDA Pipe is manufactured and stocked at the mills of THE AMERICAN BRASS COMPANY in Waterbury and Torrington, Conn.; Buffalo, N. Y.; Detroit, Mich.; Kenosha, Wis.; New Toronto, Ontario, and is sold through leading plumbing material distributors everywhere.

"Brown & Brothers" Seamless Drawn Copper Range Boilers

THE AMERICAN BRASS COMPANY, having acquired the business formerly conducted by The Randolph-Clowes Company, is continuing the production of the well-known "Brown & Brothers" Seamless Drawn Copper Range Boilers.

This boiler is constructed of two seamless cold drawn shells of heavy gauge ANACONDA Copper and is assembled without a longitudinal seam. Manufactured in all standard popular sizes, from 30 to 300 gallons.

BRIDGEPORT BRASS COMPANY

Manufacturers of Plumrite Brass and Copper Pipe

BRIDGEPORT, CONN.

BRANCH OFFICES

AKRON, OHIO, 614 Metropolitan Building
BOSTON, MASS., 533 Statler Building
BUFFALO, N. Y., 625 Genesee Building
CHICAGO, ILL., 2016 Palmolive Building
CINCINNATI, OHIO, 537 Dixie Terminal Building
CLEVELAND, OHIO, 1969 E. 119th Street
DALLAS, TEX., 311 Santa Fe Building
DAYTON, OHIO, 501 Refiners Oil Building
DETROIT, MICH., 2426 Buhl Building
LOS ANGELES, CAL., 711 E. 14th Street, 1923 E. 7th Street
NEW YORK, N. Y., 475 Fifth Avenue
NEWARK, N. J., 325 Jelliff Avenue
PHILADELPHIA, PA., Bankers Trust Building
PITTSBURGH, PA., Union Trust Building
PROVIDENCE, R. I., 70 Clifford Street

Large Warehouse Stocks of Pipe Carried in Bridgeport, Newark, Providence and Cleveland

Products

BRIDGEPORT PLUMRITE BRASS and COPPER PIPE; COPPER WATER TUBING.

Also: Brass, Bronze and Copper Seamless Tubes; Copper Heater Tubes; Brass Condenser Tubes; Copper Brass and Bronze Sheet, Rod and Wire.

"Bridgeport" BRASS TRADE MARK CO. Plumrite

Different Waters Require Different Alloys

Water conditions vary greatly about the country, and even in towns and cities that have more than one source. As a result, the BRIDGEPORT BRASS COMPANY is prepared to furnish five grades of pipe.

Under average conditions Bridgeport Plumrite Standard is more than satisfactory. It is manufactured from the alloy that made brass pipe's reputation. This alloy has been giving satisfactory service for over 50 years.

Bridgeport Plumrite 67% can also be furnished, but where water conditions are bad and in your opinion Bridgeport Plumrite Standard will not be satisfactory, we believe Bridgeport Plumrite 85% should be used.

It is well to remember that while modern drinking water is very safe to drink, as a general rule it is more corrosive today than it was 50 years ago on account of the chemical treatment and aeration which it often receives. We will be pleased to advise you about water conditions in various sections whenever you desire this information.

Bridgeport Plumrite Standard

For general good water conditions. Contains approximately 60% copper and 40% zinc. Known as Muntz Metal. Meets

A.S.T.M. specifications B 43-24; U. S. Government Master Specification 342A, Grade C; and U. S. Army Specification 83-5A, Grade C. Can be bent easily when red hot as well as when cold.

Bridgeport Plumrite 67%

Contains 65% to 68% Copper. Meets A.S.T.M. specification B 43-24; Navy 44P-12; U. S. Government Specifications

Grade B; and U. S. Army Specifications 85-5A. All bends must be made when the metal is cold.

Bridgeport Plumrite Admiralty

Contains approximately 70% copper, 1% tin, and 29% zinc. This alloy is used by both United States and British Navies for condenser tubes. A.S.T.M. Specifications B-44-24; Navy 44-B-7E.

Bridgeport Plumrite 85%

For corrosive water conditions, for salt water and for water polluted with mineral acids from mines or with organic acids from peaty soils or with chemicals used in purification or softening—for ground service. Contains approximately 85%

copper, 15% zinc. Also known as red brass. Meets U. S. Government Master Specifications. No. 342A and U. S. Army Specification No. 35-5A. Bridgeport Plumrite 85% is the highest grade of brass pipe obtainable.

Bridgeport Plumrite Copper

Contains approximately 99.9% copper. Meets A.S.T.M. Speci-

fications B 42-24; U. S. Navy Specification No. 44-P-2C; U. S. Government Master Specification No. 287.

Bridgeport Copper Water Tubing

This is furnished in coils or in straight lengths and has a wall thickness which is considerably thinner than copper pipe, iron pipe size. Used in connection with compression fittings.

Straight lengths furnished both soft and hard drawn.

Booklets for Distribution

Water Pipe Sizes—a booklet containing formulae and tables for determining the pipe sizes for water pipes in buildings.

Plumrite Brass Pipe—contains many illustrations of some of our latest installations.

Bridgeport Copper Water Tubing.

Specification

All brass [copper] pipe shall be Bridgeport Plumrite Seamless *(alloy)*, iron pipe sizes, as manufactured by the BRIDGEPORT BRASS COMPANY, containing not less than ..% of copper. Each length of pipe shall have the manufacturer's trademark stamped thereon at intervals of not less than nine inches.

Copper Content Tolerances:
Bridgeport Plumrite Standard 59-63%, (A.S.T.M.)
Bridgeport Plumrite 67%, 65-68%, (A.S.T.M.)
Bridgeport Plumrite Admiralty 70%.
(Tin 0.90-1.20%), (A.S.T.M.)
Bridgeport Plumrite 85%, 83-87%.
Bridgeport Plumrite Copper 99.9%, (A.S.T.M.)

CHASE FLEXIBLE COPPER WATER TUBING

CHASE BRASS & COPPER CO.
—INCORPORATED—

WATERBURY, CONN.

NEW YORK, N. Y., 80 Lafayette Street
BOSTON, MASS., 411 "D" Street
BUFFALO, N. Y., 25 Ellicott Street
NEWARK, N. J., 361 Halsey Street
PHILADELPHIA, PA., 46 North 6th Street
BALTIMORE, MD., 307 E. Lombard Street
PITTSBURGH, PA., 855 North Avenue, West
CINCINNATI, OHIO, 222 Post Square
CLEVELAND, OHIO, 5005 Superior Avenue
DETROIT, MICH., 2798 E. Grand Boulevard
CHICAGO, ILL., 1300 W. Harrison Street
MILWAUKEE, WIS., 512 North Water Street
MINNEAPOLIS, MINN., 145 No. 10th Street
ST. LOUIS, MO., 314 North 2nd Street
NEW ORLEANS, LA., 429 Camp Street
DALLAS, TEX., 1407 Main Street
LOS ANGELES, CAL., 210 Central Avenue
SAN FRANCISCO, CAL., 680 Second Street
OAKLAND, CAL., 1808 Peralta Street
SEATTLE, WASH., 1957 First Avenue, South

For Chase pages on Copper Roofing Materials and Door Saddles, Chase Bronze and Copper Screen Cloth, and Brass and Copper Pipe, see Manufacturers' Index

Chase Flexible Copper Water Tubing

A pure copper tube for economical replacement of worn-out water pipes; also adaptable to many other uses.

It cannot rust; it is heatproof and freeze-proof. It will bend, yet is hard enough not to dent or flatten easily.

It comes in 45 and 60-ft. coils and 20-ft. straight lengths; requires no threading and does away with a lot of fittings.

Flexibility

Chase Flexible Copper Water Tubing will bend around corners and obstructions. It can be worked down between partitions, through very small openings in walls and floors.

Temper—Standard Lengths

Soft Temper Flexible Chase Copper Water Tubing is supplied in coils and straight lengths of 20 ft. Hard Temper Rigid Tubing is furnished in 20-ft. straight lengths only.

Saves Fittings—No Threading

The use of long lengths of Flexible Soft Copper Tubing saves a lot of fittings. Where joints are unavoidable, Chase Flexible Copper Tubing is flanged and connected by means of compression fittings—threading is eliminated entirely.

Freezeproof—Heatproof

In a series of laboratory tests, five successive freezings expanded the outside diameter of a piece of ¾ in. Chase Water Tubing by about .218 in., but the walls did not crack.

Unlimited freezing of Chase Copper Water Tubing is not recommended, but these tests demonstrate that an occasional accidental freeze-up will not work the havoc that a single experience usually produces when water freezes in a rigid pipe.

Heat has little or no effect on this new kind of water pipe. It will stand any temperature up to 408° F. Copper tubing has been used for for years in the coils of gas water heaters.

Corrosion

Chase Water Tubing is made of 99.9% pure deoxidized copper, which cannot rust. Although this pure refined metal is excellent for most water conditions, our laboratory has found certain localities which demand a special alloy pipe in order to resist the attack of a particular kind of corrosive water. If there is any doubt about a proposed water supply, our Research Department will gladly offer suggestions on the best kind of pipe to install.

Snaking Chase Flexible Copper Tubing through the Floor

After a small passageway has been opened through fire stops on the lower floors, one continuous length of flexible copper water tubing can be snaked from the top floor to the cellar

How It Works

With a 60-ft. coil of Chase Copper Water Tubing thrown over his shoulder, the plumber can easily carry

it into the building, up the stairs, and through rooms without danger of marring the paint or window sills.

Copper tubing is particularly handy to use for replacement work. Starting at the top floor, Chase Flexible Tubing is worked down between partitions and around obstructions to the cellar. Lateral take-offs are cut in wherever desired. Water Tubing Tees are installed in proper positions for the laterals, and hooking up to standard pipe size fixture connections is accomplished without any difficulty whatever.

In the cellar and at most other points where a corner must be turned or an obstruction by-passed, the tubing is bent instead of going to the trouble and expense of cutting in a series of elbows.

For Underground Service

Our regular extra heavy soft temper copper tubing is recommended for all underground water service lines.

In many municipalities flexible copper water tubing is standard for this purpose and its use specifically required by ordinance, by-laws or other official regulations.

Greatest economies are effected through using long 60-ft. coils, which, in many instances, eliminates fittings entirely, except for meter, curb stop and street main connections.

Its flexibility permits Chase Copper Water Tubing to conform perfectly with contour of trench; also adjusts itself readily to settling of back fill.

Typical Cellar Replacement Job
Note the complete absence of elbows at the corners, which means that a lot less labor and fewer fittings are required

Laying Underground Service Line
Bending Chase Copper Water Tubing around a rock in trench—no joints, no fittings

Where You Can Get It

Chase Copper Water Tubing and Fittings are distributed through plumbing jobbers to plumbers. Jobbers can buy direct from our Cleveland, Ohio, or Waterbury, Conn., mills. For 24-hour service, they can pick up Chase Tubings and Fittings from any of our *nineteen* Chase warehouses.

Identification

For easy means of identification, the Chase name and trade-mark are stamped on every foot of genuine Chase Copper Water Tubing.

Chase fittings also carry the Chase trade-mark. This identification guarantees complete satisfaction on tubing *and* fittings.

STANDARD SIZES AND LENGTHS

"Standard" for House Replacement					"Extra Heavy" for Underground Service				
Nominal Size	Outside Diam., In.	Wall Thickness, In.	Weight in Lbs. per Ft.	Lengths	Nominal Size	Outside Diam., In.	Wall Thickness, In.	Weight in Lbs. per Ft.	Lengths
⅜	.500	.035	.198	45 or 60-ft. coils; 20-ft. straight lengths.	⅜	.500	.049	.269	45 or 60-ft. coils; 20-ft. straight lengths.
½	.625	.040	.285		½	.625	.049	.344	
¾	.875	.045	.455		¾	.875	.065	.641	
1	1.125	.050	.655		1	1.125	.065	.839	
1¼	1.375	.055	.884		1¼	1.375	.065	1.04	
1½	1.625	.060	1.14		1½	1.625	.072	1.36	
2	2.125	.070	1.75		2	2.125	.083	2.06	

CHASE BRASS AND COPPER PLUMBING PIPE

CHASE BRASS & COPPER CO.

—INCORPORATED—

WATERBURY, CONN.

NEW YORK, N. Y., 80 Lafayette Street
BOSTON, MASS., 411 "D" Street
BUFFALO, N. Y., 25 Ellicott Street
NEWARK, N. J., 361 Halsey Street
PHILADELPHIA, PA., 46 No. 6th Street
BALTIMORE, MD., 307 E. Lombard Street
PITTSBURGH, PA., 855 North Avenue, West
CINCINNATI, OHIO, 222 Post Square
CLEVELAND, OHIO, 5005 Superior Avenue
DETROIT, MICH., 2798 E. Grand Boulevard
CHICAGO, ILL., 1300 W. Harrison Street
MILWAUKEE, WIS., 512 North Water Street
MINNEAPOLIS, MINN., 145 No. 10th Street
ST. LOUIS, MO., 314 No. 2nd Street
NEW ORLEANS, LA., 429 Camp Street
DALLAS, TEX., 1407 Main Street
LOS ANGELES, CAL., 210 Central Avenue
SAN FRANCISCO, CAL., 680 Second Street
OAKLAND, CAL., 1808 Peralta Street
SEATTLE, WASH., 1957 First Avenue, So.

Products

CHASE BRASS and COPPER PIPE.

For Chase pages on Copper Roofing Materials and Door Saddles, Bronze and Copper Screen Cloth and Copper Water Tubing, see Manufacturers' Index.

Brass Plumbing Pipe

The advantages of brass and copper pipes over rustable pipes are well-known; but it is important to remember that there are various kinds of brass and copper to meet these conditions.

We manufacture water pipes in four different alloys to meet these different conditions.

All Chase Brass and Copper Pipes are subjected to water pressure tests as well as visual inspection before they are shipped from the Chase mills. Each length has the Chase trade-mark, together with the alloy name stamped every 12 in.

Chase Alpha Brass Pipe

This is the standard brass pipe for general plumbing use. It is a mixture containing approximately 66% copper, 33% zinc, and 1% lead. Alpha Pipe cuts and threads easier than the ordinary brass pipe of 60% copper and 40% zinc. Alpha can be bent cold, and has an excellent surface for nickel plating. It is easily recognized by its light honey yellow color, and the trade-mark, together with the name "Chase Alpha Brass Pipe," which is stamped every 12 in. along every length.

Chase Admiralty Brass Pipe

70% copper, 1% tin, balance zinc. This mixture has been used with great success in handling hot and cold salt water, and for certain particular types of corrosive waters. For example, fresh spring and well waters are usually handled better with Admiralty than any other kind of pipe. Our laboratory will gladly advise where it should be used. It is fully guaranteed and is easily identified by our trade-mark and name, every 12 in. on each length.

Chase Red Brass Pipe

85% copper, 15% zinc. Many localities have shown preference for this particular high copper alloy. It has been used with considerable success in places where there are extremely corrosive water conditions.

Chase Pure Copper Pipe

This pipe should not be confused with Chase Copper Water Tubing. Chase Copper Pipe is made in standard pipe sizes. It is a rigid pipe, not a flexible tube. We recommend it for certain special conditions.

Identification

The Chase trade-mark, and the alloy name, are stamped every 12 in. in every Chase Brass and Copper Water Pipe, which permits easy identification whether it is used in long or short lengths.

Guarantee

Every Chase Brass and Copper Pipe is fully guaranteed. We will be glad to send you a copy of our written guarantee upon request.

Specifications

The following form of specification is short and to the point, yet broad enough to insure getting good plumbing pipe for your clients:

All hot and cold water supply lines shall be semi-annealed, standard pipe size, brass pipe, containing (state type and mixture). Chase Plumbing Pipe is approved.

Every length of pipe shall bear the name or trade-mark of the manufacturer stamped every 12 in. on each length. Sizes up to 4 in. must have been tested to at least 2000 lbs. hydrostatic pressure and above 4 in. to at least 1000 lbs., without signs of cracking or other failure.

ESTABLISHED 1860

T. E. CONKLIN BRASS & COPPER CO., INC.

TELEPHONE
WAlker 5-7500

56 Lafayette Street, NEW YORK, N. Y.

Member of Copper and Brass Research Association

Products

ARCHITECTURAL BRONZE, BRASS, MUNTZ METAL, COPPER and NICKEL SILVER in the form of Sheets, Rods, Tubes, Wire, Angles, Channels and Extruded Shapes.

BRASS PIPE.

COPPER TUBING and SERVICE PIPE.

RED BRASS SERVICE FITTINGS.

SCREWS, BOLTS, NUTS, WASHERS and RODS of "Everdur."

BRONZE and COPPER SCREEN CLOTH.

Large Stocks for Immediate Delivery

We carry one of the largest stocks of architectural bronze, brass, copper and nickel silver in the East with a variety second to none. Quick shipments and deliveries are thus made possible, regardless of the geographical location of the job or contractor.

In addition to the above we always have on hand for prompt shipment large stocks of rivets and burrs; copper wire and cut nails for slating, roofing and boat building; brass escutcheon pins; bronze and copper tacks; soldering irons, etc.

Bronze

Sheets—Half hard patent leveled and square edged; acid dipped patent leveled.
Rolls—Soft commercial in continuous rolls.
Strips—Commercial drawn with square corners.
Rods—Round, half round, square, rectangular, and hexagon. Round and hexagonal Naval bronze rods.
Tubes—Round, square and rectangular.
Wire—Half hard round and flat.
Channels and Angles—With square edges.
Phosphor Bronze—Sheets, rods and wire.

Brass and Muntz Metal

Sheets—Rich low, half hard, patent leveled and square edged.
Rolls—For spinning and deep drawing.
Strips—Flat and in coils.
Rods—Round, square, hexagon, half round and half oval.
Tubes—Round, square, rope, reeded and rectangular.
Wire—Hard, spring and rich low soft; high and low round, half round, square and flat.
Angles and Channels—With square edges.

Copper

Sheets and Rolls—Hot rolled; cold rolled; plain, polished or tinned. Sheet and roll copper for roofing and flashing.
Rods—Round, square and rectangular.
Tubes—Round, square, rope, reeded and rectangular.
Wire—Soft, hard or spring; round, square, flat and half round.

Nickel Silver

Sheets—Plain or polished on one side and patent leveled.
Rolls—For spinning or drawing.
Rods—Round, square, half round and hexagon.
Wire—Soft, hard or spring; round, half round, hexagon, octagon, square and flat.

Brass Pipe

We are prepared to make prompt shipment of brass pipe from our large stock. A complete range of sizes is carried at all times.

Bronze and Copper Screen Cloth

We carry a large stock for immediate delivery, in 100-ft. rolls, in widths 18 in. and every 2 in. wider up to and including 48 in., and in 14, 16 and 18-mesh.

Copper Tubing and Service Pipe

For plumbing and underground water service.

Water works officials and municipal engineers are giving serious consideration to the subject of pipe for water service. The chief requirements sought are resistance to corrosion, both internal and external, ductility and facility in making the necessary joints and connections.

Conklin Copper Water Tubing and Service Pipe provide all the above mentioned requisites. Both tubing and pipe bend easily and the use of elbows and fittings is reduced to a minimum. Only a few simple tools are required for installation.

STANDARD DIMENSIONS AND WEIGHTS OF COPPER TUBING

Nominal size, in.	Exact o.d., in.	Permitted tolerance, plus or minus, in.	Wall thickness, in.	Weight per ft., lb.	Test pressure per sq. in., lb.	Maximum length in coils, ft.	Maximum straight lengths, ft.
⅜	.500	.0025	.049	.269	1460	60	35
½	.625	.0025	.049	.343	1140	60	35
¾	.875	.003	.065	.640	1040	60	35
1	1.125	.003	065	.838	780	60	35
1¼	1.375	.0035	.065	1.04	630	..	35
1½	1.625	.004	.072	1.36	580	..	35
2	2.125	.005	.083	2.06	520	..	35

Red Brass Plumbing Method and Copper Service Tube Fittings

A leakproof connection is the best assurance of a troubleproof piping installation. Such connections are provided by Conklin fittings because of their assured *double-seal* feature.

The *double* seal provides *double* strength, safety and ease of installation. The 45° seat of the fitting holds the pipe in a wedge, insuring an absolutely tight seal and the 90° seat locks the pipe, provides a second seal of positive tightness, and protects the 45° seal by absorbing all pulling strains and vibration.

A complete line of tees, ells, couplings, water works brass goods, as well as separate connections to meet the requirements of any copper service pipe installation, always in stock.

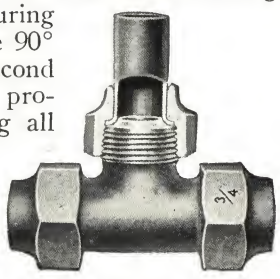


Fig. 500
Plumbing Method Tee

"Everdur" (Copper-Silicon-Manganese Alloy)

The addition of silicon and manganese to copper, when their proportions are properly adjusted, produces a copper-rich alloy of the solid solution type and gives to the copper strength approaching that of steel without impairing its non-rusting and corrosion-resistant properties. Products made of "Everdur" alloy are recommended for use where conditions of unusual stress and exposure to severe weather or corrosion must be met with a reasonably priced metal.

A complete line of the following items made of "Everdur" in all standard sizes is carried in stock:

Lag screws; wood screws (round, flat and oval head); cold headed machine bolts; hexagon nuts; lock and flat washers; machine screws (round or flat head); hanger screws; piston finish rods in 18-ft. lengths and in diameters of ¾ to 2 in. for marine shafting and underwater parts.

FOSTER WHEELER CORPORATION

Manufacturers of Brass Pipe, Hot Water Heaters, Hot Water Heating Systems, Wainwright Expansion Joints and Power Plant Equipment

165 Broadway, NEW YORK, N. Y.

BRANCH OFFICES AND REPRESENTATIVES

ATLANTA, Candler Building
BOSTON, 80 Federal Street
CHICAGO, 20 No. Wacker Drive
CINCINNATI, 18 East 4th Street
CLEVELAND, 1170 Ivanhoe Road
DALLAS, Republic Bank Building
DENVER, University Building
DETROIT, Dime Bank Building
KANSAS CITY, Board of Trade Building
LOS ANGELES, Petroleum Securities Building
MILWAUKEE, Security Building
NEW ORLEANS, American Bank Building
PHILADELPHIA, Packard Building
PITTSBURGH, Oliver Building
SALT LAKE CITY, Continental Bank Building
SAN FRANCISCO, Balboa Building
TULSA, 712 Thompson Building
HONOLULU, T. H., Grace Brothers, Pier No. 11

Member of Copper and Brass Research Association

Products

CRESCENT BRAND BRASS, RED BRASS, and COPPER PIPE.

WAINWRIGHT EXPANSION JOINTS.

Wainwright Hot Water Heaters and Hot Water Heating Systems.

Copper Service Tubing.

Foster Wheeler Crescent Brand Brass Pipe

Foster Wheeler Crescent brand pipe is made with various percentages of copper, zinc, lead and tin under the most modern manufacturing conditions. Local conditions govern the use of pipe made from the various mixtures.

Foster Wheeler will furnish pipe either nickel or chromium plated.

The various alloys of Foster Wheeler pipe are made to conform to the specifications of either the U. S. Government or the American Society of Testing Materials.

Crescent brand pipe is furnished as follows:

Muntz Metal—An alloy containing 60% copper and 40% zinc. This mixture was used for many years for ship sheathing and where corrosive resisting materials were deemed necessary. It is a hot working mixture; can be rolled, pierced and forged. It is easy threading and gives a clean sharp thread. It is used for general good water conditions.

Two and One Mixture—This pipe contains copper, 65% to 68%; lead, not over 0.80; and zinc, remainder. This mixture is a cold working alloy and its ease of bending will depend on the temper. It is used for general good water conditions.

Admiralty Mixture—Is used where brackish and sea water conditions exist. Composition: copper, not less than 70%; tin, 0.90 to 1.20; zinc, remainder.

Red Brass Pipe—Is used where acid and corrosive water conditions exist. It is recommended for use in underground service lines, with lines carrying water that is treated chemically for purification or softness, for acid sludge lines, etc. Specifications permit 79% copper content, although 85% is the actual copper content of Foster Wheeler red brass pipe. It is so marked.

Foster Wheeler Copper Tubing and Pipe—Contains 99.9% copper and is used wherever conditions warrant.

Above Identification Appears on All Foster Wheeler Crescent Brand Brass Pipe

Guarantee—Every length of Crescent brand brass pipe is guaranteed to be as nearly physically perfect as possible. Successive tests to insure proper hardness and ductility, also pressure tests exceeding many times the conditions of actual service, are applied to all pipe. These tests, coupled with a rigid inspection of all lengths, assure a high class and fully dependable pipe.

Identification—All Foster Wheeler Crescent brand pipe is readily recognized by the identification (shown below) appearing in approximately every 12 in. of length. This marking permanently identifies all Foster Wheeler Crescent brand brass pipe.

Sizes—Crescent brand brass pipe is made in standard pipe sizes, in regular, extra heavy and double extra heavy. Special sizes and gages made to order.

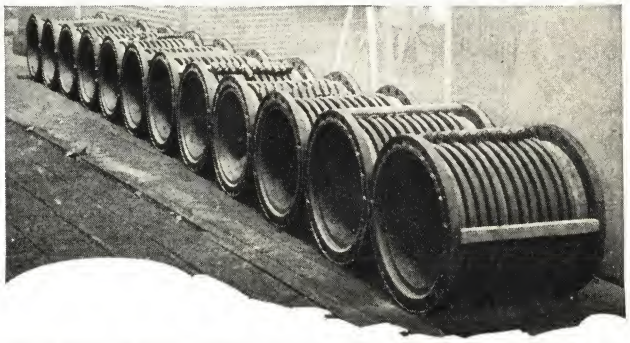
Delivery—Crescent brand pipe is manufactured and stocked at Carteret, N. J. It is also handled by leading distributers of plumbing materials.

Service—Foster Wheeler Research Laboratory, which controls the manufacturing processes of Crescent brand pipe, has collected a great deal of material relative to the proper application of various mixtures of brass and copper tubing and pipe. The research laboratory is available at all times to assist the architect in studying and analyzing special conditions and making the proper selection of pipe.

Wainwright Expansion Joints

Wainwright multicorrugated copper expansion joints are built for high and low pressure service to take up the expansion in pipe lines carrying steam, hot water or oil.

Wainwright Joints are constructed of seamless copper cylinders with corrugations rolled inwardly to prevent thinning of the metal without restricting the nominal pipe area. The total movement caused by expansion is evenly distributed to each corrugation so that excessive movement is not imposed on any one corrugation.



Shop View of 20-in. Wainwright Expansion Joints, Showing Part of an Order for 32, to Be Used in High Pressure Work

REVERE COPPER AND BRASS INCORPORATED

EXECUTIVE AND GENERAL SALES OFFICES
230 Park Avenue, New York, N. Y.
GENERAL OFFICES
ROME, N. Y.
DIVISIONS
BALTIMORE DIVISION, Baltimore, Md.
DALLAS DIVISION, Chicago, Ill.
ROME DIVISION, Rome, N. Y.
TAUNTON-NEW BEDFORD DIVISION, Taunton, Mass.
HIGGINS DIVISION, Detroit, Mich.
MICHIGAN DIVISION, Detroit, Mich.
SALES OFFICES
NEW YORK, N. Y., 75 East 45th Street
BOSTON, MASS., 20 Providence Street
PHILADELPHIA, PA., 123 South Broad Street
PITTSBURGH, PA., 2137 Koppers Bldg.
MILWAUKEE, WISC., 229 E. Wisconsin Ave.
CLEVELAND, OHIO, 917 Midland Bank Bldg.
CINCINNATI, OHIO, 2616 Carew Tower

Products

REVERE BRASS PIPE, REVERE RED BRASS PIPE, REVERE COPPER PIPE (Standard Pipe Size), PR PIPE (Paul Revere) ALL-COPPER PIPE.

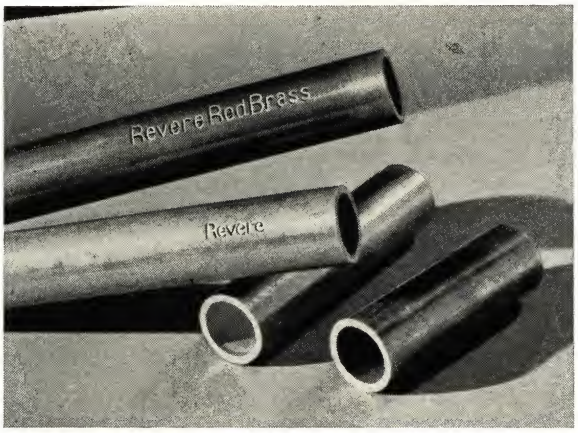
For Revere Sheet Copper and Leadtex (Lead Coated Copper), Architectural Metals in Sheets, Extruded and Drawn Shapes and Tubes, see Manufacturers' Index.

REVERE BRASS AND COPPER PIPE

Revere Brass Pipe

Revere Brass Pipe is manufactured in two grades: (Yellow) Brass Pipe in mixtures containing 60% and 67% copper, for normal water conditions and Red Brass Pipe (85% copper) for extremely corrosive waters.

With over sixty years of manufacturing experience, with complete laboratory control and the most careful inspection following each process or stage of production, either of these grades may be depended upon absolutely for the use for which it is intended.



Both of these pipe mixtures are hard enough to cut freely and thread easily, yet softened sufficiently to remove internal strains and to permit of ready bending. The possibility of season cracking is eliminated by correct heat treatment.

Revere Brass Pipe (Yellow Brass)—Revere Yellow Brass Pipe is seamless, semi-annealed and free-threading. It is a clean lemon-yellow in color with a fine smooth finish. It is marked each foot of its length with "Revere."

This pipe is intended for waters normally corrosive. The selection of pipe should depend on local water conditions. In general, a normal water supply is one with low permanent hardness, a fair degree of temporary hardness, low in carbonic acid gas content and relatively high in alkalinity.

Revere Red Brass Pipe (85% Copper)—Revere Red Brass Pipe (85% Copper,) distinguished by its copper-bronze color, removes all guess work from a plumbing installation. This pipe meets all government specifications for "Grade A" water pipe. It is marked "Revere Red Brass" each foot of its length.

It is designed for use with extremely corrosive waters and should always be used where there is high sulphur and carbon-dioxide content or where heavy chlorination is necessary to insure purity and for all installations in contact with soil or cinder concrete.

It is also recommended for salt (sea) water used in baths and swimming pools. In fact, where the utmost is demanded from a pipe obtainable commercially at reasonable cost, Revere Red Brass should be used.

It is a good idea to consider the use of this pipe wherever possible, regardless of the present condition of the water supply, as a safeguard against possible changes in corrosiveness due to future changes in supply, purification methods, etc.

Service Installations

Where underground service installations are made with threaded connections, Revere Red Brass Pipe should be used regardless of water conditions. In these cases, expansion, settling of the fill and other conditions encountered in underground service work must be taken into consideration as is necessary with all rigid pipe. (Note: For underground service work PR Pipe (all copper flexible pipe) available in 60 foot lengths and joined with compression fittings is recommended. See next page for details on PR Pipe.)

Tests

Each length of Revere Brass Pipe and Red Brass Pipe is tested under an internal hydrostatic pressure of 1000 pounds per square inch.

Revere Copper Pipe (Standard Pipe Size)

Revere Copper Pipe is a rigid pipe made of 99.9% pure copper in Standard Pipe Size. (PR Pipe is also 99.9% pure copper—it is *not* Standard Pipe Size, being used with compression fittings.)

Although pure copper pipe in Standard Pipe Size is not in general use for plumbing purposes because of its cost, there are certain localities where only this type pipe gives satisfaction. It also is used industrially to meet most exacting piping conditions.

Brass Pipe Specifications

1. **Supply Lines**—All hot and cold water supply lines and all branches to plumbing fixtures shall be of Revere Brass Pipe (or Revere Red Brass Pipe).
2. **Fittings**—All fittings shall be of substantial beaded construction and of approximately the same copper content as the pipe used. (Brass or Red Brass).
3. **Nipples**—All nipples must be of the same composition as the pipe used and the Contractor shall guarantee that they were cut from trade-marked lengths of Revere Pipe.
4. **Support**—Only brass or copper hangers shall be used and they shall be spaced in such a way as to provide adequate support.
5. **Expansion and Contraction**—An allowance of one-quarter inch shall be made in every ten feet in hot and cold water lines for expansion and contraction.
6. **Vises and Wrenches**—Friction vises and wrenches shall be used exclusively in working Brass Pipe.
7. **Insulation**—All pipe laid in concrete or cinders shall be protected in such a way that at no time will the brass be in contact with cinders or concrete.
8. **Iron Pipe Connections**—If it is necessary to connect Brass Pipe with an Iron Pipe line, a trap or lift shall be provided sufficient to prevent draining of rust into the brass piping.
9. **Service Lines**—The service supply line from main to building shall be of Revere Red Brass Pipe used in conjunction with a flexible copper gooseneck, or (the Architect should indicate his choice) service temper PR Pipe and compression fittings shall be used.

Sizes and Delivery

Revere Brass Pipe, Revere Red Brass Pipe and Revere Copper Pipe are made in Standard Pipe Sizes, both regular and extra heavy. Special commercial sizes and gauges will be made to specifications. These products are readily available from leading plumbing supply distributors.

PR PIPE
(Paul Revere Pipe)

Hard Temper

(For new and exposed work)

P R PIPE

Soft Temper

(For replacement work)

A FORWARD STEP IN PLUMBING

PR Pipe (Paul Revere Pipe) is a cold drawn, seamless copper pipe for water supply and other uses:

99.9% Pure Copper—completely deoxidized.

Economical—no waste metal.

Durable—cannot rust.

Ductile—readily bent and flanged.

Adaptable—for new work and old.

Many uses—for plumbing and other purposes.

Permanently tight joints—with compression fittings.

What PR Pipe Is

PR Pipe is a pure copper pipe, made of 99.9% virgin copper. It is completely deoxidized and possesses a gun-barrel finish inside, free from flaws and blemishes. Used with suitable compression fittings, it furnishes a complete water system from street main to the various fixtures in the building. This system is not only permanent and trouble-free, but economical to install.

Copper—the Ideal Material for Water Service Pipe

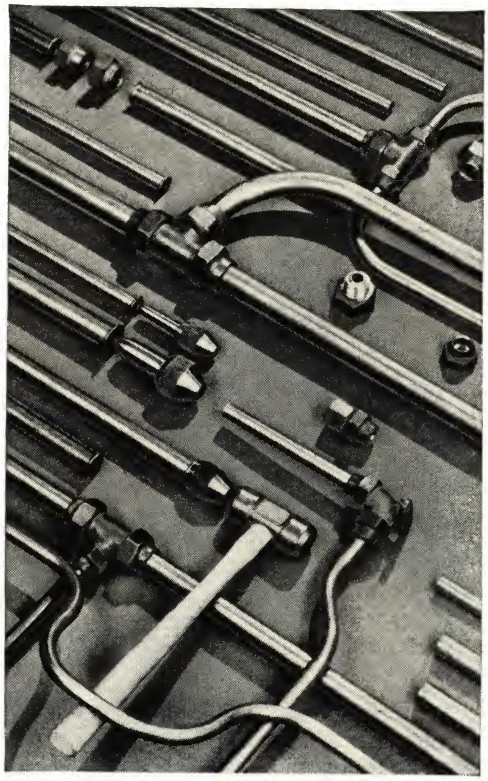
Experience has established copper as the most serviceable material for water pipes. In the past, the one practical objection to copper has been its cost. Even though this could be justified on the basis of actual performance, few people had the courage to make the necessary investment under former methods of installation. Now with PR Pipe this objection is removed.

PR Pipe Joined with Compression Fittings

In Standard Pipe Size pipe practically half of the wall thickness is required to furnish sufficient thickness at the bottom of the thread to withstand the working stresses.

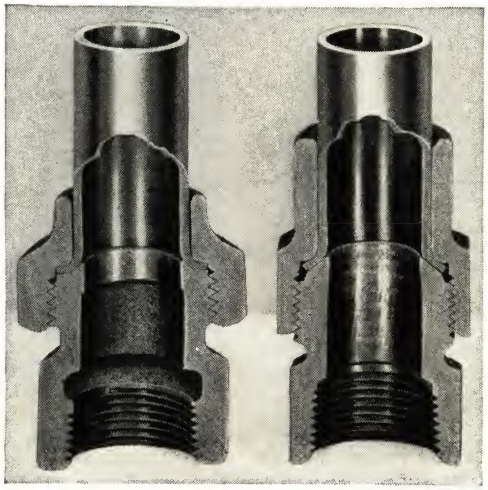
With PR Pipe threading is eliminated. All joints are made with compression fittings. Thus PR Pipe has no weak point and its wall thickness is uniform throughout. This permits a reduction in the amount of metal to approximately half that required when threaded joints are used, with a subsequent saving in the cost of material which removes the only practical objection to copper pipe.

The wall thickness of PR Pipe equals the available wall thickness of Standard Pipe Size pipe at the base of the thread.



Above:—Study this picture closely . . . it illustrates many of the features of PR Pipe, as well as the method of making joints.

Below:—Two basic types of compression joints . . . one with 90° flange, one with 45° flange. Tightening the fittings makes permanent leakproof joints.



Compression Fittings—the Tightest Joints Known to Engineering Science

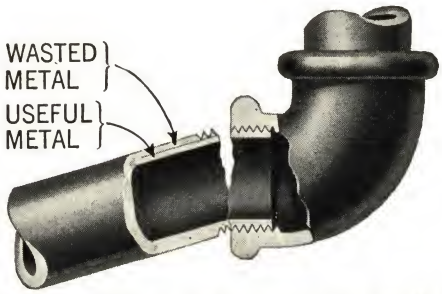
The vise-grip of the compression joint makes it the tightest joint known to engineering science. This has been proven by years of service in locomotives, steamships, factory steam lines, refrigeration systems, automobile and airplane fuel lines, and for other uses where absolutely leak-proof conduct of fluids or gases is required.

There is a compression fitting for every use. These include tees, elbows, couplings, adapters, etc.

Columbia University Tests

At Columbia University on December 8 and 9, 1930, tests were run to determine the ability of PR Pipe and compression fittings to withstand maximum normal water pressures. Water was turned on at maximum city pressure, then raised by hydrostatic machine to 3,400 pounds before a leak occurred. Subsequent tests revealed that there was a fine flaw in the casting of the fitting rather than leakage through the joint. In a vibration test 3,000 impulses per minute for 30 minutes failed to cause leak or loss of pressure. The two days' tests proved that neither torsion, deflection nor high water pressure can unseat a perfect PR Pipe joint made with a compression fitting. (For folder giving complete data on above tests write REVERE COPPER AND BRASS INCORPORATED.)

PR PIPE (Continued)



The weakest spot in a threaded pipe is the thread where it emerges from the fitting. PR Pipe being threadless has no such weak point. Its full thickness is used throughout.

How Joints are Made

The making of joints is a matter of sawing off and reaming the ends of the pipes to be joined, then slipping the nut of the fitting over the pipe, bringing it into place, and flanging the pipe over the seat of the fitting by means of a special flanging tool. The final step is to bring the two parts of the fitting together and tighten the nut which clamps the pipe between the seats, making an absolutely tight and a thoroughly strong joint.

PR Pipe Made in Two Tempers

PR Pipe is drawn to accurate gauge and annealed to correct temper. It is furnished in two standard tempers, soft, and hard.

The soft pipe in sizes from ⅜″ to 1″ may be had in straight lengths up to 20 feet or in coils up to 60 feet. Sizes over 1″ come in straight lengths only. The hard pipe is furnished in straight lengths up to and including 20 feet.

Hard Temper PR Pipe

Hard temper PR Pipe is generally recommended for new work and should always be used for exposed plumbing. Smooth bends can be made with a suitable bending machine, reducing the number of elbows needed, and producing a quiet, smooth-flowing, friction-free water supply system.

When the hard pipe is used there is no danger of sags and a minimum number of straps and hangers are required. The resultant job is a credit from the standpoint of appearance, service and permanence.

Soft Temper PR Pipe

Soft temper PR Pipe is for use wherever a flexible piping is desired. It has particular advantages for replacement work where it can be fished through the walls and long runs made without couplings. In the case of replacements there is a double saving in the use of PR Pipe, (1) that due to the use of less metal (2) there is a minimum amount of house wrecking where this pipe is used, because of the long lengths in which it is furnished and of its flexibility which allows it to be bent around obstructions.

PR Pipe and Freezing

Both the hard and soft tempers of PR Pipe are for practical purposes freeze-proof. Accidental freezing does not cause PR Pipe to burst. Rather the pipe expands slightly to take up the pressure. In actual test PR Pipe has withstood up to twelve freezings without bursting.

How to Lay Out a PR Pipe Job

In laying out a plumbing installation with PR Pipe the following things should be taken into consideration: (1) Compression fittings are used instead of threaded fittings; (2) Elbows can be largely eliminated due to the fact that PR Pipe can be bent to meet the needs of the installation; (3) A reduction can be made in the number of couplings inasmuch as PR Pipe is furnished in long lengths. (Soft Pipe in coils up to 60 feet.) (Hard Pipe in straight lengths up to 20 feet.)

Aside from the above, a PR Pipe installation should be laid out similar to one where threaded pipe is used.

PR Pipe Made Only by Revere

PR Pipe is made only by Revere Copper and Brass Incorporated—with 130 years' experience in the working of copper. For 30 years Revere has made copper tubing and piping for plumbing and extremely exacting industrial service . . . . such as automobiles, airplanes, oil burners, and refrigerators.

Special Uses of PR Pipe

In addition to providing a permanent, trouble-free water supply system when used with compression fittings, PR Pipe has many other uses including: (1) Services from curb to house, (2) oil burner lines, (3) factory maintenance, (4) lawn irrigation, (5) expansion joints, (6) heating work, coils, etc., (7) heat control systems, (8) refrigerator installations, (9) conduits for compressed air, chemicals and gases. Some of these uses are covered briefly.

PR Pipe (soft temper) comes in long flexible lengths which can be fished through narrow, constricted spaces. This is a great advantage in replacement work as it eliminates much of the tearing up, with the attendant plastering, painting, etc.

PR PIPE (Continued)

Underground Services

PR Pipe has been used successfully for several years for water services from main to meter and its use is growing daily for this purpose because of its many advantages over rigid pipe.

Being 99.9% pure copper, it meets the problems of corrosion and other destructive elements more nearly than any other kind of service pipe. It is lighter and its greater flexibility is an aid in installing. It is ductile enough to allow for settling of the trenches or shifting of the soil due to the "traveling of mains." It eliminates goosenecks and uses fewer connections inasmuch as it comes in 60 ft. lengths. It cuts service costs and gives permanent, trouble free service—the ideal pipe for this purpose.

PR Pipe for Anaesthetic Lines

Although primarily intended for plumbing service, PR Pipe has been found to be particularly adaptable for carrying anaesthetics from centrally located tank rooms in hospitals to operating rooms. This system has the advantages of central supply, instant availability at the point of use, positive control, saving of time.

Among the gases carried are nitrous oxide, oxygen, and ethylene. PR Pipe is impervious to the action of these. By using the flexible PR Pipe in 60 ft. lengths unnecessary fittings are eliminated. The compression joints are also absolutely leak proof. As a test of this on one installation, 110 lb. air pressure was maintained for one week without the sign of a leak.

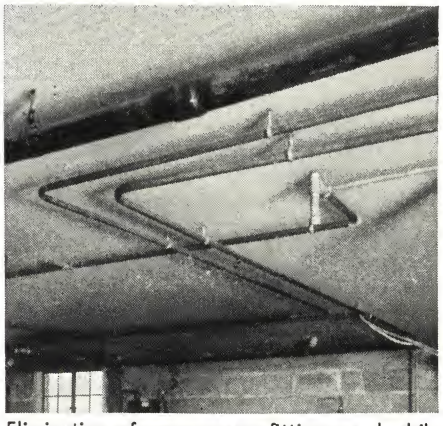
STANDARD WEIGHTS AND DIMENSIONS

Both hard and soft temper PR Pipe shall conform to the following weights and dimensions:

Nominal Pipe size, in.	Actual ID., in.	Exact OD., in.	Wall thickness BWG ga.	Wall thickness in.	Weight per foot lb.
⅜	.402	.500	18	.049	0.269
½	.526	.625	18	.049	0.344
¾	.745	.875	16	.065	0.641
1	.995	1.125	16	.065	0.839
1¼	1.245	1.375	16	.065	1.04
1½	1.481	1.625	15	.072	1.36
2	1.959	2.125	14	.083	2.06

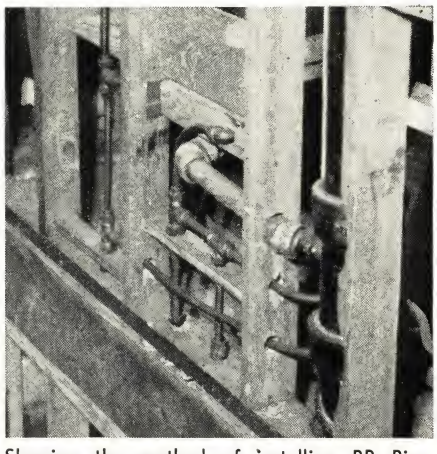
Revere Co-operation

Revere maintains a corps of experienced representatives at the service of PR Pipe users. These men can be of real assistance in the case of first installation or when unusual problems arise.



Elimination of unnecessary fittings, and ability of PR Pipe to be bent result in neat, workmanlike jobs, as the one illustrated. Notice also how the number of hangers is reduced to a minimum where hard temper PR Pipe is used.

One of the many types of expansion joints or bends which it is possible to make with PR Pipe.



Showing the method of installing PR Pipe in close quarters. Studs are pierced and PR Pipe passed through. Neat, compact, serviceable.

SPECIFICATIONS AND TESTS

Specifications

Supply Pipes

All pipes that are installed for the purpose of carrying cold water, hot water, steam, oil, gas, or other liquids and solutions containing no harmful acids, shall be of standard Full Weight PR Pipe as manufactured by Revere Copper and Brass Incorporated. The material herein specified as PR Pipe denotes the standard of quality and dimensions that are required for such pipes. Other brands and makes of pipe similar in sizes and quality may be quoted upon, but bidders on such other material must state in detail the difference in quality of manufacture, sizes and the difference in the performance.

Hard Pipe

Hard pipe shall be used for all exposed work, and for all runs—mains, risers—circulation lines and branches, where rigid piping is desirable. Such hard pipe shall be of a quality known as PR Pipe Hard and shall always be bent with a bending machine.

Soft Pipe

Soft pipe shall be used wherever it is necessary to provide for the elongation of the pipe, wherever there is a danger of freezing, or wherever a flexible pipe is required. The quality of the pipe shall be what is known as PR Pipe Soft and capable of being bent or flexed into position by hand.

Expansion Bends

All expansion bends and loops shall be of PR Pipe Soft (or hard temper) and shall be made with a proper bending machine.

Workmanship and Guarantee

Each length of pipe shall be round and of uniform thickness throughout. It shall be free from cracks, seams, slivers, scales, grooves, scratches and other inner and outer surface defects.

Revere Copper and Brass Incorporated guarantees that PR Pipe, in either hard or soft temper, will conform to the above specifications and to be made of the best quality of material and workmanship. Each length of pipe is subjected to a hydrostatic pressure test before leaving the mill.

Physical Properties and Tests

Tension tests—the pipe, Soft, or Hard, as specified, shall meet the following minimum tensile properties:

	Tensile strength, lbs. per sq. in.	Elongation in 4 ins. per cent
Soft	30,000	25
Hard	40,000	10

Bend Test

The bend test specimen shall withstand being bent flat on itself through 180 degrees while cold without cracking on the outside of the bent portion. Full sections of Soft shall withstand being bent cold through 180 degrees without cracking on the outside of the bent portion, around a pin the diameter of which is one and one-half times the inside diameter of the pipe. This test shall be in addition to the bend test above specified.

Flange Test

A full section of the pipe not more than 4 inches in length shall have a flange turned over at right angles to the axis of the pipe without showing cracks or flaws. The width of this flange as measured from the outside of the pipe shall equal double the wall thickness of the pipe.

Hydrostatic Tests

Each pipe shall withstand, without showing weakness or defects, an internal hydrostatic pressure sufficient to subject the material to a fiber stress of 6000 pounds per square inch.

Test Specimens

Tension test specimens shall consist of full sections of pipe 2 feet long. The ends shall be plugged with metal plugs which shall not extend within gauge mark.

Bend test specimen shall consist of a strip not over 1½ inches in width cut longitudinally from the pipe.

All tests shall be conducted on samples taken at random; one specimen representing each 5000 feet or less applying on the order.

HAYS MANUFACTURING COMPANY

Hays Copper Plumbing Method

ERIE, PA.

For Hays Plumbers' Brass Goods, see Manufacturers' Index

Copper Plumbing

The use of pure copper pipe for plumbing is growing rapidly since the introduction of a practical method of installation which makes its cost little more, often less, than the cost of older systems, while the result is permanent, troubleproof piping.

The use of pure copper pipe at a low cost is made possible by compression fittings which eliminate the need for threading the pipe. A thin wall pipe may be used without any sacrifice in wall strength, since the strength of heavier pipe is reduced by the depth of the threads. At the same time this thin wall pipe made of ductile copper greatly simplifies installation. The number of fittings required is reduced and the connections are easier to make.

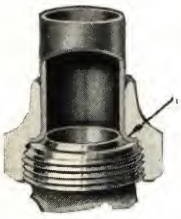
This system, installed in a workmanlike manner, means an uninterrupted flow of clear, clean water for the life of the building. A great mechanical factor in bringing about this important improvement in plumbing systems has been the Hays Double Seal Connection.

Hays Copper Plumbing Method

This is the name given to copper pipe plumbing installed with Hays Fittings.

No special plans are needed. The installation, as far as the position in the building is concerned, is practically the same as that of any other system.

Copper pipe, being ductile, can be led around obstructions, bends at corners unless very abrupt; crossovers, etc., can be made without the use of elbows.



Hays Double Seal Connection

Connection provides a double contact between flanged copper pipe and connection by means of a 45 and a 90-degree angle in the seat.

The 45-degree angle holds the pipe in a wedge, making a seal that is absolutely tight. The 90-degree angle is the shock absorber; it locks the pipe, provides a second seal of positive tightness and protects the first seal by absorbing pulling strains and vibrations.

Hays Double Seal Connections are accurately machined to match the bore of the copper pipe used, permitting the same full flow of water. Each connection is tested under a hydraulic pressure of 200 lbs. per sq. in.

Advantages of This System

This piping system, properly installed, is permanently trouble-free and will cause no interruption of the flow of water during life of the building.

Tests have been conducted for pressure, vibration, deflection, torsion and freezing and have proven that copper pipe and Hays Fittings will outlive by far any building in which they may be installed.

Copper pipe will not rust or corrode. Inside walls remain smooth and full force of the water is never diminished by deterioration of the line.

The first cost is less than a brass pipe installation and but little more than an iron or steel pipe job. Taking this thought into consideration, the Hays Copper Plumbing Method is the cheapest in the end.

Fittings

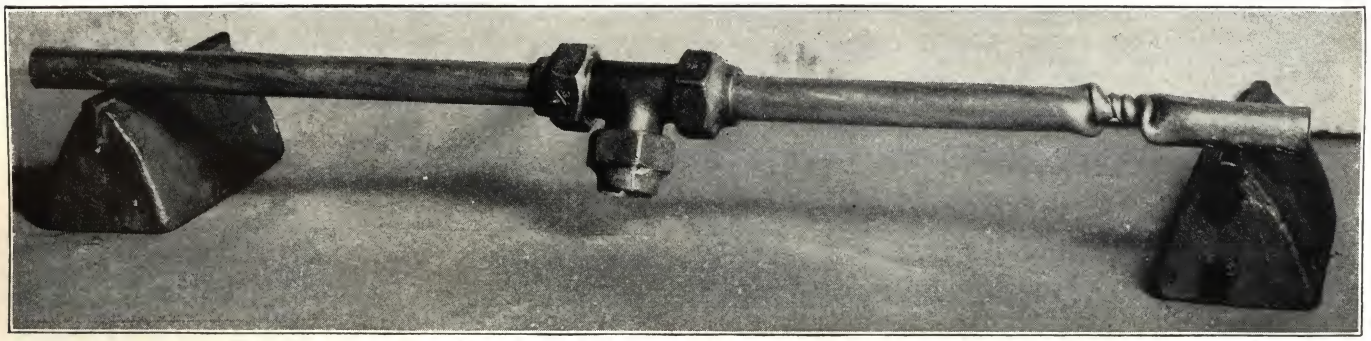
A selection of over 400 sizes and styles of fittings assures users that Hays can fill their requirements promptly.

Remodeling and Repair Work

The Hays Copper Plumbing Method should be used for replacement of worn-out piping, as here, in addition to its other advantages, it eliminates most of the tearing up of floors and cutting into walls which is often necessary where rigid pipe is used. Hays Double Seal Connections are the only fittings for copper pipe with standard iron pipe threading on coupling end to tie in with present plumbing.

Booklet

More detailed information about this system will be found in the booklet "The Hays Copper Plumbing Method," A.I.A. File No. 29b4.



Test Specimen That Has Been Subjected to Torsion of 810-inch-pounds by Machine
Although the opening was closed, no separation occurred at the fitting joints

CATALOG C

COPPER and BRASS PIPE and FITTINGS

STREAMLINE

TRADE MARK REG. U. S. PAT. OFF.

PRODUCTS

Mueller Brass Co.

PORT HURON, MICHIGAN

Mueller Brass Co.

PORT HURON, MICHIGAN

Three Generations of Brass Making

The Company

The Mueller Brass Company of Port Huron, Michigan, was incorporated in 1917 and during its industrial life has contributed some remarkable outstanding advances to industry. Immediately after the World War its executives had the vision to see the commercial possibilities in brass forgings which, previous to this time, were confined almost solely to the manufacture of munitions. Brass forgings today are one of the world's largest industries and the Mueller Brass Company is recognized as one of the world's largest manufacturers of this product. The Mueller Brass Company's contribution to the electric refrigeration industry has probably had more to do, than any other factor, in bringing it to the state of perfection that it has attained today.

In 1924 the Mueller Brass Company invented and marketed a product known as Mueller Copper Service Pipe and Fittings for waterworks service use. In a few short years this product has become standard with an ever-growing number of waterworks systems throughout the United States and Canada.

The Mueller Brass Company's latest and most revolutionary advance for plumbing, heating and industrial uses is their product known internationally as Mueller STREAMLINE Copper Pipe and Fittings which are fully described and illustrated on the succeeding pages of this catalog.

THREE GENERATIONS OF BRASSMAKING

Reliability

The Mueller Brass Company's rating in Bradstreet's and Dun's is over one million dollars—first grade of credit.

Complete control from virgin metal to finished product, including extensive engineering and laboratory facilities, is an outstanding feature in the Mueller organization. No new product is ever put upon the market without having successfully passed tests far beyond those which it would ever be called upon to withstand.

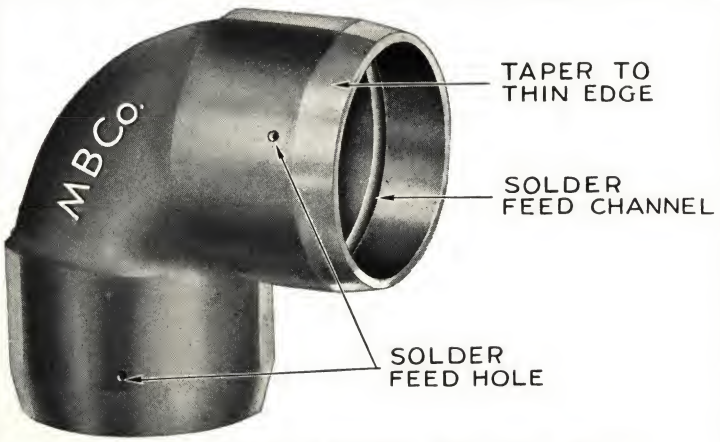
Mechanical Features of the New Mueller STREAMLINE Fitting

The new STREAMLINE Fitting invented by the Mueller Brass Company of Port Huron, Michigan, is the most revolutionary advance of the age to the development of plumbing and heating. It is a fitting made to be used by the plumber or steamfitter and requires a mechanic's skill and tools to connect. It is not intended for the jack-of-all-trades yet is readily installed by the experienced plumber or steamfitter.

The New Mueller STREAMLINE Fitting is threadless and is designed to make a conveniently soldered connection to Mueller STREAMLINE Copper Pipe for plumbing, heating and industrial uses.

The soldering is not done with a soldering iron. The fitting is heated with a blow torch after the pipe has been inserted and wire solder then introduced through a feed hole. No tinning whatever is required.

There are several distinct mechanical features utilized in the construction of Mueller STREAMLINE Fittings. The pipe openings in the fittings are machined to close tolerances and the copper pipe, when inserted in the fitting, fits snugly.



Patent 1,770,852 Patent 1,776,502 Other Patents Pending

The distance to which the copper pipe may be inserted in the fitting has been carefully determined and made positive by a shoulder in the fitting itself against which the pipe rests. This shoulder is the same thickness as the pipe wall, thus insuring a continuous uninterrupted waterway that cuts flow resistance to a minimum. STREAMLINE Fittings are now furnished with the solder feed hole drilled.

The solder feed hole is located immediately above the solder feed channel (see illustration) so that when the solder is fed in after heating with a blow torch, it is carried around and evenly distributed in all directions by capillary attraction. The pipe is thus uniformly soldered to the fitting.

The tapered ends of the fittings, which are made with a thin edge, hasten the cooling of the solder at this point and form what is known to the trade as a solder gate.

A joint made with Mueller STREAMLINE Fittings to Mueller STREAMLINE Copper Pipe is, in contrast to all other methods of connecting, actually much stronger than the pipe itself.

The Phenomenon of Capillary Attraction

The Basic Principle on Which a STREAMLINE Connection Is Made

The phenomenon of capillary attraction is really the basic principle on which the STREAMLINE Fitting is constructed. The successful application of this phenomenon in making connections with Mueller STREAMLINE Copper Pipe and Fittings depends upon close tolerances and clean surfaces. Mueller STREAMLINE Copper Pipe **is designed for and intended to be used with** Mueller STREAMLINE Fittings.

There is practically no limit to the height to which solder will rise by capillary attraction, depending upon proper working conditions and the uniform application of heat. Experiments conducted in our own laboratory have conclusively shown that it will rise at least a distance of two and one-half feet which is away and beyond anything that it would be required to do in actual practice.

Plumber making connection with Mueller STREAMLINE Fitting to Mueller Copper Pipe. Note the neat, compact appearance of the work

How a STREAMLINE Connection Is Made

The method of making a connection with a Mueller STREAMLINE Fitting to Mueller STREAMLINE Copper Pipe is by soldering, using Mueller STREAMLINE Solder, the blow torch and the application of the phenomenon of capillary attraction.

The fitting is placed on the pipe where required, after STREAMLINE Soldering flux has been applied, heated uniformly with the blow torch and STREAMLINE wire solder fed in at a conveniently drilled opening in the fitting for the purpose. The solder is drawn around evenly in the joint by capillary attraction and *immediately becomes visible as a bright line at the point of junction where pipe and fitting join, conclusively indicating that a perfect joint has been completed.* THIS IS THE ONLY JOINT THAT CAN BE VISUALLY INSPECTED DURING THE PROGRESS OF THE WORK FOR LEAKS. ACTUAL TESTING BECOMES A MERE FORMALITY.

Note this particular feature—The solder will flow up, down or laterally with equal facility and the operator can just as readily make a perfect joint by applying the solder through a solder feed hole located at the bottom of the fitting as he can if it is located at the top. There is no more difficulty in installing a pipe in the upper opening of a tee, for instance, than in the down or side outlets.

Heating up the fitting and applying the solder.

Connections Located in Places Difficult of Access

While the illustration on this page of the plumber making a connection shows him working in an almost ideal situation, there is very little trouble involved even in almost inaccessible places high up on walls or near the ceiling.

In the great majority of cases it is quite possible, after a little careful measuring has been done, to lay out and connect sections of the piping on the floor or bench.

Cost Comparisons

An installation of Mueller STREAMLINE Copper Pipe and Fittings in average residence buildings, in the great majority of cases, costs no more than a galvanized iron installation and costs a great deal less than an installation of brass pipe and fittings. It must be remembered that STREAMLINE Hard Copper Pipe is not connected by threading or flaring and consequently does not require the heavy wall of threaded brass or iron pipe. In larger buildings, however, such as hotels, large office buildings, etc., a STREAMLINE installation may cost somewhat more than an iron installation but considerably less than brass. If, however, the fact is taken into consideration that smaller sizes in STREAMLINE Copper Pipe can be used on hot water lines than corresponding service in iron, together with the high salvage value of the copper pipe, which is immediately re-usable for the same service, even after it has been in use for years, then the cost is very much lower.

Sectional view of the completed joint.

Mueller Brass Co.
PORT HURON, MICHIGAN

Mueller STREAMLINE Copper Pipe and Fittings

Procedure for Making Joints

1. Cut pipe square with STREAMLINE Pipe Cutter or fine hack saw (use 32 tooth saw preferably); use mill file to remove burr.

2. Using SANDPAPER or SANDCLOTH, rub outside of copper pipe around the end at least 1½ to 2½ inches until it becomes bright. Do not leave any dark spots.

3. Using SANDPAPER or SANDCLOTH, clean inside of fitting, where pipe goes into it, until surface becomes bright, thus removing any foreign substance.

4. Apply a light coat of Mueller Soldering flux to outside of pipe and inside of fitting. Be sure that the flux is distributed evenly. In extremely cold weather warm fitting slightly with torch to approximate room temperature (70 to 80 degrees).

5. Slip pipe into fitting until it will go no farther and turn back and forth once or twice to further insure an equal distribution of the flux.

6. Use only Mueller Special Solders as they are expressly prepared for this work. (See article in Mueller Catalog concerning special solders and fluxes.)

7. Using a blow torch, melt a drop of solder into the solder feed hole. Apply heat around the fitting until drop of solder disappears, indicating sufficient heat has been applied. Immediately remove torch and fill solder feed hole completely. If a complete ring of solder does not show all around at the junction between pipe and fitting, apply additional heat, and solder to the solder feed hole. Wipe off surplus solder and flux with cloth. If solder runs out too freely from between pipe and fitting, too much heat has been applied.

8. It is necessary on sizes larger than 1¼ in. to move the fitting on the pipe or tap with hammer when the solder starts in, to break the surface tension and to insure an equal distribution of solder.

9. When soldering large sizes, insert wooden plug in end of pipe to stop dissipation of heat.

Classification of STREAMLINE Copper Pipe

On account of the many varying conditions in actual use, the Mueller Brass Company, after many experiments and tests, now furnish STREAMLINE Copper Pipe in five classifications as follows:

Standard Hard STREAMLINE Copper Pipe is recommended for hot and cold water, air, etc., up to 200 lbs. operating pressure and on steam (saturated) up to *50 lbs. gauge. This pipe is not for bending (see below for soft pipe). It is for use with Mueller STREAMLINE Fittings. It is shipped boxed in straight lengths of 20 feet.

Heavy Hard STREAMLINE Copper Pipe is recommended for hot and cold water, air, etc., up to 300 lbs. operating pressure and on steam (saturated) up to *50 lbs. gauge. This pipe is not for bending (see below for soft pipe). It is for use with Mueller STREAMLINE Fittings. It is shipped boxed in straight lengths of 20 feet.

Extra-Heavy Hard STREAMLINE Copper Pipe is recommended for hot and cold water, air, etc., up to 500 lbs. operating pressure and on steam (saturated) up to *50 lbs. gauge. This pipe can be bent after annealing with a blow torch. It is for use with Mueller STREAMLINE Fittings. It is shipped boxed in straight lengths of 20 feet.

Pipe of the above classifications is of requisite stiffness for ease in handling and installing, particularly on new or exposed jobs.

Heavy Soft STREAMLINE Copper Pipe is recommended for all work requiring bends, flares, concealed replacements and repairs, for plumbing and heating, hot and cold water, compressed air and vacuum lines, for operating pressures up to 200 lbs. and on steam (saturated) up to *50 lbs. gauge. This pipe can be bent without annealing.

Extra-Heavy Soft STREAMLINE Copper Pipe is recommended for all work requiring bends, flares, concealed replacements and repairs, for plumbing and heating, hot and cold water, compressed air and vacuum lines, and for underground work, for operating pressure up to 300 lbs. and on steam (saturated) up to *50 lbs. gauge. This pipe can be bent without annealing.

On certain work where it is considered good practice to make bends in the pipe rather than to use elbows, **Heavy Soft** or **Extra-Heavy Soft** STREAMLINE Copper Pipe should be used.

When installing this pipe it is necessary to use the Mueller Sizing Tool. This pipe is shipped crated in coils of 30 to 60 ft. lengths up to and including 1 in. nominal pipe sizes or boxed in straight lengths of 20 feet.

*For steam pressures up to 15 lbs. use Mueller No. 50 solder and Mueller No. 50 flux. For steam pressures from 15 lbs. to 50 lbs. use Mueller No. 104 solder and No. 104 flux. For steam pressures in excess of 50 lbs. or for any special use, write Mueller Brass Co.

OUTSTANDING ADVANTAGES
of Mueller STREAMLINE Copper Pipe and STREAMLINE Fittings

Elimination of Threaded Connections

Piping Systems commonly used in the past for plumbing and heating have required labor consuming threaded connections. The advent of the Mueller STREAMLINE Copper Pipe and Fittings is the first practical solution of a permanently tight, easily made soldered connection. By the elimination of the cut thread the strength of the tube or pipe is not reduced at the connections—the STREAMLINE Fitting and the completely soldered connection actually increase the strength of the piping system.

Permanence

Made of 99.90% pure copper, Mueller STREAMLINE Copper Pipe is permanently non-corroding except under extremely unfavorable conditions seldom encountered.

It is hard drawn and is shipped in 20-ft. straight lengths. Being hard drawn it retains its fine straight appearance and when installed there are no kinks, ripples or bends to spoil the effect.

It requires no more hangers or supports than an ordinary iron installation—it actually weighs less.

With soft copper pipe there is always the danger of driving nails through it during the process of lathing, etc. With Mueller STREAMLINE Hard Copper Pipe (Standard, Heavy and Extra-Heavy) tests conclusively show that its hard surface readily deflects nail points.

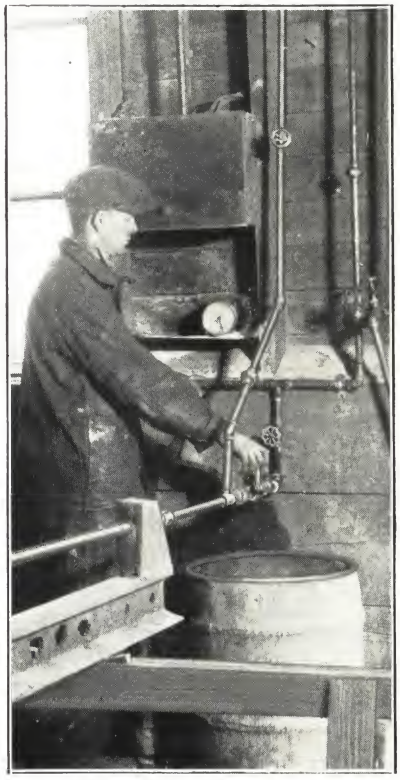
Installations of materials that rust away and corrode will, at best, last but a few years depending upon the nature of the soil or water and will then have to be replaced. In many cases corrosion and rust will start almost immediately, gradually decreasing their service and cutting down the flow capacity. At the end of a few years they have no salvage value. An installation of Mueller STREAMLINE Copper Pipe and STREAMLINE Fittings will continue to give uninterrupted capacity service during the entire life of the building.

Conservation of Space in Construction

Space saving is of major importance to both architect and owner. STREAMLINE Copper Pipe and Fittings require approximately 30% less space than other materials owing to the fact that no room is required for wrench grip or swing necessitated by screwed fittings and that a STREAMLINE Fitting, although enormously strong, is little larger than the pipe itself. An installation of STREAMLINE Copper Pipe and Fittings can be placed close to walls, partitions or ceilings, and thus decreases space for vertical pipe shafts and horizontal pipe spaces.

Absence of Noise in STREAMLINE Installations

The smooth interior of the STREAMLINE Pipe and the absence of turmoil at the recessed fittings make for extreme quietness when water is running through it. This quality of silence is greatly desirable in residences, and particularly in apartment and hotel buildings where the noise created by water traveling through most piping systems is a source of considerable annoyance to people in adjoining rooms.



Illustrating method of alternating cold water and steam through STREAMLINE Copper Pipe in expansion and contraction test.

Tests

Expansion and Contraction—Several sections of ¾-in. Mueller STREAMLINE Copper Pipe were connected with Mueller STREAMLINE couplings making a total length of 36 ft. containing 14 joints. Cold water was run through the Pipe for 15 seconds alternated with 100 lb. of steam at 339° F. This alternating test of steam and cold water was run continuously until 20,160 complete cycles had been effected. After a thorough inspection there was not the slightest sign of any damage or leak in the connection. This test was a very severe one and in view of the results obtained should satisfactorily answer any questions as to its dependability under service conditions.

Vibration—A test to determine the effect of continued vibration on connections made with Mueller STREAMLINE fittings to STREAMLINE Copper Pipe was conducted as follows:

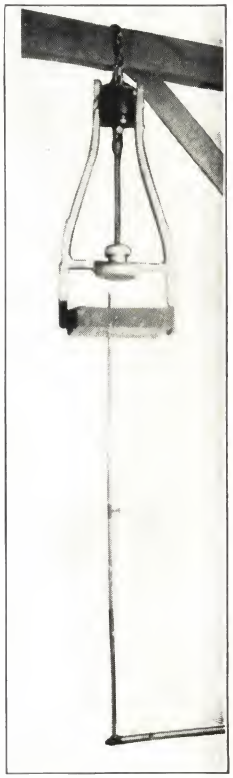
The test was run on a 10-ft. length of ¾ in. vertical pipe which contained nine joints; the lower end was held rigid. The upper end of the pipe was attached to a vibrator. The vibrator was set in motion and run continuously day and night for one week. The pipe was subjected to 850 vibrations per minute, totaling 8,568,000 vibrations over the test period with not the slightest sign of failure.

Tensile Strength—Two pieces of ¾ in. iron pipe were screwed into a coupling and pulled on the Olsen testing machine. Repeated experiments showed that the threads fractured at about 6,400 lbs.

Extra-heavy STREAMLINE Copper Pipe soldered into STREAMLINE coupling and subjected to the same test resulted in a fracture of the tube itself at slightly over 9,000 lbs. but showed not the slightest sign of joint failure.

Deflection or Bending—Two pieces of ¾ in. iron pipe size brass pipe 6 in. long were screwed into a coupling and placed over supports 5⅜ in. center to center. A deflection test showed that the thread failed at 1 1/16 in. from horizontal.

The same test was carried out on two 6 in. pieces of Standard and Extra-Heavy STREAMLINE Copper Pipe and after being bent to a 45° angle the joint was still intact.



Vibration Test

Radiation and Heat Conservation

A Mueller STREAMLINE Copper Pipe and Fitting installation radiates very little heat and in hot water lines, steam lines, etc., can be very often installed **without insulation.**

Copper heating surfaces are widely used at present, especially in the form of finned tubes for convection heat transfer or as exemplified in the numerous types of automobile engine-cooling-radiators. It is interesting to note that without exception, when brass and copper surfaces are successfully used for heat transfer, the effective radiation area is necessarily greatly increased as by the use of fins, and a current of air must be kept steadily moving over such surfaces; this current being provided either by power driven fans or by natural convection such as may be effected by heated flues above the warm surfaces.

The users of the ultra modern concealed heaters built into the walls under the windows of so many residences have learned the extreme importance of the height of the heated flue or drafthead.

When air ceases to travel over the smooth surface of a heated copper pipe, heat transfer ceases to a great extent. If the heat transfer by radiation from an ideal black body is called 1.0 the corresponding heat transfer from polished is 0.1. If the copper has been heavily oxidized even to the extent of becoming nearly black, its value is only .72. It is fair to say that a copper surface may radiate only about one-ninth as much heat as a corresponding unpainted steel surface such as that of a commercial pipe.

An important point to remember is the fact that the hot exposed surface areas of the thinner, smaller copper pipes will be much less in extent than that of ferrous piping. In the judgment of many experienced steam fitters and based on well authenticated installations which have passed through several heating seasons, the pipe sizes marked on the plans could be reduced at least one size throughout by using STREAMLINE Copper Pipe and Fittings. This is largely due to the smooth interior of the pipe, the absence of clogging rust and slimy accumulations and to the elimination of turmoil at the recessed fittings. This reduction in size represents, of course, a material saving in costs.

According to information published by the Copper and Brass Extended Uses Council of Great Britain, a copper pipe 100 feet long having a ⅜ inch bore, and .447 inch outside diameter, requires 237 B.t.u.'s to heat up from 60° F. to 200° F., as compared with 1450 B.t.u.'s to heat 100 feet of iron pipe of ½ inch bore and .840 inch outside diameter, to the same temperature. This conservation of heat in combination with the low radiation and smaller exposed area, is equivalent to a saving of one ton of coal per annum for every 100 feet of copper pipe used.

It must be remembered that although copper pipe surfaces radiate very little heat, copper itself is a very rapid conductor of heat. Therefore it naturally follows that there is considerably less loss of heat when being conveyed from the point of generation to the points of distribution.

The advantages mentioned above, together with the fact that there is no room required for a wrench grip and that the fitting itself is very little larger than the pipe, permits of it being installed closer to partitions and walls. In making a connection close to walls, ceiling or partition, the mechanic can readily overcome the objectionable features of scorching with the blow torch by using a thin sheet of asbestos on a simple wire bracket hooked around the pipe.

A STREAMLINE Installation Permits the Use of Smaller Radiator Connections on Hot Water Heating

Since the shoulder inside a STREAMLINE Fitting against which the pipe rests, is the same thickness as the pipe wall, a smooth, uniform, uninterrupted waterway or bore is maintained. In addition, copper pipe does not clog or rust and the original flow capacity remains the same.

These qualities permit the use of the following sizes of radiator connections for hot water heating:

Radiator Tappings	First Story	Second Story
⅜"	0- 25 sq. ft.	0- 30 sq. ft.
½"	26- 60 sq. ft.	31- 90 sq. ft.
¾"	61-100 sq. ft.	91-125 sq. ft.

The size of mains must be equal to or larger in cross section than the area of all the branches, workmanship must be first class and adjustable radiator valves must be used.

Under these conditions STREAMLINE Hard Copper Pipe and Fittings in the above sizes will provide ample water circulation.

For Repair and Replacement Work

An installation of STREAMLINE Copper Pipe and Fittings cannot rust. They are ideal for replacement work and when once installed, last a lifetime without further attention.

The cost of STREAMLINE Copper Pipe and Fittings is approximately the same as iron but costs very much less than iron in repair jobs, owing to the fact that it is not necessary to tear up large areas of wall and flooring to make a replacement. The removal of a base or floor board is generally all that is necessary.

Mueller **Heavy Soft** and **Extra-Heavy Soft** STREAMLINE Copper Pipe is pliable enough to be easily bent and worked around projections. It may be readily run between studding, over or under electric conduits, by manipulating and bending the pipe in almost the same way as an electrician installs an electric cable. A STREAMLINE installation requires less room than any other material for the same purpose. A STREAMLINE joint is the Strongest Part of the Installation and no apprehension need be felt concerning future leakage at these points.

STREAMLINE Copper Pipe is provided in both hard and soft tempers and there are jobs where either or both may be used to very good advantage. Mueller **Standard Hard, Heavy Hard** and **Extra-Heavy Hard** STREAMLINE Copper Pipe are particularly suitable on some of the larger jobs where utility corridors or large partition areas are available. In these cases, straight length runs are easily handled and the compactness of the STREAMLINE Fitting, which is very slightly larger than the pipe itself, makes an exceptionally handsome job.

Mueller STREAMLINE Fittings

STREAMLINE 90° Elbow
Copper to Copper
This Elbow is furnished in sizes from ¼ to 6 in. inclusive.

IMPORTANT

All Mueller STREAMLINE Fittings are fully covered by U. S. Patents granted.

Nos. 1,770,852 / 1,776,502

Other patents have been applied for.

Note

STREAMLINE Fittings are furnished with the solder feed hole drilled.

STREAMLINE Coupling
Copper to Copper
Furnished in sizes from ¼ to 6 in. inclusive.

General Information on Mueller STREAMLINE Copper to Copper Couplings

These are provided with an internal stop or boss situated midway from the two pipe openings. This makes positive the distance to which pipe may be inserted in the fitting. To use the connection as a union coupling, stop can be flattened by placing over a rounded surface such as a pipe or chisel and striking a few light blows with hammer.

STREAMLINE 90° Elbow
Copper to Outside I.P.S.
This Elbow is furnished in sizes from ¼ to 6 in. inclusive.

STREAMLINE Coupling
Copper to Outside I.P.S.
This Coupling is furnished in sizes from ¼ to 6 in. inclusive.

STREAMLINE 90° Elbow
Copper to Inside I.P.S.
Furnished in sizes from ⅜ to 4 in. inclusive.

STREAMLINE 45° Elbow
Copper to Copper
Furnished in sizes from ⅜ to 6 in. inclusive.

STREAMLINE Coupling
Copper to Inside I.P.S.
Furnished in sizes from ¼ to 2 in. inclusive.

Mueller Brass Co.

PORT HURON, MICHIGAN

Mueller STREAMLINE Fittings

Patent Nos. 1,770,852 and 1,776,502

(Other Patents Applied For)

STREAMLINE Tee
Copper to Copper to Copper
This Tee is furnished in sizes from ¼ to 6 in. incl.

STREAMLINE Tee
Copper to Copper to Inside I.P.S.
Furnished in sizes from ⅜ to 2 in. inclusive.

Inside I.P.S. to Copper to Copper
Furnished in the following sizes:
½" inside I.P.S. x ½" c. x ½" c.
¾" inside I.P.S. x ¾" c. x ¾" c.

STREAMLINE Crosses
Copper to Copper
Furnished in the following sizes:

1"x1"x1"x1"	2"x2"x2"x2"
1¼"x1¼"x1¼"x1¼"	2½"x2½"x2½"x2½"
1½"x1½"x1½"x1½"	3"x3"x3"x3"

STREAMLINE Fitting Nipple
Fitting to Outside I. P. S.
Furnished in sizes from ⅜ to 6 in. inclusive

STREAMLINE Fitting Coupling
Fitting to Inside I. P. S.
This coupling is furnished in sizes from ⅜ to 2½ in. inclusive

⅜" to ⅜"	1¼" to 1¼"
½" to ½" or ⅜"	1½" to 1½" or 1¼"
¾" to ¾" or ½"	2" to 2"
1" to 1" or ¾"	2½" to 2½"

STREAMLINE 90°
Street Elbow

Fitting to Copper
Furnished in sizes:
½"x½", ¾"x¾" and 1"x1"

STREAMLINE Bushings Fitting to Copper

SIZES

⅜" to ¼"	1½" to 1¼", 1" or ¾"
½" to ⅜" or ¼"	2" to 1½", 1¼" or 1"
¾" to ½" or ⅜"	2½" to 2", 1½" or 1¼"
1" to ¾" or ½"	3" to 2½", 2" or 1½"
1¼" to 1", ¾" or ½"	4" to 3", 2½" or 2"

STREAM-LINE 45° Street Elbow

Fitting to Copper
Furnished in sizes:
½"x½", ¾"x¾", and 1"x1"

Mueller STREAMLINE Fittings

Patents Nos. 1,770,852 and 1,776,502
(Other Patents Applied For)

STREAMLINE Drop Ear Tee
Copper to Copper to Inside I.P.S.
½" C. x ½" C.x½" Inside I.P.S.
½" C. x ½" C.x⅜" Inside I.P.S.
Copper to Copper to Copper
½" to ½" to ½", and ¾" to ¾" to ¾"

STREAMLINE Drop Ear Elbow
Copper to Inside I.P.S.

⅜"x⅜"	½"x⅜"
½"x½"	1¼"x1"

Copper to Copper
⅜" to ⅜", ½" to ½", and ¾" to ¾"

STREAMLINE Plug
Sizes from ¼ to 2 in. inclusive.

STREAMLINE Cap
Sizes from ¼ to 6 in. inclusive.

STREAMLINE Eccentric Coupling
Copper to Copper

¾"x ½"	2" x1½"	3½"x2½"
1" x ¾"	2" x1¼"	4" x3½"
1¼"x ¾"	2½"x2"	4" x3"
1¼"x1"	3" x2½"	5" x4"
1½"x1¼"	3" x2"	6" x5"
	3½"x3"	

90° Range Boiler Elbow

STREAMLINE Range Boiler Fittings
STREAMLINE Range Boiler Couplings, and 90° Elbows are furnished in the following sizes:
¾" Copper x1" Outside I.P.S.x¾" Inside I.P.S. Coupling or Elbow
½" Copper x1" Outside I.P.S.x½" Inside I.P.S. Coupling or Elbow
¾" Copper x1" Outside I.P.S.x½" Inside I.P.S. Coupling or Elbow

Range Boiler Coupling

Mueller Brass Co.
PORT HURON, MICHIGAN

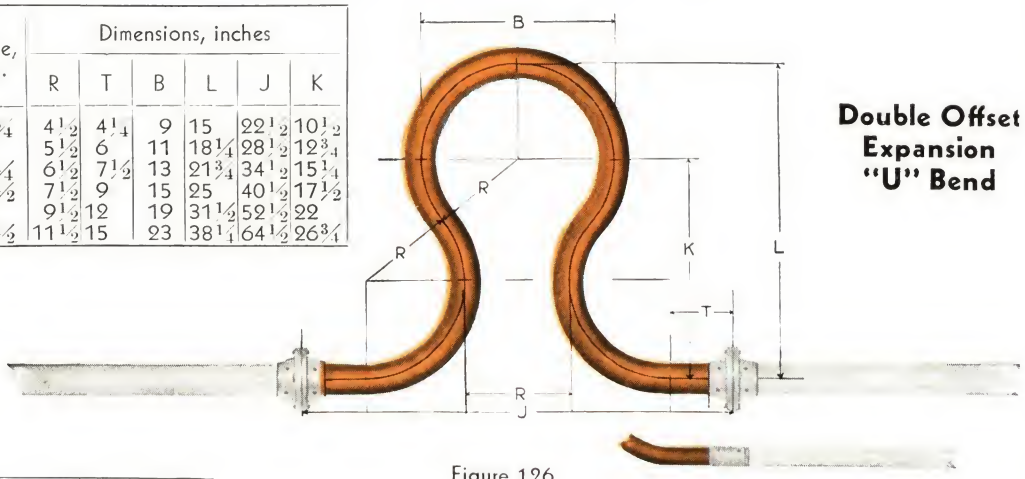
Hard STREAMLINE Copper Expansion Loops and Bends

The loops and bends illustrated herewith are particularly designed to take care of a large percentage of low pressure heating requirements on STREAMLINE installations and are shipped from stock.

Note that Double Offset Expansion U Bends as shown below in figures 126 and 127 are designed to take care of 1¼ in. of expansion when set in place without springing. These allow sufficient movement for an ordinary run of 100 ft. of pipe, either steam or return lines. Twice this movement may be obtained by springing open 1¼ in. when assembling.

All STREAMLINE Expansion loops, bends, sweeps, offsets and return bends are made from Mueller Extra, Heavy Hard STREAMLINE Copper Pipe.

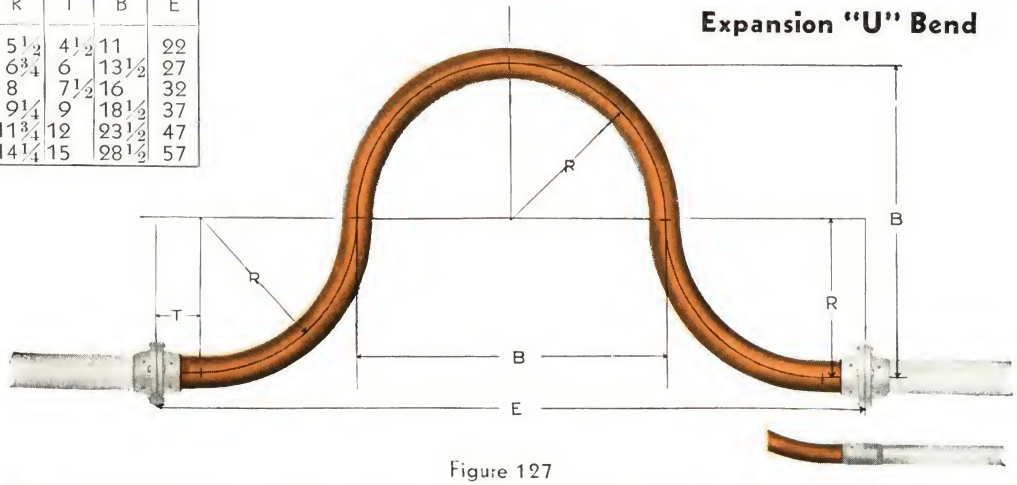
Part No.	Size, in.	Dimensions, inches					
		R	T	B	L	J	K
A-3100	¾	4½	4¼	9	15	22½	10½
A-3101	1	5½	6	11	18¼	28½	12¾
A-3102	1¼	6½	7½	13	21¾	34½	15¼
A-3103	1½	7½	9	15	25	40½	17½
A-3104	2	9½	12	19	31½	52½	22
A-3105	2½	11½	15	23	38¼	64½	26¾



Double Offset Expansion "U" Bend

Figure 126

Part No.	Size, in.	Dimensions, inches			
		R	T	B	E
A-3106	¾	5½	4½	11	22
A-3107	1	6¾	6	13½	27
A-3108	1¼	8	7½	16	32
A-3109	1½	9¼	9	18½	37
A-3110	2	11¾	12	23½	47
A-3111	2½	14¼	15	28½	57



Expansion "U" Bend

Figure 127

STANDARD COMPANION FLANGES

Patents Nos. 1,770,852 and 1,776,502
(Other Patents Applied For)
Sizes—2, 2½, 3, 3½, 4, 5, and 6 in.

The STREAMLINE companion flange (illustrated) offers several important advantages over brass or ferrous pipe installations. They permit an easy, inexpensive installation because of the absence of threads which are difficult to cut in the larger sizes. On account of the ease with which lengths may be figured and cut they save time and patching at the finishing section of any companion flange installation. When pipe lines must be removed STREAMLINE installations come down as readily as they go up and troubles arising through taking apart corroded threaded joints with frequent breakage and added expense are eliminated. This feature does much toward the further elimination of costly delays.

STREAMLINE Copper Sweeps, Offsets and Return Bends

These items are standardized for STREAMLINE Installations and are shipped from stock.

Quarter Bend

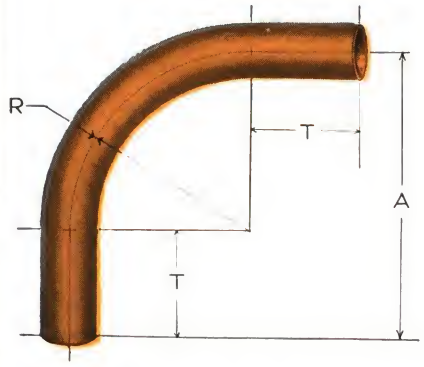


Figure 128

Eighth Bend

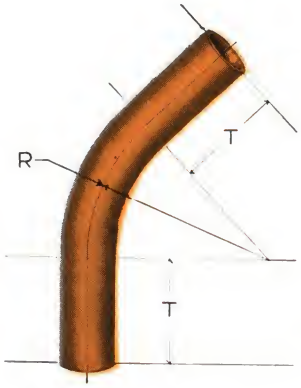


Figure 129

Return Bend

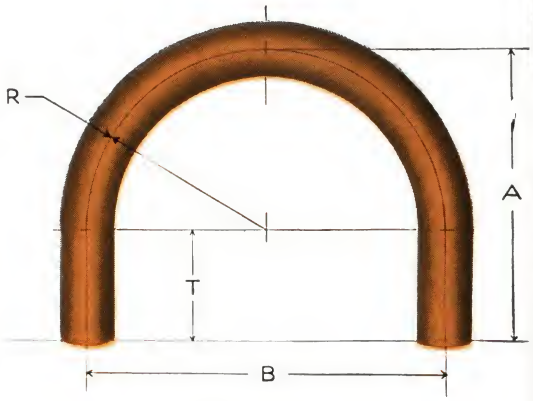


Figure 130

Offsets will prove extremely convenient in many locations.

They have been developed to meet the requirements of most STREAMLINE installations and are made from Extra-Heavy Hard STREAMLINE Copper Pipe.

Shipment from stock.

Fig. 128 Part No.	Fig. 129 Part No.	Fig. 130 Part No.	Nom. Size	R	T	A	B
A-3112	A-3119	A-3126	½″	3½″	3″	6½″	7″
A-3113	A-3120	A-3127	¾″	4½″	4½″	9″	9″
A-3114	A-3121	A-3128	1″	5½″	6″	11½″	11″
A-3115	A-3122	A-3129	1¼″	6½″	7½″	14″	13″
A-3116	A-3123	A-3130	1½″	7½″	9″	16½″	15″
A-3117	A-3124	A-3131	2″	9½″	12″	21½″	19″
A-3118	A-3125	A-3132	2½″	11½″	15″	26½″	23″

Offset

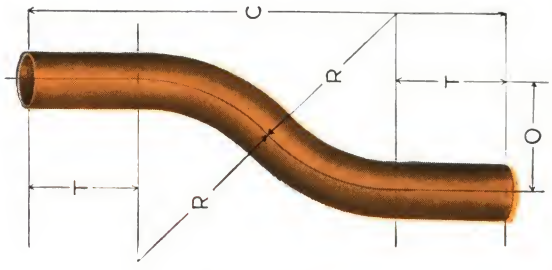


Figure 131

Part No.	Nom. Size	Amt. of Offset "O"	Length "C"	R	T
A-3133	½″	1½″	10½″	3½″	3″
A-3134	½″	3″	11¾″	3½″	4½″
A-3135	¾″	1½″	14″	4½″	4½″
A-3136	1″	1½″	17½″	5½″	6″
A-3137	1″	3″	19½″	5½″	6″
A-3138	1¼″	1½″	21″	6½″	7½″
A-3139	1¼″	3″	23½″	6½″	7½″
A-3140	1½″	2″	25½″	7½″	9″
A-3141	1½″	4″	28″	7½″	9″
A-3142	2″	2″	32½″	9½″	12″
A-3143	2″	4″	35½″	9½″	12″
A-3144	2½″	2″	39¼″	11½″	15″
A-3145	2½″	4″	43″	11½″	15″

Catalog No. A-11130

STREAMLINE Range Boiler Dip Tube

Mueller STREAMLINE Range Boiler Dip Tubes are made from Standard Hard STREAMLINE Copper Pipe and are 54 in. in length. They are attached to a ½ in. outside I. P. S. Bushing thus permitting their general use. They are recommended also for use in connection with STREAMLINE Range Boiler Fittings which thread directly into the range boiler and provide a STREAMLINE outlet in addition to the STREAMLINE I. P. S. thread to receive the dip tube.

Mueller Brass Co.
PORT HURON MICHIGAN

Architect's Specifications for Mueller STREAMLINE Copper Pipe and Copper Fittings

No. 101
Standard Hard STREAMLINE Copper Pipe and Fittings

For Pressures Up To 200 Pounds For Heating, Plumbing and Industrial Uses

1. All plumbing and heating, hot and cold water, compressed air and vacuum lines for pressures up to 200 pounds and saturated steam up to 50 pounds (gauge)*, up to and including 6 inch shall be **Standard Hard** STREAMLINE Copper Pipe.
2. The pipe shall be made from deoxidized copper, and shall analyze not less than 99.9% copper, and shall withstand a hydrostatic test of 6000 pounds per square inch fibre stress.

   All fittings are for pressures up to 200 pounds and shall withstand a 75 pound air pressure test under water, for porosity.
3. The **Standard Hard** STREAMLINE Copper Pipe and Fittings shall be manufactured by the Mueller Brass Co., Port Huron, Michigan.
4. Weights and Dimensions of **Standard Hard** STREAMLINE Copper Pipe.

Nominal Size, In.	Wall Thickness, In.	Pounds per Lineal Foot	O. D. Tolerance
1/8	.025	.068	.250 + or − .001
1/4	.025	.106	.375 + or − .001
3/8	.025	.144	.500 + or − .001
1/2	.028	.203	.625 + or − .001
3/4	.032	.328	.875 + or − .001
1	.035	.464	1.125 + or − .0015
1 1/4	.042	.681	1.375 + or − .0015
1 1/2	.049	.940	1.625 + or − .002
2	.058	1.46	2.125 + or − .002
2 1/2	.065	2.03	2.625 + or − .002
3	.072	2.68	3.125 + or − .002
3 1/2	.083	3.58	3.625 + or − .002
4	.095	4.66	4.125 + or − .002
5	.109	6.65	5.125 + or − .002
6	.120	8.77	6.125 + or − .002

5. No pipe exceeding the O. D. tolerance shown will be accepted. The weight of the pipe shall vary not more than 5% from the weight specified.

   The thickness at any point shall not be less than that specified by more than 5%.
6. *Joints with STREAMLINE Fittings and STREAMLINE Copper Pipe must be made with solders and non-corrosive fluxes as supplied by the Mueller Brass Co.

No. 106
Heavy Hard STREAMLINE Copper Pipe and Fittings

For Pressures Up To 300 Pounds For Heating, Plumbing and Industrial Uses

1. All plumbing and heating, hot and cold water, compressed air and vacuum lines for pressures up to 300 pounds and saturated steam up to 50 pounds (gauge)* up to and including 2 inch shall be **Heavy Hard** STREAMLINE Copper Pipe.
2. The pipe shall be made from deoxidized copper and shall analyze not less than 99.9% copper, and shall withstand a hydrostatic test of 6000 pounds per square inch fibre stress.

   All fittings are for pressures up to 300 pounds and shall withstand a 75 pound air pressure test under water for porosity.
3. The **Heavy Hard** STREAMLINE Copper Pipe and Fittings shall be manufactured by the Mueller Brass Co., Port Huron, Michigan.
4. Weights and Dimensions of **Heavy Hard** STREAMLINE Copper Pipe.

Nominal Size, In.	Wall Thickness, In.	Pounds per Lineal Foot	O. D. Tolerance
3/8	.035	.198	.500 + or − .001
1/2	.040	.284	.625 + or − .001
3/4	.045	.454	.875 + or − .001
1	.050	.653	1.125 + or − .0015
1 1/4	.055	.882	1.375 + or − .0015
1 1/2	.060	1.141	1.625 + or − .002
2	.070	1.748	2.125 + or − .002

5. No pipe exceeding the O. D. tolerance shown will be accepted. The weight of the pipe shall vary not more than 5% from the weight specified.

   The thickness at any point shall not be less than that specified by more than 5 per cent.
6. * Joints with STREAMLINE Fittings and STREAMLINE Copper Pipe must be made with solders and non-corrosive fluxes as supplied by the Mueller Brass Co.

*Mueller STREAMLINE Solders and Fluxes

The Mueller Brass Co. supplies special wire solder and fluxes for making connections with STREAMLINE Copper Pipe and Fittings, depending upon the temperatures encountered in service. They were selected after experiments and tests as the best materials for their particular use. If solders and fluxes other than those recommended were used and defective work resulted, the blame might be unjustly attributed to STREAMLINE pipe and fittings.

GENERAL USES FOR SPECIFYING

For steam pressures up to 15 lbs., specify Mueller No. 50 solder and Mueller No. 50 Flux.

For steam pressures from 15 to 50 lbs. specify Mueller No. 104 Solder and Mueller No. 104 Flux.

For steam pressures in excess of 50 lbs., or for any special use, write Mueller Brass Co.

No. 102
Extra-Heavy Hard STREAMLINE Copper Pipe and Fittings

For Pressures Up To 300 Pounds
For Heating, Plumbing and Industrial Uses

1. All plumbing and heating, hot and cold water, compressed air and vacuum lines for pressures up to 500 pounds, and saturated steam up to 50 pounds (gauge)*, up to and including 6 inch, shall be **Extra-Heavy Hard** STREAMLINE Copper Pipe.
2. The pipe shall be made from deoxidized copper, and shall analyze not less than 99.9% copper, and shall withstand a hydrostatic test of 6000 pounds per square inch fibre stress.
   Standard fittings up to 1¼ inch, and Extra-Heavy fittings over 1¼ inch are for pressures up to 500 pounds, and shall withstand a 75 pound air pressure test under water, for porosity.
3. The STREAMLINE **Extra Heavy Hard** Copper Pipe and Fittings shall be manufactured by the Mueller Brass Co., Port Huron, Michigan.
4. Weights and Dimensions of **Extra-Heavy Hard** STREAMLINE Copper Pipe.

Nominal Size, In.	Wall Thickness, In.	Pounds per Lineal Foot	O. D. Tolerance
⅛	.032	.085	.250 + or − .001
¼	.032	.134	.375 + or − .001
⅜	.049	.269	.500 + or − .001
½	.049	.343	.625 + or − .001
¾	.065	.640	.875 + or − .001
1	.065	.838	1.125 + or − .0015
1¼	.065	1.04	1.375 + or − .0015
1½	.072	1.36	1.625 + or − .002
2	.083	2.06	2.125 + or − .002
2½	.095	2.92	2.625 + or − .002
3	.109	4.00	3.125 + or − .002
3½	.120	5.12	3.625 + or − .002
4	.134	6.51	4.125 + or − .002
5	.148	8.75	5.125 + or − .002
6	.165	11.96	6.125 + or − .002

5. No pipe exceeding the O. D. tolerance shown will be accepted. The weight of the pipe shall vary not more than 5% from the weight specified.
   The thickness at any point shall not be less than that specified by more than 5 per cent.
6. Joints with STREAMLINE Fittings and STREAMLINE Copper Pipe must be made with solders and non-corrosive fluxes as supplied by the Mueller Brass Co.

No. 103
Extra-Heavy Soft STREAMLINE Copper Pipe and Fittings

For Pressures Up To 300 Pounds
For Bends, Flares, Underground Work, Repairs and Replacements

1. All work requiring a flexible pipe for bends, flares, concealed replacements and repairs, for plumbing and heating, hot and cold water, compressed air and vacuum lines and for under-ground, for pressures up to 300 pounds, and saturated steam up to 50 pounds (gauge)*, up to and including 2 inch, shall be **Extra-Heavy Soft** STREAMLINE Copper Pipe.
2. The pipe shall be made from deoxidized copper, and shall analyze not less than 99.9% copper, and shall withstand a hydrostatic test of 6000 pounds per square inch fibre stress.
   All fittings are for pressures up to 300 pounds and shall withstand a 75 pound air pressure test under water, for porosity.
3. The **Extra-Heavy Soft** STREAMLINE Copper Pipe and Fittings shall be manufactured by the Mueller Brass Co., Port Huron, Michigan.
4. Weights and Dimensions of **Extra-Heavy Soft** STREAMLINE Copper Pipe.

Nominal Size, In.	Wall Thickness, In.	Pounds per Lineal Foot	O. D. Tolerance**
⅛	.032	.085	.250 + or − .001
¼	.032	.134	.375 + or − .001
⅜	.049	.269	.500 + or − .001
½	.049	.343	.625 + or − .001
¾	.065	.640	.875 + or − .001
1	.065	.838	1.125 + or − .0015
1¼	.065	1.04	1.375 + or − .0015
1½	.072	1.36	1.625 + or − .002
2	.083	2.06	2.125 + or − .002

5.** The O.D. tolerance of the pipe may vary from that specified, due to the soft temper. Sizing tools, manufactured by the Mueller Brass Co., should be used to insure a perfect fit for each joint prior to soldering.
   The weight of the pipe shall vary not more than 5 per cent from the weight specified.
   The thickness at any point shall not be less than that specified by more than 5 per cent.
6. Joints with STREAMLINE Fittings and STREAMLINE Copper Pipe must be made with solders and non-corrosive fluxes as supplied by the Mueller Brass Co.

No. 107—Heavy-Soft STREAMLINE Copper Pipe and Fittings

For Pressures Up To 200 Pounds
For Bends, Flares, Underground Work, Repairs and Replacements

1. All work requiring a flexible pipe for bends, flares, concealed replacements and repairs, for plumbing and heating, hot and cold water, compressed air and vacuum lines and for underground, for pressures up to 200 pounds, and saturated steam up to 50 pounds (gauge)*, up to and including 2 inch, shall be **Heavy Soft** STREAMLINE Copper Pipe.
2. The pipe shall be made from deoxidized copper and shall analyze not less than 99.9% copper, and shall withstand a hydrostatic test of 6000 pounds per square inch fibre stress.
   All fittings are for pressures up to 200 pounds and shall withstand a 75 pound air pressure test under water for porosity.
3. The **Heavy Soft** STREAMLINE Copper Pipe and Fittings shall be manufactured by the Mueller Brass Co., Port Huron, Michigan.
4.** The O. D. Tolerance of the pipe may vary from that specified, due to the soft temper. Sizing tools, manufactured by the Mueller Brass Co., should be used to insure a perfect fit for each joint prior to soldering.
   The weight of the pipe shall vary not more than 5% from the weight specified.
   The thickness at any point shall not be less than that specified by more than 5 per cent.
5. Joints with STREAMLINE Fittings and STREAMLINE Copper Pipe must be made with solders and non-corrosive fluxes as supplied by the Mueller Brass Co.
6. Weights and Dimensions of **Heavy Soft** STREAMLINE Copper Pipe.

Nominal Size, In.	Wall Thickness, In.	Pounds per Lineal Foot	O. D. Tolerance**
⅜	.035	.198	.500 + or − .001
½	.040	.284	.625 + or − .001
¾	.045	.454	.875 + or − .001
1	.050	.653	1.125 + or − .0015
1¼	.055	.882	1.375 + or − .0015
1½	.060	1.141	1.625 + or − .002
2	.070	1.748	2.125 + or − .002

See page 3 for classification and uses.

*See page 11 for solders and fluxes.

Mueller Brass Co.
PORT HURON, MICHIGAN

Relative Discharge Capacity
Mueller STREAMLINE Copper Pipe

This is a table similar to those long established for use with iron pipe sizes when figuring capacities of mains for many branches or laterals. It does not take into account, pressure drop due to wall friction, elbows, etc., nor does it have anything to do with velocities.

In effect:—you may have eight ¾ in. laterals; therefore follow down the column under ¾ in. until you come to an approximation of the eight; in this case between 6.14 and 9.47. Your main then will be 2 or 2½ in. depending entirely on the class of service.

Since such a table is written around the idea that ALL LATERALS ARE WORKING TO CAPACITY AT THE SAME TIME, it is more or less of a generality and good judgment should, of course, be used.

Standard Hard STREAMLINE Copper Pipe

Nominal Pipe Size, In.	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
¼	1													
⅜	1.92	1												
½	3.06	1.60	1											
¾	6.23	3.25	2.03	1										
1	10.5	5.50	3.43	1.69	1									
1¼	15.8	8.23	5.15	2.53	1.50	1								
1½	22.1	11.5	7.20	3.55	2.09	1.40	1							
2	38.2	19.9	12.5	6.14	3.63	2.42	1.73	1						
2½	59	30.8	19.2	9.48	5.59	3.74	2.67	1.54	1					
3	84	43.9	27.4	13.5	7.98	5.33	3.81	2.20	1.43	1				
3½	113	59	36.9	18.2	10.8	7.18	5.13	2.96	1.92	1.35	1			
4	147	77	48.8	23.6	13.9	9.39	6.64	3.84	2.49	1.74	1.29	1		
5	228	119	74	36.6	21.6	14.5	10.3	5.97	3.87	2.71	2.01	1.56	1	
6	328	171	107	53	31.1	20.8	14.9	8.58	5.56	3.89	2.90	2.24	1.44	1

Heavy Hard and Heavy Soft STREAMLINE Copper Pipe

Nominal Pipe Size, In.	⅜	½	¾	1	1¼	1½	2
⅜	1						
½	1.61	1					
¾	3.34	2.08	1				
1	5.69	3.54	1.71	1			
1¼	8.68	5.40	2.60	1.53	1		
1½	12.3	7.64	3.68	2.16	1.42	1	
2	21.4	13.3	6.40	3.75	2.46	1.74	1

Extra Heavy Hard and Extra Heavy Soft STREAMLINE Copper Pipe

Nominal Pipe Size, In.	¼	⅜	½	⅝	¾	1	1¼	1½	2	2½	3	3½	4
¼	1												
⅜	1.64	1											
½	2.83	1.72	1										
⅝	4.33	2.63	1.53	1									
¾	5.67	3.43	2.00	1.31	1								
1	10.1	6.13	3.57	2.33	1.79	1							
1¼	15.8	9.58	5.58	3.65	2.79	1.57	1						
1½	22.4	13.6	7.91	5.16	3.95	2.22	1.42	1					
2	39.1	23.7	13.8	9.03	6.92	3.88	2.48	1.75	1				
2½	60.4	36.8	21.4	13.9	10.7	6.00	3.84	2.71	1.55	1			
3	86	52	30.5	19.9	15.2	8.52	5.45	3.85	2.20	1.43	1		
3½	117	71	41.3	26.9	20.6	11.6	7.39	5.22	2.98	1.93	1.36	1	
4	152	92	53	35.0	26.8	15.0	9.6	6.78	3.88	2.51	1.76	1.30	1

General Properties of Mueller STREAMLINE Copper Pipe

Nominal Pipe Size, In.	Outside Diameter, In.	Stubbs Gauge	Decimal Equivalent or Wall Thickness	Actual Inside Diameter, In.	Calculated Bursting Pressure,* Lbs.	Safe Working Pressure Factor of 6, lbs.	Actual I. D. Area, Sq. In.	Actual Net Copper Area, Sq. In.	Ultimate Strength in Tension, lb.	Gals. Discharge Per Minute**	Weight Per Foot, Pounds
Standard Hard STREAMLINE Copper Pipe											
¼	.375	23	.025	.325	5,600	933	.0830	.0275	1,155	3.10	.106
⅜	.500	23	.025	.450	4,200	700	.1590	.0373	1,567	5.95	.144
½	.625	22	.028	.569	3,763	627	.2543	.0525	2,205	9.5	.203
¾	.875	21	.032	.811	3,072	512	.5166	.0847	3,557	19.3	.328
1	1.125	20	.035	1.055	2,613	436	.8742	.1198	5,032	32.7	.464
1¼	1.375	19	.042	1.291	2,566	428	1.309	.176	7,932	49.0	.681
1½	1.625	18	.049	1.527	2,533	422	1.831	.243	10,206	68.5	.940
2	2.125	17	.058	2.009	2,293	382	3.170	.377	15,834	118	1.46
2½	2.625	16	.065	2.495	2,080	347	4.889	.523	21,966	183	2.03
3	3.125	15	.072	2.981	1,935	323	6.979	.691	29,022	261	2.68
3½	3.625	14	.083	3.459	1,923	321	9.397	.923	38,766	351	3.58
4	4.125	13	.095	3.935	1,934	322	12.161	1.20	50,400	455	4.66
5	5.125	12	.109	4.907	1,787	298	18.91	1.72	72,240	707	6.65
6	6.125	11	.120	5.885	1,646	274	27.20	2.26	94,920	1,017	8.77
Heavy Hard STREAMLINE Copper Pipe											
⅜	.500	.....	.035	.430	5,879	980	.145	.051	2,142	5.42	.198
½	.625	.....	.040	.545	5,376	896	.233	.074	3,108	8.71	.284
¾	.875	.....	.045	.785	4,319	720	.484	.117	4,914	18.1	.454
1	1.125	.....	.050	1.025	3,733	622	.825	.169	7,098	30.9	.653
1¼	1.375	.....	.055	1.265	3,362	560	1.258	.227	9,534	47.1	.882
1½	1.625	.....	.060	1.505	3,102	517	1.781	.293	12,306	66.6	1.141
2	2.125	.....	.070	1.985	2,767	461	3.097	.450	18,900	116	1.748
Extra-Heavy Hard STREAMLINE Copper Pipe											
¼	.375	21	.032	.311	7,168	1,195	.077	.034	1,428	2.88	.134
⅜	.500	18	.049	.402	8,232	1,372	.127	.069	2,898	4.75	.269
½	.625	18	.049	.527	6,586	1,098	.218	.089	3,738	8.15	.344
¾	.875	16	.065	.745	6,240	1,040	.436	.165	6,930	16.31	.641
1	1.125	16	.065	.995	4,853	809	.778	.216	9,072	29.10	.839
1¼	1.375	16	.065	1.245	3,971	662	1.217	.267	11,215	45.52	1.04
1½	1.625	15	.072	1.481	3,722	620	1.723	.351	14,740	64.44	1.36
2	2.125	14	.083	1.959	3,281	547	3.012	.532	20,344	112.65	2.06
2½	2.625	13	.095	2.435	3,040	507	4.654	.753	31,710	174.06	2.92
3	3.125	12	.109	2.907	2,930	488	6.633	1.033	43,386	248.08	4.00
3½	3.625	11	.120	3.385	2,780	463	8.994	1.321	55,482	336.47	5.12
4	4.125	10	.134	3.857	2,729	455	11.678	1.680	70,560	436.76	6.51
Heavy Soft STREAMLINE Copper Pipe											
⅜	.500	.....	.035	.430	4,200	700	.145	.051	1,530	5.42	.198
½	.625	.....	.040	.545	3,840	640	.233	.074	2,220	8.71	.284
¾	.875	.....	.045	.785	3,085	514	.484	.117	3,510	18.1	.454
1	1.125	.....	.050	1.025	2,668	445	.825	.169	5,070	30.9	.653
1¼	1.375	.....	.055	1.265	2,400	400	1.258	.227	6,810	47.1	.882
1½	1.625	.....	.060	1.505	2,216	369	1.781	.293	8,790	66.6	1.141
2	2.125	.....	.070	1.985	1,977	329	3.097	.450	13,500	116	1.748
Extra-Heavy Soft STREAMLINE Copper Pipe											
¼	.375	21	.032	.311	5,120	853	.077	.034	1,014	2.88	.134
⅜	.500	18	.049	.402	5,880	980	.127	.069	2,070	4.75	.269
½	.625	18	.049	.527	4,705	784	.218	.089	2,670	8.15	.344
⅝	.750	18	.049	.652	3,920	653	.334	.108	3,240	12.50	.418
¾	.875	16	.065	.745	4,458	743	.436	.165	4,950	16.31	.641
1	1.125	16	.065	.995	3,467	578	.778	.216	6,480	29.10	.839
1¼	1.375	16	.065	1.245	2,836	473	1.217	.267	8,010	45.52	1.04
1½	1.625	15	.072	1.481	2,658	443	1.723	.351	10,530	64.44	1.36
2	2.125	14	.083	1.959	2,343	391	3.012	.532	15,960	112.65	2.06
2½	2.625	13	.095	2.435	2,171	362	4.654	.755	22,650	174.06	2.92
3	3.125	12	.109	2.907	2,092	349	6.633	1.033	30,990	248.07	4.00
3½	3.625	11	.120	3.385	1,986	331	8.994	1.321	39,630	336.47	5.12
4	4.125	10	.134	3.857	1,949	325	11.678	1.680	50,400	436.76	6.51

* Based on expression of B. P. $= \frac{2tT}{O.D.}$

** Based on water velocities of 12 ft. per second at orifice.

COPPER and BRASS PIPE and FITTINGS

STREAMLINE

TRADE MARK REG. U. S. PAT. OFF.

PRODUCTS

Sales Representatives and Branches

ALBANY, N. Y.
H. A. McDermott . . . . . 272 Quail St.

ATLANTA, GA.
Rapp Co., Inc. . . . . 627 Hemphill Ave.

BUFFALO, N. Y.
The J. M. & L. A. Osborn Company . . . 64-86 Rapin St.

CHICAGO, ILLINOIS
Steel Sales Corporation . . . . . 129 South Jefferson St.

CLEVELAND, OHIO
Mueller Brass Co. . . . . 4500 Euclid Ave.

DALLAS, TEXAS
Ed. Shimer . . . . . Hotel Hilton

DAYTON, OHIO
Mueller Brass Co. . . . . 620 Harries Bldg.

DENVER, COLORADO
Building Products Corp. . . . . 1435 Welton St.

DETROIT, MICHIGAN
Hunter-Wilkie Co. . . . . 2842 West Grand Blvd.

FLINT, MICHIGAN
George A. Reamer . . . . . 20 Dort Bldg.

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Steel Sales Corporation . . . . . 647 West Virginia St.

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Steel Sales Corporation . . . . . 4903 Delmar Blvd.

WASHINGTON, D. C.
I. H. Clark . . . . . Hotel Harrington

TORONTO, CANADA
Mueller Brass Co. of Canada, Limited . . . . . Canadian Rail & Harbour Terminals, Ltd.

Mueller Brass Co.

PORT HURON, MICHIGAN

GENERAL CERAMICS COMPANY

Manufacturers of High Grade Acidproof Chemical Stoneware

71 West 35th Street
NEW YORK, N. Y.

SAN FRANCISCO, CAL., 276 Monadnock Building
CHICAGO, ILL., 208 South La Salle Street
MONTREAL, QUE., 1111 Beaver Hall Hill

PLANTS AT KEASBEY and METUCHEN, N. J.

Products

High Grade Acidproof Chemical Stoneware manufactured by the General Ceramics Company has been specified as standard equipment in many large chemistry and physics laboratories in both the United States and Canada. It is also being used in leading hospitals, newspaper plants, photo-engraving shops and other establishments where corrosive fluids are used.

Advantages

Sinks, drain lines and ventilating ducts made of this ware are absolutely unaffected by any of the chemicals met with in industrial work, as it is the material in which such chemicals are manufactured. Equipment made of General Ceramics High Grade Chemical Stoneware for handling corrosive materials is, therefore, practically indestructible and is the most permanent part of the entire building construction. Alternative materials, such as so-called acid-resisting metals or alloys, sewer tile, soapstone, enameled metals or inferior chemical ware, that are resistant to certain chemicals but are rapidly eaten away by others, must be replaced at intervals and are a constant expense for repairs and upkeep. Such alternative materials are frequently more expensive than the General Ceramics High Grade Chemical Stoneware.

This stoneware is a dense granite-like mass covered with an acidproof glaze serving only to give it a smooth attractive finish, the ware itself being acidproof all the way through. It is the strongest of all materials made from clay, yet it can be readily cut with a sharp chisel without danger of splitting on account of its homogeneous texture.

Installations

Among the many important buildings that have been equipped with General Ceramics Company ware are the chemistry laboratories of Yale University, Harvard University, Walter Reed Hospital, New York Times Building, Curtis Publishing Building, New York Assay Office and the Metropolitan Life Insurance Building.

The manufacture of the highest quality of chemical stoneware is a somewhat protracted process that cannot be hurried without detriment to the product. The time required for manufacture varies from six to ten weeks, depending on the dimensions and the shapes required. We endeavor to carry at all times an ample stock of all standard equipment, but orders should be placed in sufficient time to allow for the manufacture of specials.

Specifications

In order to be sure of getting a permanent installation of acidproof chemical stoneware, specifications should read:

All parts of this installation subject to the action of acids or acid wastes are to be made of high grade acidproof chemical stoneware manufactured by the General Ceramics Company of New York, N. Y.

Service

Our Engineering Department is prepared to assist in laying out chemical stoneware installations and in the design of special equipment.

Write for General Ceramics Chemical Stoneware Catalog showing complete line, dimensions, etc., also price list.

Fig. 389. Laboratory Sink

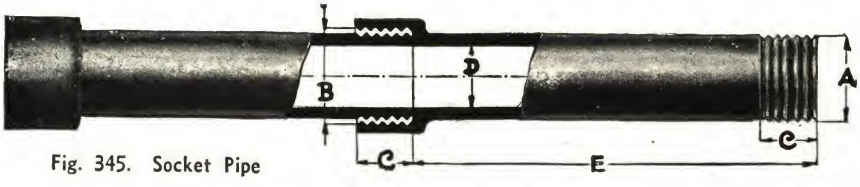


Fig. 345. Socket Pipe

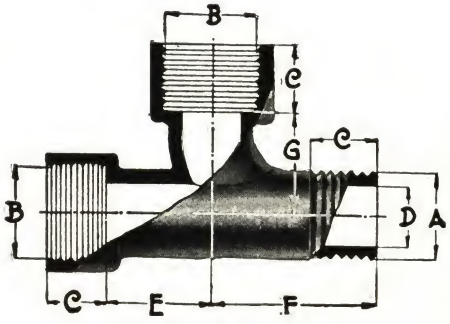


Fig. 397. Sanitary Tee

THE DURIRON COMPANY, INC.

Sole Manufacturers of Duriron Acid-proof Drain Pipe and Fittings, Exhaust Fans, Laboratory Equipment and Special Castings

DAYTON, OHIO

BUILDING EQUIPMENT SALES OFFICES

ATLANTA, GA., 619 Trust Co. of Georgia Building
BIRMINGHAM, ALA., Crawford Building
BOSTON, MASS., 80 Boylston Street
BUFFALO, N. Y., Jackson Building
CHARLOTTE, N. C., Builders Building
CHICAGO, ILL., Straus Building
CLEVELAND, OHIO, 528 Leader Building
DALLAS, TEX., 711 Westmount Avenue
DENVER, COLO., Exchange Building
DES MOINES, IOWA, Masonic Temple
DETROIT, MICH., General Motors Building
HOUSTON, TEX., Post Dispatch Building
KANSAS CITY, MO., Mutual Building
LOS ANGELES, CAL., Hollingsworth Building
MEMPHIS, TENN., Tennessee Hotel
MINNEAPOLIS, MINN., 923 Nicollet Avenue
NASHVILLE, TENN., Stahlman Building
NEW ORLEANS, LA., Jahnke Building
NEW YORK, N. Y., 22 East 40th Street
OKLAHOMA CITY, OKLA., 215 W. 10th Street
PHILADELPHIA, PA., 1505 Race Street
PITTSBURGH, PA., Empire Building
RICHMOND, VA., 1714 Summitt Avenue
SALT LAKE CITY, UTAH, 228 S. W. Temple Street
SAN FRANCISCO, CAL., Monadnock Building
ST. LOUIS, MO., Arcade Building
TACOMA, WASH., Tacoma Building
TAMPA, FLA., Builders Exchange Building
MONTREAL, QUE., 1111 Beaver Hall Hill
TORONTO, ONT., 156 Yonge Street
VANCOUVER, B. C., 410 Homer Street
WINNIPEG, MAN., 309 Boyd Building

Products

ACID-PROOF DRAIN PIPE and FITTINGS (all extra heavy); EXPANSION JOINTS; ASBESTOS PACKING.

ACID-PROOF VENTILATING FANS.

LABORATORY EQUIPMENT, including Sinks, Outlets, Traps, Floor Drains, Beehive Strainers, Overflows, Glass Cleaning Kettles, Kjeldahl Apparatus, etc.

Acid-proof Pumps, Valves, Cocks, Tank Connections and Outlets, Flanged Pipe and Fittings, Ejectors, Kettles and Special Castings.

What Duriron Is

Duriron is a hard, close grained cast metal that is resistant to the action of practically all corrosives used commercially or in the laboratory.

Despite the similarity of names, Duriron should not be confused with iron. In analysis it differs more from iron than bronze from brass. Its signal advantages over the acid handling materials are its greater strength, its universal resistance, and the fact that it does not depend on a coating, lining or glaze, but is wholly and equally resistant clear through its structure.

Corrosive Tests on Duriron

Tests were made on Duriron over a period of 120 days duration, using all of the corrosives in general commercial use. The tabulated results of these tests are given below, from which it is proved that the life of Duriron pipe handling corrosive wastes is virtually unlimited.

A 5% solution of hydrochloric acid shows the greatest percentage of loss, but computations prove that it would take about 350 years for that acid to corrode Duriron to a depth of 1 in.

Solution	Per cent of loss	Depth of corrosion in inches, per year
95% Sulphuric acid	.007	.0000206
25% Sulphuric acid	.016	.0000463
10% Sulphuric acid	.025	.0000685
70% Nitric acid	.006	.0000188
25% Nitric acid	.007	.0000206
10% Nitric acid	.000	.0000000
5% Hydrochloric acid	1.162	.00324
90% Acetic acid	.006	.0000188
87% Phosphoric acid	.006	.0000188
25% Phosphoric acid	.010	.0000292
10% Phosphoric acid	.008	.000024
7.9% Oxalic acid	.014	.0000412
2.1% Oxalic acid	.013	.000036
9.1% Picric acid	.005	.0000137
25% Copper sulphate	.008	.000024
27% Ammonium chloride	.026	.0000977
48% Ferric chloride	.013	.0000485
Commercial oleic acid	.003	.00000857

A number of Duriron installations carrying the most corrosive liquids have been in service for over ten years, and show no signs of deterioration. We have a great volume of data on the corrosion of other materials, and this is at all times available to the architect.

Duriron Engineering Service

Our extensive experience with all conditions in the handling of acids and acid wastes, and our familiarity with building and plumbing codes and regulations, enables us to offer valuable co-operation in the layout of acid waste lines; to make definite recommendations on ventilating problems, and to be of help in all matters where corrosion must be considered. We shall be glad to make specific recommendations as to which lines and fittings should be Duriron in any given installation, but for preliminary plans or estimates the following general recommendations will be found of value.

Duriron Should Be Specified

For the waste lines from educational, hospital and industrial laboratories. In structures devoted to crafts, such as: photoengraving, electroplating, etc. In loft buildings devoted to general manufacturing. Battery repair stations. In commercial kitchens where drainage of corrosives is extensive. This is particularly true of the garbage "raking pan" drainage. Wastelines from industrial plants whose processes require the use of corrosives.

For sink outlets, traps, horizontal piping and stack entrance fittings in medical buildings housing physicians, surgeons and dentists. House drains for combination sanitary and acid wastes.

Waste lines through cinder concrete, and similar situations where corrosion attacks on *outside* of pipe.

Exhaust fans and ducts for removal of corrosive fumes from chemical hoods, laboratories, pickling rooms, etc.

Roof vents exposed to coal smoke and moisture, or extreme atmospheric corrosion of any sort.

All wastes where absolute insurance against failure is important, due either to corrosion or rust; such as memorials, public buildings, and those erected to endure indefinitely.

Typical Specifications for Duriron Drain Lines

(1) Pipe—All pipe and fittings carrying acid waste from ..... to ..... shall be of Duriron as manufactured by THE DURIRON COMPANY, INC., Dayton, Ohio, of the sizes shown on drawings .....

(2) All such pipe and fittings shall be of bell and spigot type, extra heavy weight and dimensions, and shall fulfill the requirements of the city plumbing code of the City of .....

(3) Joints—All joints in lines carrying acid wastes shall be made by ramming tightly in bottom of bell one ring of pure asbestos wick packing, upon which shall be poured sufficient molten lead to fill the bell completely, the lead being properly calked in the manner usual with cast iron soil pipe.

(4) Cleanouts—Suitable cleanout plugs shall be provided as shown on drawings.

(5) Expansion Joints—If lines are to handle wastes of high temperature, expansion joints shall be provided as shown on drawings.

(6) Alignment—All pipe lines shall be correctly aligned before joints are made. Proper supports shall be provided; at least one support to each length of pipe in horizontal lines, one at each bend, and supports at intervals no greater than 10 ft. in vertical lines.

(7) Floor Drains—Floor drains in ..... shall be of Duriron, double drainage type, Plate No. ....

(8) Vents—Vent lines carrying acid fumes shall be of Duriron as specified for pipe above. (Unless fumes are of extreme strength other materials may be used.)

(9) Sinks—All sinks in ..... shall be of Duriron, of the sizes and shapes as shown on detail drawings. Each sink shall bear the name "Duriron" cast thereon. Sink outlets shall be of Duriron.

(10) Sink Connections—All connections from sinks to waste lines, including traps, shall be Duriron as specified.

(11) Exhaust Fans—All exhaust fans for exhausting acid fumes from hoods, together with all suction and discharge pipes connected therewith, shall be of Duriron. Such fans shall be of the type, size and capacity as shown on drawings.

Important—It is important that the location of floor outlets follow exactly the specifications in laboratory installations. If this is not done within close limits, the laboratory furniture can not be properly located. Inaccurate location of floor openings by the plumbing contractor offers an excuse to the furniture contractor to substitute an inferior material to offset the extra fitting work made necessary by this deviation.

Duriron Drain Pipe

Advantages—Easily installed and familiar work to plumbers.

Duriron pipe joints, properly made, *stay tight;* this is a serious limitation in ordinary materials used to handle acid and acid waste.

Requires no protective coating inside or outside. Not necessary to encase in concrete, provide drip pans, or otherwise prepare for failure. Elaborate supports not needed. Lines may be concealed in walls and ceiling when desirable.

Fills all code requirements for sanitary drain, and may be used for dual service of acid and sanitary line, saving an extra line. No other material may be so used.

Does not warp nor sag from heat. No discoloration of walls when run in partitions. Takes paint readily when desired for decoration.

Permits the location of a department such as a laboratory anywhere in the structure.

Complete stocks always maintained, assuring immediate deliveries.

Duriron pipe joints, properly calked, will not loosen under ordinary building vibration. Its hardness is such that it is not scoured by sharp solids carried in solutions. Duriron drain lines, once installed, are permanent. They may be concealed in walls and floors without fear of disfigurement from leaks, and consequent tearing out of finish. Not requiring asphaltum coating, there is no possibility of wall discoloration.

Cost—Compared to extra heavy cast iron soil pipe, the cost of a Duriron pipe installation, *including labor,* is about three times as great. This cost is but a small fraction of one per cent of that of the building, and it assures permanent freedom from repairs or replacements due to corrosion, in addition to insuring the finish from damage by leaking waste lines. After one replacement of a cast iron line the costs are about equal, and it should be remembered that replacement follows numerous repair jobs. With ordinary materials, repairs and replacements afford only temporary relief, and are a continuous charge on maintenance.

Pipe Installation—Duriron drain pipe is installed the same, as easily, and with the same labor cost as cast iron soil pipe. No special instruction to plumber is necessary.

Joints should be packed with asbestos wick packing rather than hemp or oakum, which are not acid-proof.

Any *pure* asbestos is suitable, but not always obtainable. For this reason we manufacture a specially treated pure asbestos packing for this purpose.

Comparative Physical Tests—The Testing Laboratories of Columbia University some years ago made an exhaustive series of tests, both chemical and physical, on vitrified tile, lead and Duriron pipe. Chemical tests show Duriron far superior in universal resistance. Physical tests are summarized below:

COMPARATIVE PHYSICAL PROPERTIES DURIRON, LEAD AND VITRIFIED TILE PIPE

From Tests made by Testing Laboratories of Columbia University

	Vitrified Pipe	Lead Pipe	Duriron Pipe
Average ultimate crushing load, lbs. per ft.	1556	1492	13490
Average transverse ultimate load, lbs., center load, span 21 in.	1813	400	11250
Modulus of rupture, computed from crushing load, lbs. per sq. in.	1644	*	17200

*Impossible to compute for a plastic material such as lead.

Immediate Shipments—Complete stocks of Duriron drain pipe and fittings are always maintained in all sizes to, and including, 8 in. The 10, 12, and 15-in. sizes are supplied promptly on order.

Stocks available in Dayton, Chicago, New York and San Francisco.

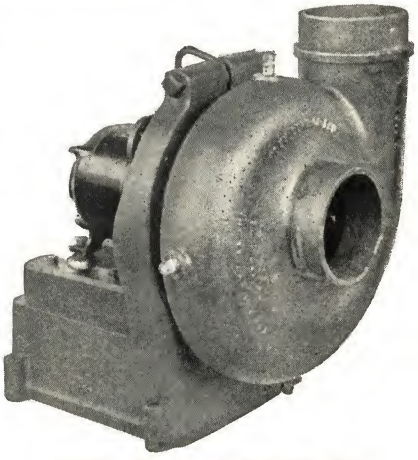
Duriron Ventilating Fans

Ventilation of laboratories, laboratory hoods, pickling rooms, and places where it is necessary to remove corrosive and noxious fumes, require an exhauster that will not be affected by the gases handled. All parts of Duriron fans that come in contact with the fumes carried are of Duriron, and are unaffected by vapors or condensate.

This type of equipment is used only for bettering atmospheric conditions and is usually located in an inaccessible position and should, therefore, operate with the least amount of attention. Duriron fans are of simple and sturdy construction. They may be furnished for either direct connection or for belt drive. They require no coating or painting of the exposed surfaces, and give continuous and efficient service with little care other than lubrication.

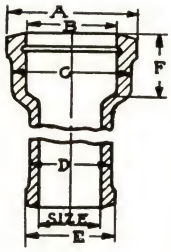
These fans are built in five sizes, having approximate capacities of 100, 450, 1000, 1500 and 4000 cu. ft. per minute.

Literature—Duriron Bulletin No. 158, "Exhaust Fans," contains complete specifications and capacities of Duriron ventilating fans. (Size 8x10½ in., A.I.A. File Number 30d1.)



Duriron Exhaust Fan No. 55

Note: Larger sizes of pipe and fittings which are not shown here are not regularly stocked, but are furnished on special order.

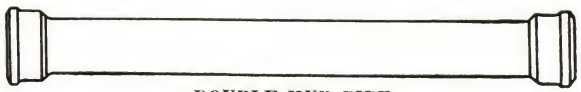


DIMENSIONS (IN INCHES) OF DURIRON PIPE

Size	1½	2	3	4	6	8	10	12	15	Size
A	3 11/16	4 5/16	5 5/16	6 5/16	8 1/2	11 1/4	14 1/4	16 3/4	20 1/4	A
B	2 13/16	3 5/16	4 5/16	5 5/16	7 5/16	9 5/8	12 1/4	14 1/2	17 3/4	B
C	3 7/16	3 15/16	5 1/16	6 1/16	8 5/16	10 7/8	13 3/4	16	19 3/4	C
D	2 1/8	2 5/8	3 5/8	4 5/8	6 3/4	8 3/4	11 1/4	13 1/4	16 3/4	D
E	2 3/8	2 7/8	3 7/8	4 7/8	7 1/8	9 1/4	11 5/8	14	17 1/4	E
F	2 3/8	2 1/2	2 3/4	3	3	3 3/8	3 5/8	3 7/8	4 1/8	F

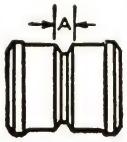
SINGLE HUB PIPE

Size, in.	Length, ft.	Over all length, ft.–in.	Weight, lb.
1½	3	3 -2 3/8	20
2	4	4 -2 1/2	32
3	5	5 -2 3/4	56
4	5	5 -3	86
6	5	5 -3	135
8	5	5 -3 3/8	217



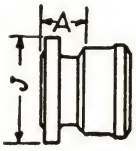
DOUBLE HUB PIPE

Size, in.	Length, ft.–in.	Over all length, ft.–in.	Weight, lb.
1½	2 -9 5/8	3 -2 3/8	23
2	3 -9 1/2	4 -2 1/2	34
3	4 -9 1/4	5 -2 3/4	61
4	4 -9	5 -3	88
6	4 -9	5 -3	142
8	5 -0	5 -6 3/4	258



DOUBLE HUBS

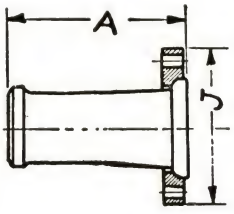
Size, in.	Wt., lb.	Dim. A, in.
1½	5½	1
2	6½	1
3	9	1
4	15	1
6	24	1
8	44	2



ADAPTER—BELL AND FLANGE

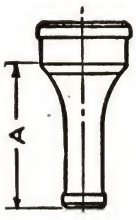
Size, in.	Wt., lb.	Dim. A, in.	Dim. J, in.
1½	7	2 1/8	5
2	9	2 1/2	6
3	14 1/2	2 1/2	7 1/2
4	21	2 3/4	9
6	30	3	11
8	35	3 1/2	13 1/2

Note: Bolt dimensions U. S. 1914 Standard.



ADAPTER—SPIGOT AND SPLIT FLANGE

Size, in.	Wt., lb.	Dim. A, in.	Dim. J, in.
1½	6	5 1/4	5
2	9	5 3/4	6
3	16	7	7½
4	24	8	9
6	32	9½	11
8	45	10 3/4	13½

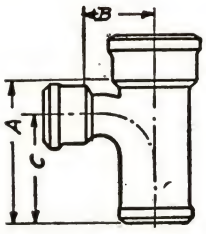


SANITARY INCREASERS

Size, in.	Wt., lb.	A, in.	Size, in.	Wt., lb.	A, in.
1½x2	7	9	3x6	16	9
1½x3	8½	9	4x5	16	9
1½x4	10½	9	4x6	17½	9
2x3	9	9	4x8	43	11 5/8
2x4	11	9	5x6	18	9
2x6	15	9	6x8	50	11 7/8
3x4	13	9			

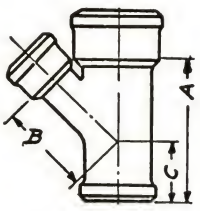
SANITARY REDUCERS

Size, in.	Wt., lb.	A, in.	Size, in.	Wt., lb.	A, in.
2x1½	5	5	6x2	12	5
3x1½	6	5	6x3	13	5
3x2	7	5	6x4	14	5
4x1½	7	5	6x5	18	5
4x2	8	5	8x4	27	6
4x3	9	5	8x6	29	6
5x4	12	5			



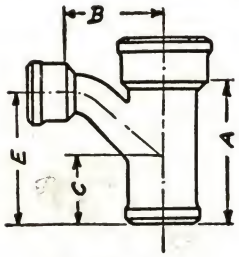
SANITARY T BRANCHES

Size, in.	Wt., lb.	Dimensions, in. A	B	C	Size, in.	Wt., lb.	Dimensions, in. A	B	C
1½x1½	9	8 3/8	3 1/4	6 3/4	4x4	22	11	4 1/2	8
2 x1½	10	8 1/2	3 1/2	6 3/4	6x2	35	9	5 1/2	7
2 x2	11	9	3 1/2	7	6x3	39	10	5 1/2	7 1/2
3 x1½	13	8 1/2	4	6 3/4	6x4	44	11	5 1/2	8
3 x2	14	9	4	7	6x6	52	13	5 1/2	9
3 x3	17	10	4	7 1/2	8x4	65	10 5/8	6 1/4	8
4 x1½	16	8 1/2	4 1/2	6 3/4	8x6	72	14 1/2	6 5/8	10 1/2
4 x2	18	9	4 1/2	7	8x8	87	19	6 5/8	13 1/2
4 x3	21	10	4 1/2	7 1/2					



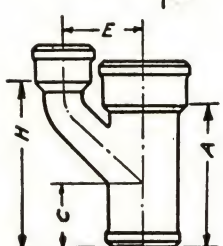
SANITARY Y BRANCHES

Size, in.	Wt., lb.	Dimensions, in. A	B	C	Size, in.	Wt., lb.	Dimensions, in. A	B	C
1½x1½	9	8 1/8	3 3/4	4 3/8	4x4	25	12	6 3/4	5 1/4
2 x1½	10	8 5/8	4 3/8	4 3/8	6x2	35	9	7 1/8	2 3/4
2 x2	11	9	4 1/4	4 3/4	6x3	39	10 1/2	7 5/8	3 1/2
3 x1½	13	8 5/8	5	3 7/8	6x4	44	12	8 1/8	4 1/4
3 x2	14	9	5	4 1/4	6x6	52	15	9 1/4	5 3/4
3 x3	17	10 1/2	5 1/2	5	8x4	71	13 1/2	10	4 1/2
4 x1½	17	9 1/8	5 3/4	3 7/8	8x6	87	16 1/2	11	6 1/8
4 x2	18	9	5 3/4	3 3/4	8x8	122	19 1/2	12 1/4	7 1/4
4 x3	21	10 1/2	6 1/4	4 1/2					



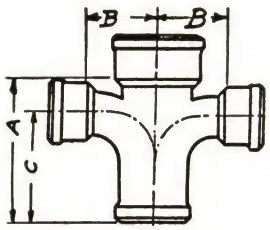
SANITARY T-Y OR COMBINATION Y AND ⅛ BEND

Size, in.	Wt., lb.	Dimensions, in. A	B	C	E	Size, in.	Wt., lb.	Dimensions, in. A	B	C	E
1½x1½	9	8 1/8	4 5/8	4 3/8	7 3/8	4x2	19	9	6 1/4	3 11/16	8 1/16
2 x1½	11	8 5/8	4 5/8	4 3/8	7 3/8	4x3	22	10 1/2	7	4 1/2	9 9/16
2 x2	12	9	5 1/4	4 3/4	8 1/4	4x4	28	12	7 3/4	5 1/4	10 13/16
3 x1½	14	8 5/8	5 1/8	3 7/8	7 3/8	6x2	26	9	7 1/4	2 11/16	8 1/16
3 x2	15	9	5 3/4	4 3/16	8 1/16	6x3	34	10 1/2	8	3 1/2	9 9/16
3 x3	19	10 1/2	6 1/2	5	9 9/16	6x4	36	12	8 3/4	4 1/4	10 13/16
4 x1½	18	9 1/8	5 7/8	3 7/8	8 1/8	6x6	47	15	10 1/4	5 3/4	13 7/16



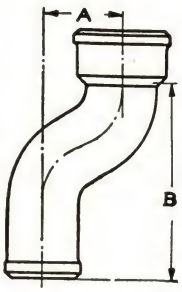
SANITARY UPRIGHT Y BRANCH OR H FITTING

Size, in.	Wt., lb.	Dimensions, in. A	C	E	H	Size, in.	Wt., lb.	Dimensions, in. A	C	E	H
1½x1½	9	8 1/8	4 3/8	4	10	4x2	19	9	3 11/16	5 1/2	11
2 x1½	11	8 5/8	4 3/8	4 1/4	10 1/4	4x3	22	10 1/2	4 1/2	6	12 1/2
2 x2	12	9	4 3/4	4 1/2	11	4x4	28	12	5 1/4	6 1/2	14
3 x1½	14	8 5/8	3 7/8	4 3/4	10 1/4	6x2	36	9	2 11/16	6 3/4	11
3 x2	15	9	4 3/16	5	11	6x3	41	10 1/2	3 1/2	7 1/4	12 1/2
3 x3	19	10 1/2	5	5 1/2	12 1/2	6x4	46	12	4 1/4	8	14
4 x1½	18	9 1/8	3 7/8	5 1/4	10 3/4	6x6	56	15	5 3/4	8 1/2	16 7/8



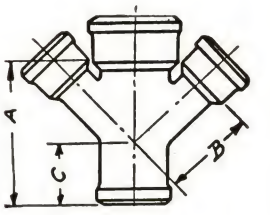
DOUBLE BRANCH SANITARY T

Size, in.	Wt., lb.	Dim., in.			Size, in.	Wt., lb.	Dim., in.		
		A	B + B	C			A	B + B	C
1½ x 1½	11	8⅜	6½	6¾	4 x 2	20	9	9	7
2 x 1½	12	8½	7	6¾	4 x 3	26	10	9	7½
2 x 2	14	9	7	7	4 x 4	33	11	9	8
3 x 1½	18	8½	8	6¾	6 x 2	42	9	11	7
3 x 2	20	9	8	7	6 x 3	50	10	11	7½
3 x 3	21	10	8	7½	6 x 4	54	11	11	8
4 x 1½	19	8½	9	6¾	6 x 6	65	13	11	9



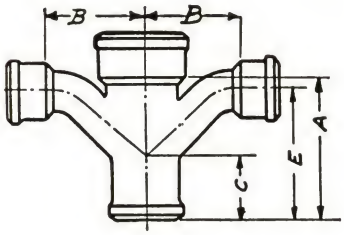
SANITARY OFFSETS

Size, in.	Dimensions, in.		Wt., lb.
	A	B	
1½	2	8⅛	7½
1½	4	8⅝	9¼
1½	6	9⅛	9½
1½	8	9⅝	10½
1½	10	10⅛	11½
1½	12	10⅝	12½
2	2	8	8
2	4	8½	9½
2	6	9	11
2	8	9½	14
2	10	10	15
2	12	10½	16
3	2	8½	12
3	4	9½	13
3	6	10	15
3	8	10½	16½
3	10	11	18
3	12	11½	19½
4	2	9	19½
4	4	11	23
4	6	11	26
4	8	11½	29
4	10	12	34½
4	12	12½	37½
6	2	10	33
6	4	12	38½
6	6	13	44
6	8	13½	48
6	10	14	52
6	12	14½	55



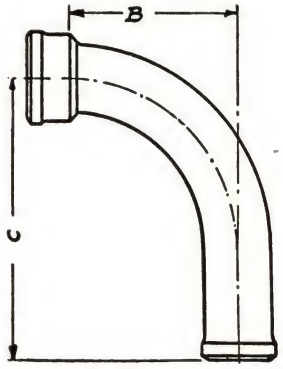
DOUBLE BRANCH SANITARY Y

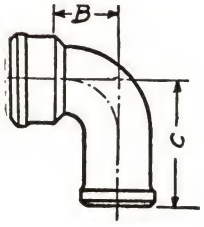
Size, in.	Wt., lb.	Dimensions, in.			Size, in.	Wt., lb.	Dimensions, in.		
		A	B	C			A	B	C
1½ x 1½	11	8⅛	3¾	4⅜	4 x 2	21	9	5¾	3¾
2 x 1½	13	8⅝	4⅜	4⅜	4 x 3	27	10½	6¼	4½
2 x 2	15	9	4¼	4¾	4 x 4	33	12	6¾	5¼
3 x 1½	13	8⅝	5	3⅞	6 x 2	42	9	7⅛	2¾
3 x 2	15	9	5	4¼	6 x 3	51	10½	7⅝	3½
3 x 3	21	10½	5½	5	6 x 4	55	12	8⅛	4¼
4 x 1½	20	9⅛	5¾	3⅞	6 x 6	66	15	9¼	5¾



DOUBLE BRANCH SANITARY COMBINATION Y AND ⅛ BEND

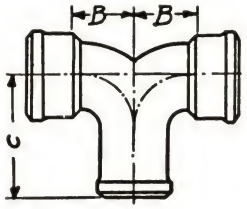
Size, in.	Wt., lb.	Dimensions, in.				Size, in.	Wt., lb.	Dimensions, in.			
		A	B + B	C	E			A	B + B	C	E
1½ x 1½	14	8⅛	9¼	4⅜	7⅜	4 x 2	26	9	12½	3 11/16	8 3/16
2 x 1½	15	8⅝	9¼	4⅜	7⅜	4 x 3	30	10½	14	4½	9 9/16
2 x 2	18	9	10½	4¾	8¼	4 x 4	45	12	15½	5¼	10 13/16
3 x 1½	21	8⅝	10¼	3⅞	7⅜	6 x 2	44	9	14½	2 11/16	8 3/16
3 x 2	22	9	11½	4⅝	8 3/16	6 x 3	53	10½	16	3½	9 9/16
3 x 3	29	10½	13	5	9 9/16	6 x 4	57	12	17½	4¼	10 13/16
4 x 1½	24	9⅛	11¾	3⅞	8⅛	6 x 6	71	15	20½	5¾	13 7/16





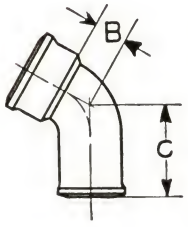
QUARTER BENDS

Size, in.	Wt., lb.	Dim., in.	
		B	C
1½	6	3¼	6¾
2	7	3½	7
3	12	4	7½
4	16	4½	8
6	30	5½	9
8	67	6⅛	10



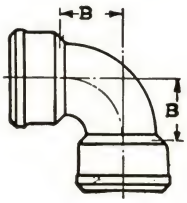
DOUBLE QUARTER BENDS

Size, in.	Wt., lb.	Dim., in.	
		B + B	C
1½	11	6½	6¾
2	12	7	7
3	17	8	7½
4	25	9	8
6	40	11	9



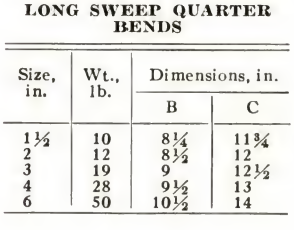
SIXTH BENDS

Size, in.	Wt., lb.	Dim., in.	
		B	C
1½	5½	2	5⅝
2	7	2¼	5¾
3	10	2½	6
4	13	2¾	6⅛
6	27½	3⅜	6⅞



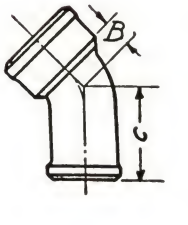
DOUBLE HUB QUARTER BENDS

Size, in.	Wt., lb.	Dim., in.
		B
1½	8	3¼
2	9	3½
3	16	4
4	19	4½
6	39	5½



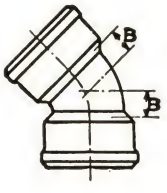
LONG SWEEP QUARTER BENDS

Size, in.	Wt., lb.	Dimensions, in.	
		B	C
1½	10	8¼	11¾
2	12	8½	12
3	19	9	12½
4	28	9½	13
6	50	10½	14



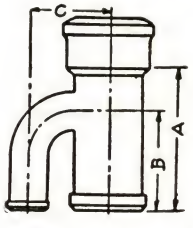
EIGHTH BENDS

Size, in.	Wt., lb.	Dim., in.	
		B	C
1½	5	1⅝	5⅛
2	6	1¾	5¼
3	9	2	5 7/16
4	13	2¼	5 11/16
6	25	2½	6 1/16
8	50	3 11/16	8 13/16



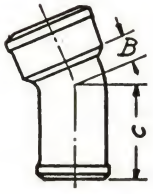
DOUBLE HUB EIGHTH BENDS

Size, in.	Wt., lb.	Dim., in.
		B
1½	6	1⅝
2	7	1¾
3	13	2
4	17	2¼
6	34	2½



VENT BRANCHES

Size, in.	Wt., lb.	Dimensions, in.		
		A	B	C
2 x 2	11	9	7	4½
3 x 2	14	10	7	5
3 x 3	18	10	7½	5½
4 x 2	18	11	7	5½
4 x 3	20	11	7½	6
4 x 4	26	11	8	6½
6 x 3	32	13	7½	7¼
6 x 4	33	13	8	7½
6 x 6	43	13	9	8½



SIXTEENTH BENDS

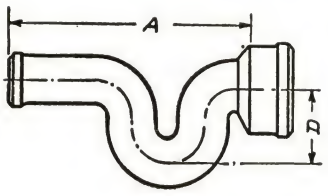
Size, in.	Wt., lb.	Dimensions, in.	
		B	C
1½	4½	1	4 1/16
2	6	1 1/16	4 5/8
3	9	1¼	4 11/16
4	12	1⅜	4 13/16
6	17	1½	5
8	44	2	7⅛

SCREWED CLEANOUT PLUGS

Size, in.	Weight, lb.
1½	2¼
2	3½
3	5¼
4	8¾
*6	14

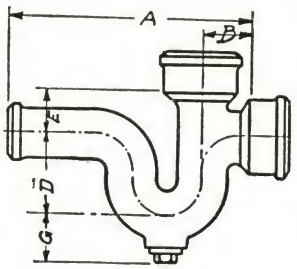
*Bolted type.

Note: Minimum depth of seal on all traps, 2½ in.



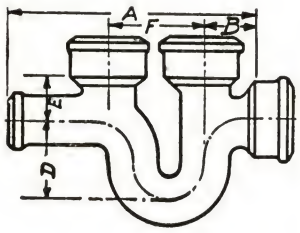
SANITARY RUNNING TRAP—NO VENT

Size, in.	Wt., lb.	Dimensions, in.	
		A	D
1½	9	12⅛	4
2	13	13½	4½
3	21	15½	5½
4	40	17½	6½
6	48	21½	8½
8	155	26⅞	11



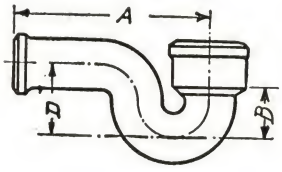
SANITARY RUNNING TRAP—SINGLE HUB VENT (Showing Cleanout)

Size, in.	Wt., lb.	Vent, in.	Dimensions, in.				
			A	B	D	E	G
1½	13	1½	12⅛	1⅞	4	1⅞	3
2	17	2	13½	2½	4½	2½	3¼
3	27	3	15½	3	5½	3¼	3¾
4	43	4	17½	3½	6½	3½	4¼
6	60	4	21½	4½	8½	4¼	5¼
8	187	6	26⅞	5½	11	4¼	6¼



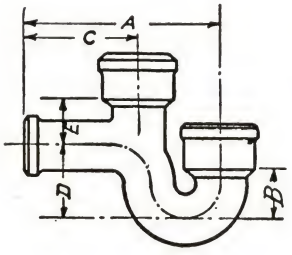
SANITARY RUNNING TRAP—DOUBLE HUB VENT

Size, in.	Wt., lb.	Vent, in.	Dimensions, in.				
			A	B	D	E	F
1½	16	1½	12⅛	1⅞	4	1⅞	4¾
2	19	2	13½	2½	4½	2½	5¼
3	32	3	15½	3	5½	3¼	6¼
4	45	4	17½	3½	6½	3½	7¼
6	88	4	21½	4½	8½	4¼	8¼
8	208	6	26⅞	5½	11	4¼	12



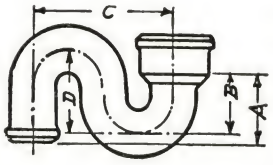
SANITARY P TRAP (OR ½ S TRAP)—NO VENT

Size, in.	Wt., lb.	Dimensions, in.		
		A	B	D
1½	8	10¼	2⅜	4
2	11	11	3	4½
3	19	12½	4¼	5½
4	27	14	5½	6½
6	67	17	8½	8½



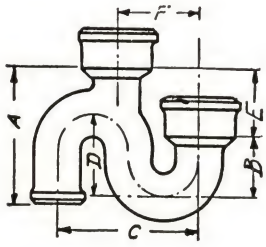
SANITARY P TRAP (OR ½ S TRAP)—HUB VENT

Size, in.	Wt., lb.	Vent, in.	Dimensions, in.				
			A	B	C	D	E
1½	12	1½	10¼	2⅜	6⅛	4	1⅝
2	15	2	11	3	6¼	4½	2¼
3	24	3	12½	4¼	6¼	5½	3
4	38	4	14	5½	7	6½	3¼
6	82	4	17	8½	8	8½	4



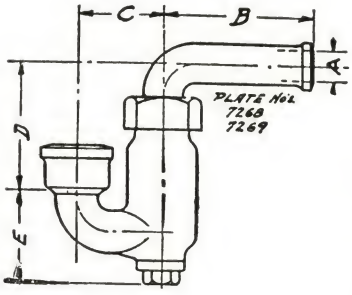
SANITARY S TRAP—NO VENT

Size, in.	Wt., lb.	Dimensions, in.			
		A	B	C	D
1½	9	5⅛	2⅜	7	4
2	14	5½	3	8	4½
3	22	6¼	4¼	10	5½
4	32	7	5½	12	6½
6	46	9	8½	16	8½



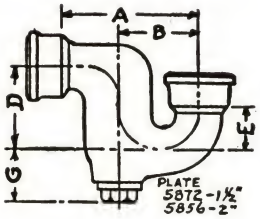
SANITARY S TRAP—HUB VENT

Size, in.	Wt., lb.	Vent, in.	Dimensions, in.				
			A	B	C	E	F
1½	13	1½	8⅜	2⅜	7	3¼	4⅛
2	16	2	9¼	3	8	3¾	4¾
3	28	3	10½	4¼	10	4¼	6¼
4	39	4	11¼	5½	12	4¼	7
6	57	4	14	8½	16	5	9



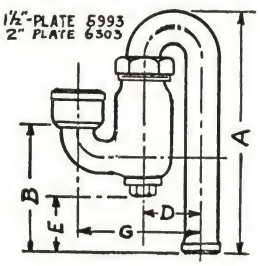
NON-SYPHON P TRAP

Plate No.	Size A, in.	Wt., lb.	Dimensions, in.			
			B	C	D	E
7268	1½	18	8	4½	6¾	5¼
7269	2	28	8	5½	6	9



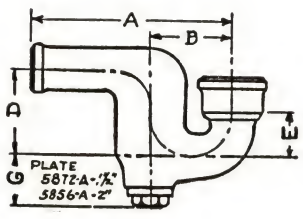
DRUM TRAPS

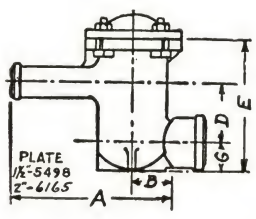
Plate No.		5872	5856	5872-A	5856-A	5498	6165
Size, in.		1½	2	1½	2	1½	2
Wt., lb.		16	22	14	20	27	31
Dimensions, in.	A	6⅝	7¾	12¼	13¾	11	11⅜
	B	4¼	5	4¼	5	2⅝	2¾
	D	4½	4½	4½	4½	4	4½
	E	1⅞	2¼	1⅞	2¼	9⅜	10⅜
	G	3½	3¾	3½	3¾	2⅜	2⅝



CENTRIFUGAL DRUM TRAPS (NON-SYPHON)

Plate No.	Size, in.	Wt., lb.	Dimensions, in.				
			A	B	D	E	G
5993	1½	23	16½	8½	4	3½	8½
5993-A	1½	29	24½	16½	4	11½	8½
6303	2	38	20¼	13	5½	4	11
6303-A	2	44	28¼	21	5½	12	11





Long Sink Traps

The 1½-in. sink trap may also be furnished with flared end for standard sink coupling.

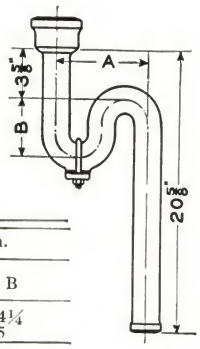
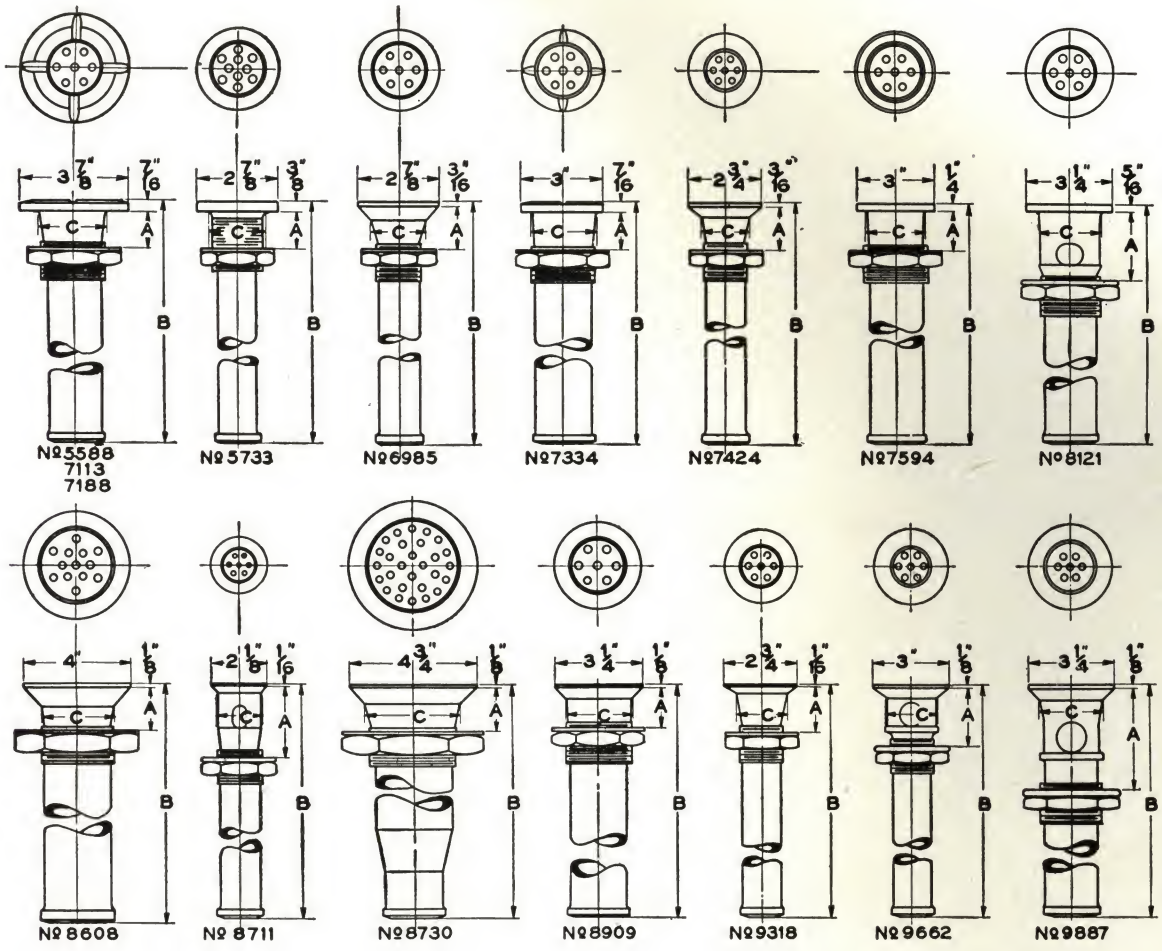


Plate No.	Size, in.	Dimensions, in.	
		A	B
5419-A	1½	6¾	4¼
7075	2	7¾	5

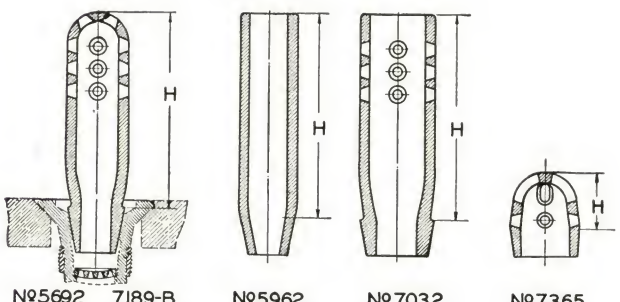
SINK STRAINERS AND STANDING OVERFLOWS



DURIRON SINK OUTLETS

Plate No.	Size, in.	Dimensions, in. A	B	C	Plate No.	Size, in.	Dimensions, in. A	B	C
5588	1½ or 2	1 to 2¼	10	2½	8121†*	1½ or 2	2 to 3¼	10	2½
5733†	1	¼ to 2	8¼	2	8608†	2	1 to 2	5¼	3
6985	1	1 to 2¼	10	2¼	8711†*	1	2 to 2¾	10	1¾
7113	1½ or 2	1 to 2¼	13	2½	8730†	1½	1¼ to 2¼	7	3¾
7188†	1½ or 2	1 to 2¼	4⅝	2½	8909	1½ or 2	1 to 2¼	10	2½
7334†	1½ or 2	1 to 2¼	10	2½	9318†	1	¼ to 2	10	2
7424†	1	½ to 2	10	1¾	9662†*	1	1½ to 2½	10	2
7594	1½ or 2	1¼ to 2¼	10	2½	9887†*	1½ or 2	2¾ to 4¼	10	2½

Furnished with flat loose strainers. All except Nos. 5733, 8608, 8711, 8730 and 9662 can be furnished with Duriron stoppers.
†Not kept in stock. Shipment one week. *For sink with patent overflow.



STANDING OVERFLOWS

Plate No.	Height, in.	Type
5692	4½	Beehive
5692-A	9	Beehive
8210†	5	Beehive
8889	10	Beehive
7189-B†	9½	Beehive
7189-C†	4	Beehive
7189-D†	6	Beehive
7189-E	8	Beehive
5962	9 max.	Open end
7796†	9 max.	Open end
7032	8½	Open end
7365†	1	Beehive

No standing overflows can be furnished for outlets Nos. 5733, 8608, 8711, 8730 or 9662.
†Not kept in stock. Shipment one week.

DURIRON FLOOR DRAINS

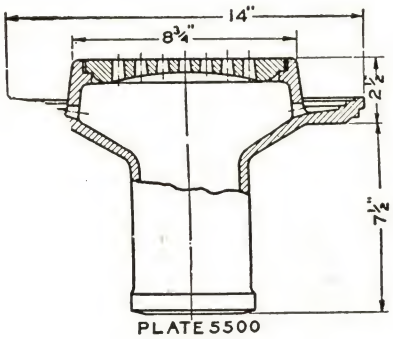


PLATE 5500

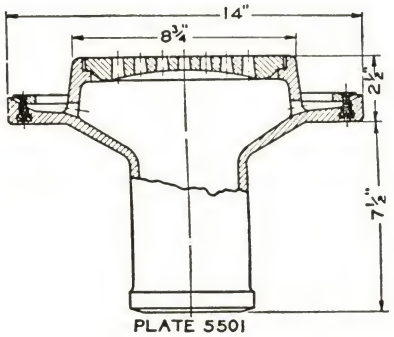


PLATE 5501

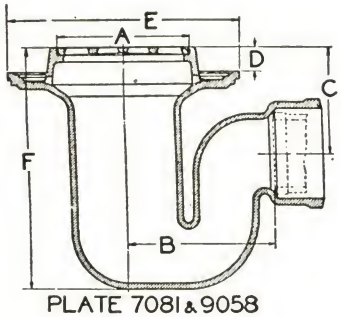


PLATE 7081 & 9058

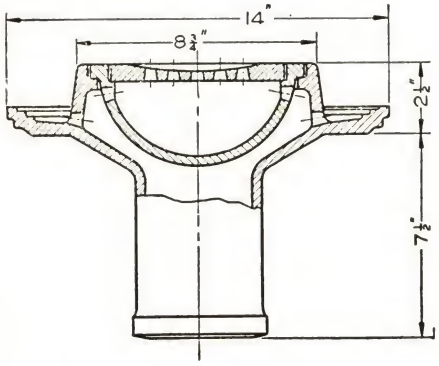


PLATE 5687

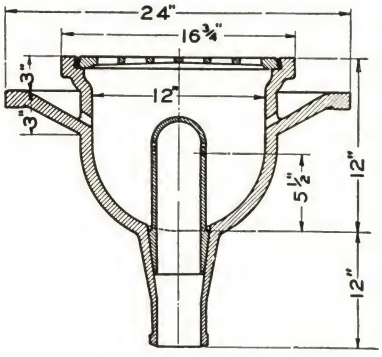


PLATE 7270-B

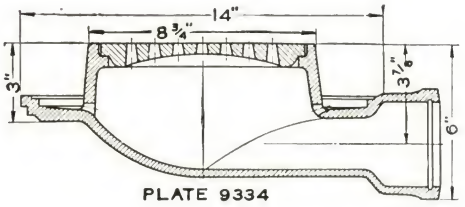


PLATE 9334

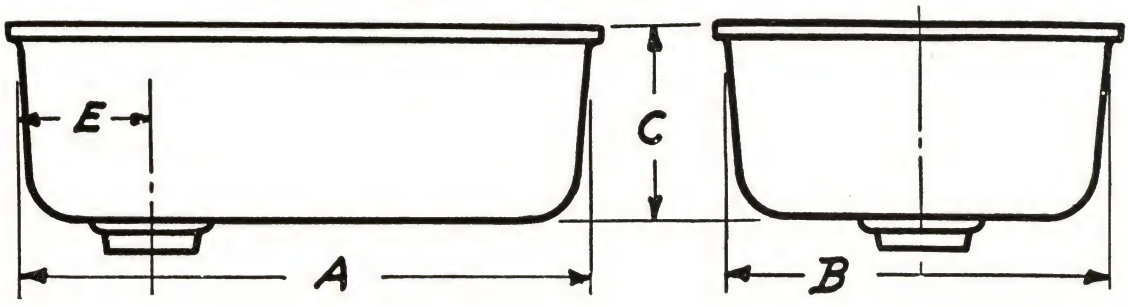
Note: Floor drains are furnished with strainer plates of Alcumite (an aluminum bronze of high tensile strength) unless the drain is to handle nitric acid and ferric chloride, when Duriron strainer plates are furnished.

DURIRON FLOOR DRAINS

Plate No.	Outlet size, in.	Wt., lb.	Dimensions, in.						Flashing ring
			A	B	C	D	E	F	
			Double Drainage Type						
5500	2, 3, 4 or 6	40							No
5501	2, 3, 4 or 6	40							Yes
7081-A	1½	30	4	6⅝	3⅞	1½	10⅜	9	No
7081-B	2	32	4	6½	3⅝	1½	10⅜	9	No
9058-3	3	75	8	9	5⅞	1½	14	14½	No
9058-4	4	79	8	9	6⅜	1½	14	14½	No
5687	2, 3, 4 or 6	72							No
5687-A	2, 3, 4 or 6	75							Yes
7270-B	3 or 4	270							No
9334	2	40							No

DURIRON SINKS—FLAT RIM

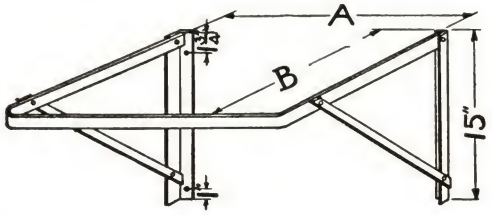
Duriron sink outlet (Plate 5588) is included. These dimensions are outside of sink under rim. Rim width, ½ in.; thickness, ⅝ in. Other sizes sinks made to order.



DURIRON SINKS (Flat Rim)

Plate No.	Wt., lb.	Dimensions, in.			
		A	B	C	E
5851	72	16	14	8	5⅜
5852	103	24	16	8	5 5/16
5853	120	28	16	8	5 5/16
5964	73	17	9	10	8½
7924*	58	14	10½	9	5
7925*	68	16	12	9	5
8142*	45	15¼	7¼	7½	7½

*Not carried in stock.



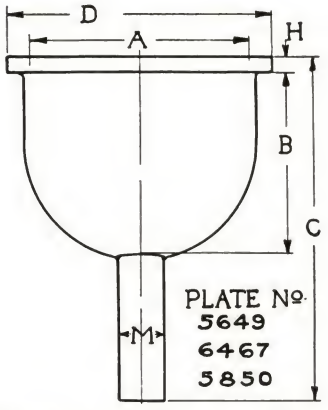
Steel Bracket for Sink

STEEL BRACKETS FOR SINKS (PAINTED BLACK)

Size	To fit sink No.	Dimensions, in.	
		A	B
1	5851	16⅛	14⅝
2	5852	24⅛	16⅝
3	5853	28⅛	16⅝
4	5964	17⅛	9⅝

HEMISPHERICAL LABORATORY SINKS

Duriron hemispherical sinks or bowls are finding great favor in chemistry laboratories when used in fume hoods or in tops of tables. When set in a hood, one bowl should be placed in each compartment, recessed so that the top of the sink rim is slightly below the working surface. A drainage groove should be provided in the floor of the hood, sloping to the sink across the rear of the hood. When used in the tops of chemistry tables, these sinks replace the trough and should be spaced so that one sink is within reach of each student or chemist. Their use in the tables avoids the necessity of repairs which so frequently occur in stone or lead troughs, and provides greater cleanliness.

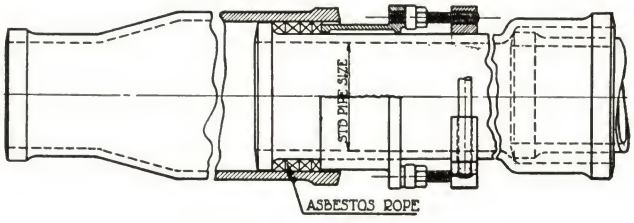


Hemispherical Laboratory Sink

Plate No.	Size (i. d.) outlet, in.	Dimensions, in.					
		A	B	C	D	H	M
5649	1½	5	5	11	6¼	⅜	2
6467	1½	6	6	12	7½	½	2¼
5850—1½	1½	8	4½	10½	9½	½	2¼
5850—2	2	8	4½	10½	9½	½	2¾
7332—1½	1½	12	6	12	13½	⅝	2¼
7332—2	2	12	6	12	13½	⅝	2¾

DURIRON EXPANSION JOINTS

Since the coefficient of expansion of Duriron is much greater than that of cast iron, special provision must be made when drainage systems are subject to unusual variations in temperature. The Duriron expansion joint is designed and used for such cases.



Duriron Expansion Joint

The length of this expansion joint is the same as a full piece of corresponding pipe so that it may be installed without difficulty. Made in 3, 4 and 6-in. sizes which weigh 70, 85 and 150 lb., respectively. These sizes are carried in stock, others made to order when required.

Particulars of Installation—Care must be taken to provide suitable anchors for the pipe line at points midway between expansion joints. In extreme cases it may also be necessary to provide locking clamps at all pipe joints. Our experience on this point is available without obligation.

DURIRON ROPE ASBESTOS PACKING

The Duriron asbestos packing is made from commercially pure asbestos, and is treated with special materials to make it most desirable for acid service. So that the correct amount may be calculated for the work, the accompanying table of requirements per joint is given.

Pure asbestos rope should always be specified for use in place of hemp or oakum to secure an acidproof joint. This is for the reason that hemp or oakum is soon destroyed by the action of acids, allowing the joint to leak.

In the packing of a joint, in order to make sure that there is no open space left when this packing is put in the bottom of the bell or hub, we recommend that the packing be separated into two or three strands and laid in so that the ends will overlap, and surely make a joint all the way round.

The amounts of packing given below, when calked in tightly, fill up the bell or hub from 1½ to 1¾ in. from the top, which space is left for the lead backing.

DURIRON ROPE ASBESTOS PACKING

Pipe size, in.....	1½	2	3	4	6	8
Weight per joint, lb...	0.14	0.16	0.22	0.26	0.35	0.44
Length, in.....	10	12	16	19	26	33

Note: 100 ft. (1200 in.) of this packing weighs 16 lb.

OTHER LABORATORY EQUIPMENT

Many educational and hospital laboratories have occasion to perform protein, nitrogen or ammonia determination by the Kjeldahl digestion process. For this purpose, there is available a complete Duriron digestion equipment of novel design which does not require the use of a hood. It is described in Bulletin No. 139.

Large laboratories often find it desirable to provide a container for hot chromic acid in which is cleaned the glassware. Duriron jacketed kettles, heated by steam or hot water, are available in two standard sizes, 13 and 35 gal.

Drawings of these will be furnished on request.

MAURICE A. KNIGHT

Manufacturer of Acid and Corrosion Proof Chemical Stoneware

AKRON, OHIO

BRANCH OFFICES

NEW YORK OFFICE: 804 World Building, Fred M. Klein, Mgr.—Telephone, Beekman 3-1657

PHILADELPHIA OFFICE: 1600 Arch Street, Edward B. Wilson, Mgr.—Telephone, Rittenhouse 6300

CHICAGO OFFICE: 230 No. Canal Street, S. D. Barkman, Mgr.—Telephone, Franklin 4658

ST. LOUIS, OFFICE: First National Life Building, J. E. Bender, Mgr.—Telephone, Main 1784

SAN FRANCISCO OFFICE: Merchants Exchange Building, B. M. Pilhashy, Mgr.—Telephone, Douglas 375

NIAGARA FALLS OFFICE: 309 United Office Building, E. M. Sergeant, Mgr.—Telephone, Niagara Falls 507

CANADIAN OFFICES

MONTREAL: 1307 Notre Dame Street, West, P. H. Jamieson, Mgr.—Telephone, Main 2625 TORONTO: 44 Victoria Street, National Sewer Pipe Company

Guaranty

Knight-ware is guaranteed to be acid proof throughout the entire body, free from defects and satisfactory in every respect.

Knight-ware will withstand the action of acids, alkalis, chemicals, and all corrosive solutions and gases, weak or strong, hot or cold.

Its acid proof qualities do not depend upon any glaze, enamel or veneer, *"It is the body itself."*

Where Knight-ware Is Used

Knight-ware is used extensively as plant equipment in the manufacture of acids, alkalis, chemicals and corrosive solutions and gases.

Because of the readiness with which Knight-ware lends itself to various shapes and designs, it is used as equipment for almost every purpose involving the use of acids and corrosive agents. It is especially adapted for *acid proof sinks, waste lines* and *fittings, ventilating lines, sumps* or *catchbasins,* as well as many other types of apparatus for *high school, college and university laboratories, hospitals, newspaper buildings,* and any other buildings where acid and corrosive solutions are used and acid proof waste, sewer or ventilating lines are necessary.

Knight-ware Pipe and Fittings

The bell and spigot type of connection is generally employed for laboratory use, although we are able to supply any type connection desired and offer several standard connections from which to choose. We also make up special types to order.

Bell and spigot pipe are available in any bore and in all standard fittings. Special fittings made to order. All bells are deep and well grooved permitting tight packing. Each piece fully covered by our *guaranty.*

Knight-ware Sinks

Because of the great diversity of shapes and sizes in which laboratory sinks are required by *colleges, universities, commercial* and *private laboratories,* it has been found inadvisable to carry any so-called standard sizes in stock. We make sinks to your order from your prints and specifications and to suit your requirements exactly. *Because Knight-ware sinks are entirely handmade, it costs no more for this service.*

Knight-ware sinks are made in one piece and are not slabs bolted or cemented together. All faces are smooth and well glazed, corners are well rounded and, in general, every precaution is taken to see that they are easy to clean and keep clean. Outlets to the sinks are ordinarily made as an integral part of the sink itself, so that no separate outlet connections have to be purchased. If required, we can also manufacture outlet connections separately.

Knight-ware sinks are fully *guaranteed* acid proof, free from defects and satisfactory in *every* respect.

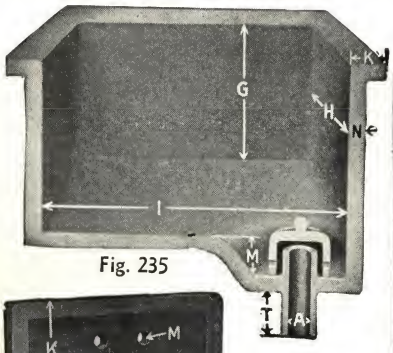


Fig. 235

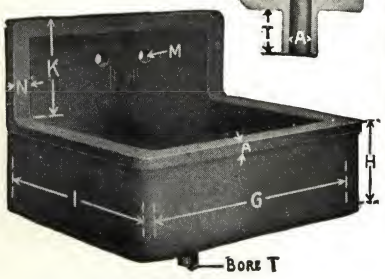


Fig. 237

Fig. 238—Laboratory Sink with Back Cut Out for Trough

Literature

Our 48-page catalogue on Knight-ware Laboratory Equipment, containing complete details and fully illustrated, will be mailed upon request.

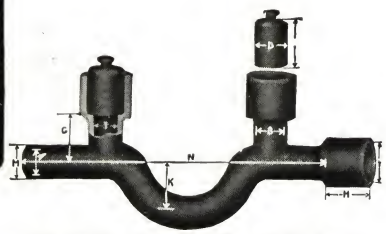


Fig. 267A—Running Trap with Two Cleanouts and Plugs

THE U. S. STONEWARE CO.

Manufacturers of Guaranteed Acid-proof Chemical Stoneware

WORKS (SINCE 1865)

AKRON, OHIO

NEW YORK OFFICE: 50 Church Street

CHICAGO OFFICE: 75 East Wacker Drive

Acid-proof Chemical Stoneware Laboratory Sinks

"U. S. *Standard*" Acid-proof Sinks are widely used in laboratories of universities, schools, hospitals and industrial companies.

The construction is *one-piece,* without seams or joints. The material is non-porous and non-absorbent. The corners are well-rounded and the surface smooth.

TRADE-MARK

Glaze—Our exclusive "Hy-Gloss" salt glaze has a high lustre, dark brown finish and is an integral part of the body itself.

Guarantee—Our products are unconditionally guaranteed to be acid, alkali and corrosion proof throughout the body, with or without the salt glaze.

Bulletin—Write for Bulletin No. 504 giving full information.

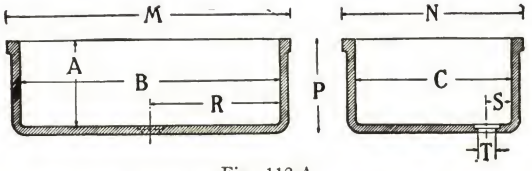


Fig. 112-A
Laboratory Sink (Plain Countersunk Outlet to Take Metal Plug)

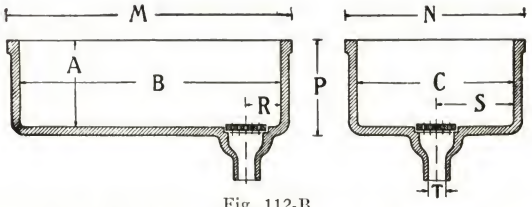


Fig. 112-B
Laboratory Sink (with Integral Nipple Outlet and Removable Strainer)

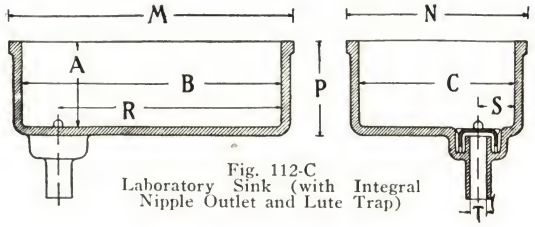


Fig. 112-C
Laboratory Sink (with Integral Nipple Outlet and Lute Trap)

DIMENSIONS OF "U. S. STANDARD" ACID-PROOF CHEMICAL STONEWARE SINKS

Size No.	B	C	A	M	N	P	Code Word
700	11	9	8	14	12	9	Tab
701	14	10	6	17	13	7	Tacit
702	16	8	6	19	11	7	Tack
703	15	14	6	18	17	7	Taffy
704	16	12	6	19	15	7	Tag
705	16	16	9	19	19	10	Tale
706	18	10	11	21	13	12	Talon
707	18	14	7	21	17	8	Tamp
708	18	14	10½	21	17	11½	Tang
709	18	16	6	21	19	7	Tape
710	20	12	7	23	15	8	Tally
711	20	12	12	23	15	13	Tar
712	20	16	7	23½	19½	8¼	Taunt
713	24	15	8	27½	18½	9¼	Tenor
714	32	16	7	35½	19½	8¼	Terse
715	30	20	8	33½	23½	9¼	Thumb
716	36	18	7	39½	21½	8½	Tiger
717	42	20	12	45½	23½	13¾	Toast

Integral Backs on No. 700 to No. 709 sinks (dimension "E" on Fig. No. 112-ASP) are 8 in. high and are 10 in. high on the larger sizes.
Special sizes can be made to order.

Acid-proof Chemical Stoneware Piping

Our acid-proof piping is ideal for acid waste and ventilating lines. There is no other commercial product which is more universally resistant to acids, alkalis and corrosive chemicals and gases.

Bromine, ferric chloride, sulphuric, sulphurous, nitric and hydrochloric acids of any concentration or temperature, can all be handled with perfect safety. "U. S. *Standard*" Chemical Stoneware Piping is free from all the limitations of brass, rubber, high silicon iron, lead and alloys. There are no hazards, no leaks and no repairs.

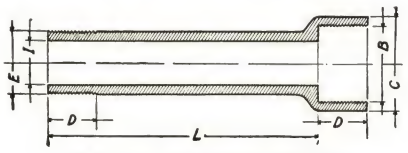


Fig. 149. Acid-proof B&S Pipe

An installation of our chemical stoneware piping is very easily and conveniently handled. The first cost is decidedly lower.

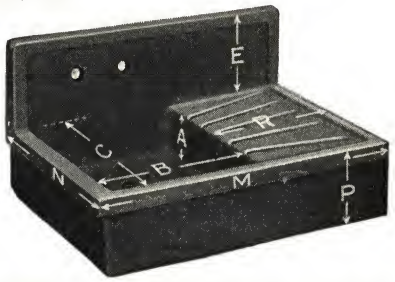
Our line is complete, including elbows, bends, Y's, TY's, traps, crosses, sumps, floor drains, etc.

Acid-proof Sinks with Integral Drainboards

Fig. 533-ASP (with Countersunk Outlet to take Metal Plug).

Fig. 533-BSP (with Integral Nipple Outlet and Removable Strainer).

Fig. 533-CSP (with Integral Nipple Outlet and Built-in Lute Trap)



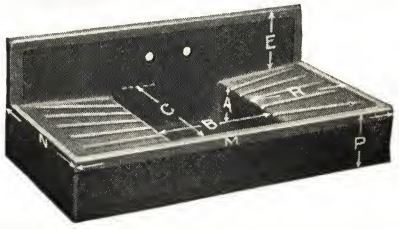
Size No.	B	C	A	E	M	N	P	R	Shipping wt., lbs.	Code word	List Prices f. o. b. factory Fig. 533-ASP	Fig. 533-BSP	Fig. 533-CSP
307	18	14	7	8	37½	16½	8⅞	18	197	Tong	$50.00	$61.00	$66.00
312	20	16	7	10	39¾	19	9⅛	18	285	Tope	52.00	63.00	68.00
313-A	24	18	8	10	43¾	21	10⅛	18	348	Tory	61.00	75.00	79.00
315	30	20	8	10	49¾	23	10⅛	18	410	Tuch	83.00	97.00	101.00

Above list prices are for sinks with drainboards at right hand or left hand. Special end table sinks can be made up with back cut out for trough drainage. Corner sinks with double integral backs can also be supplied. List prices subject to discount.

Fig. 536-ASP (with Countersunk Outlet to take Metal Plug).

Fig. 536-BSP (with Integral Nipple Outlet and Removable Strainer).

Fig. 536-CSP (with Integral Nipple Outlet and Built-in Lute Trap)



Size No.	B	C	A	E	M	N	P	R	Shipping wt., lbs.	Code word	List prices f. o. b. factory Fig. 536-ASP	Fig. 536-BSP	Fig. 536-CSP
507	18	14	7	8	54	16½	8⅞	18	284	Trew	$76.00	$91.00	$96.00
512	20	16	7	10	56	19	9⅛	18	402	Trig	78.00	93.00	98.00
513-A	24	18	8	10	60	21	10⅛	18	477	Trow	92.00	108.00	114.00
515	30	20	8	10	66	23	10⅛	18	546	Tude	125.00	141.00	145.00

Special end table sinks can be made up with back cut out for trough drainage. Corner sinks with double integral backs can also be supplied. List prices subject to discount.

THE AMERICAN SEWAGE DISPOSAL CO., INC.

STAMFORD, CONN.

NEW YORK OFFICE, 101 Park Avenue

Products and Services

AMERICAN REINFORCED CONCRETE SEPTIC TANKS.

DESIGN and INSTALLATION of Sewage Disposal Systems for residences, schools, factories, institutions.

ENGINEERING INVESTIGATIONS of Sewage Disposal, Factory Waste Treatment, Water Supply Projects and Land Drainage.

Special equipment and experience in handling installations for Boy Scout, private and labor camps.

TRADE-MARK

Complete Sewage Disposal Systems

Where distances from municipal sewerage necessitate the use of private sewage disposal systems, the architect generally finds it to the advantage of the owner to give early consideration to the location and type of such system. The plans of the landscape architect are also an important factor and, where possible, his cooperation should be sought.

The purpose of every installation is the efficient and sanitary disposal of all sewage wastes. This is accomplished by providing a watertight receptacle for the retention and partial digestion of solids. The effluent must then be disposed of by subsoil absorption or, if the soil is impervious to water, a form of treatment must be provided which will result in a clarified, odorless and non-putressible, visible effluent which can be taken to a stream, or in isolated cases, spread over the land.

Septic Tanks

The main function which the septic tank performs is to relieve the sewage of solids which either settle or float.

As the septic tank is a combination of a settling tank, sludge digestion and sludge storage tank, it is good practice to design this unit with a water content equal at least to one day's sewage flow. Special provision for sludge digestion and storage can be made by the use of hopper bottoms, or with the bottom sloping toward the inlet end.

Every American tank is designed for the particular conditions under which it must operate. All tanks are built of poured concrete and are properly reinforced. Facilities are provided so that easy access can be had for cleaning at needed intervals.

Secondary Treatment

The most important part of any sewage disposal system is that of secondary treatment. Every American system is carefully designed only after a thorough investigation has been made and soil absorption conditions checked.

Usually the clarified tank effluent can be disposed of in the soil by means of tile fields, leaching trenches or wells. The size of these units is determined by checking the probable waste discharge against the soil absorption rate. Only in this way can a well balanced system be provided.

Where impervious soils are encountered, we provide the type of secondary treatment best suited to the requirements, such as sand filtration, disinfecting or other units.

Standard Materials Used

In designing sewage systems, we avoid, wherever possible, the use of so-called "specials." It is always possible to install efficient systems with the use of standard materials, such as can be purchased economically on the open market.

Capacities of Systems

Septic tanks for residence work should provide a capacity of not less than 60 gallons per resident, plus proper allowance for settlement and digestion of sludge. Where water is used freely, as for country estates, this should be increased 50% or more. Tank capacities for schools, institutions, etc., vary with the type of the building.

The capacities of secondary treatment units depend on the amount of waste water and the porosity of the soil into which it must be discharged. This requires a careful study of local conditions.

A Few American Sewage Disposal Installations

LOCATION	ARCHITECT
Frank Altschul Estate, Stamford, Conn.	R. H. Dana, Jr., New York, N. Y.
R. H. Gillespie, Stamford, Conn.	Butler & Provoost, Stamford, Conn.
Center School, East Longmeadow, Mass.	E. C. and G. C. Gardner, Springfield, Mass.
E. P. Prentice Estate, Williamstown, Mass.	C. K. B. Nevin, Boston, Mass.
Warner School, Springfield, Mass.	Robert B. Warner, Springfield, Mass.
Louis Weidlich, Southport, Conn.	Cameron Clark, New York, N. Y.
Crawford Allen Memorial Hospital, East Providence, R. I.	York & Sawyer, New York, N. Y.
W. M. Nones, Southport, Conn.	Walter J. Skinner, Bridgeport, Conn.
Pine Point Fire Station, Springfield, Mass.	B. Hammett Seabury Co., Springfield, Mass.
Norman C. McLeod, Old Lyme, Conn.	Brown Rolston, Newark, N. J.
Fairfield High School, Fairfield, Conn.	O. C. S. Ziroli, Fairfield, Conn.
D. J. Hardenbrook, Waterford, Conn.	Payne & Keefe, New London, Conn.
Sanford Stoddard, Southport, Conn.	A. C. Holden Associates, New York, N. Y.
Woodbridge Center School, Woodbridge, Conn.	Harrison E. Baldwin, New Haven, Conn.
I. K. Fulton, Sachem's Head, Conn.	Brooks & Glazier, Hartford, Conn.
Waterbury Country Club, Waterbury, Conn.	Parsons & Wait, Boston, Mass.
A. J. Van Beuren, Carmel, N. Y.	F. B. Hinchman, New York, N. Y.
North Hadley School, North Hadley, Mass.	Putnam & Stuart, Northampton, Mass.
E. T. Andrews, West Hartford, Conn.	Smith & Bassette, Hartford, Conn.
Dr. G. S. Reynolds, Pittsfield, Mass.	Joseph McArthur Vance, Pittsfield, Mass.
Col. Hugh L. Cooper, Stamford, Conn.	Chester A. Patterson, New York, N. Y.
Frederick B. Rentschler, West Hartford, Conn.	Thos. H. Desmond Associates, Simsbury, Conn.
James Gilmore, West Mystic, Conn.	E. L. Scholfield, New London, Conn.

ATEN SEWAGE DISPOSAL CO., INC.

TELEPHONE
LAckawanna 4-2770

286 Fifth Avenue, NEW YORK, N. Y.

Products and Service

The ATEN SEWAGE DISPOSAL CO., INC., designs and furnishes sewage disposal systems for residences, clubs, schools, hotels, hospitals, factories or other institutions not connected with city sewers. We contract for the complete installation of our systems, or we can furnish necessary parts (septic tank fittings, metal forms for crowned roofs and reinforced wire forms for concrete work, cast iron manhole collars and covers, siphons, diverting gates, special "Y" branches for tile lines, and special horse-shoe tile) for installation by common labor.

TRADE-MARK

Principles of Sewage Disposal

For systems adapted to individual buildings or groups of buildings the greatest efficiency is attained by settling and digesting the solids in septic tanks and disposing of the sewage effluent from these tanks by filtration through the ground by means of percolation tile drains, leaching chambers or filter beds.

Aten Sewage Disposal Systems

The system consists essentially of a septic tank and filtration fields or leaching chambers. A diverting gate, siphon, special fittings and special tile are features promoting automatic and efficient operation.

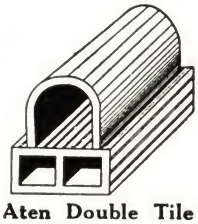
Septic Tank—The Aten septic tank consists of an airtight reinforced concrete chamber which receives the sewage, and settles and digests the solids by bacterial action. No chemicals are used.

Specialties

Siphon

Diverting Gate

Special Y Branch



Aten Double Tile

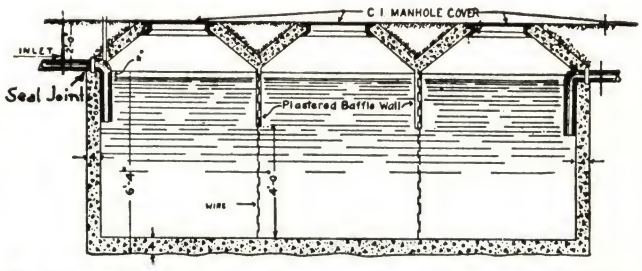
After many years of experience and experimenting, we designed a reinforced wire form by means of which a concrete tank can be poured in position without the use of wooden forms. The Aten wire form is embedded and remains in the concrete, thus reinforcing it. This form saves about half the cost of concrete because thinner walls are used; it saves the cost of wooden forms and the time of a carpenter to erect and to take them down.

Filtration Field—Consists of at least two sets of tile lines, especially designed to allow air to reach the sewage and permit uniform seepage to the soil. A diverting gate permits one set of lines to "rest" while the other is in operation.

Leaching Chambers—Used where land is not available for tile fields. Two or more are used for each septic tank so that one chamber may "rest" while the other is in operation. Constructed of stone, brick, or hollow building block.

Experience

The Company has had more than twenty years' active work in design and construction. The Engineering Staff is qualified through training and experience in sanitary and civil engineering to ably meet all conditions.



Sectional View of Aten Concrete Septic Tanks in Multiple

Aten single septic tanks can be furnished with capacities from 550 to 2500 gal. For schools, camps, clubs and factories where greater capacities are required septic tanks are installed in multiple, as shown above

A Few Aten Installations

W. K. Vanderbilt, Centerport, N. Y.
Piping Rock Club, Locust Valley, N. Y
Engineers Club, Roslyn, N. Y.
Canada Dry Ginger Ale Factory, Hudson, N. Y.
E. D. Morgan, Wheatly Hills, N. Y.
Thomas Hastings (Carrere & Hastings), Westbury, N. Y.
High and Grade Schools, Oceanside, N. Y. (5 Systems)
Cheney Bros. Hospital, South Manchester, Conn.
Nelson Doubleday, Oyster Bay, N. Y.
Dan Beard Outdoor School, Pike County, Pa.
Camp Pok-O-Moonshine, Willsborough, N. Y.
Grade Schools, Lynbrook, N. Y. (5 Systems)
Department of Parks, New York, N. Y.
Florida East Coast Railways, New Smyrna, Fla.
Montauk Beach Development Corp., Montauk, N. Y.
Grade Schools, Valley Stream, N. Y. (4 Systems)
Isolation Hospital, Perth Amboy, N. J.
Grade Schools, Rockville Center, N. Y. (2 Systems)
Oliver Morosco, Great Neck, N. Y.
Milton L'Ecluse, Huntington, N. Y.
W. C. Langley, Old Westbury, N. Y.
Carbondale Machinery Co., Carbondale, Pa.
High and Grade Schools, Mineola, N. Y. (2 Systems)
Salisbury Golf Club, Garden City, N. Y. (3 Systems)
Henry Hornblower, Plymouth, Mass.
John W. Weber, Shelter Island, N. Y.
Camp Dudley, Westport, N. Y.
High and Grade Schools, Westbury, N. Y. (3 Systems)
A. H. Wyatt, Prop., Huellets-on-Lake-George, N. Y.
Leake & Watts Orphan House, Tivoli, N. Y.
Cherrydale Manor School, Darien, Conn.
St. Joseph's Convent and Academy, Babylon, N. Y.
Evangeline Booth, Hartsdale, N. Y.
Supplee Wills Jones Dairy Co., Woodstown, N. J.
Queen of the Rosary Convent, Amityville, N. Y.
Grade Schools, Smithtown, N. Y. (2 Systems)
C. S. Goldsborough, Oxford, Md.
Glen Oaks Golf and Country Club, Great Neck, N. Y.
Grade School, Northport, N. Y.
Deepdale Golf Club, Great Neck, N. Y.
Knickerbocker Ice Co., Mineola, N. Y.
Cooke Milk & Cream Co., Central Square, N. Y.
Nazareth Trade School, Farmingdale, N. Y.
Delaware County Hospital, Delhi, N. Y.
High and Grade Schools, Floral Park, N. Y. (3 Systems)
Dr. Frederick Prime, Huntington and Shelter Island, N. Y.
St. Joseph's Novitiate, Metuchen, N. J.
Home for the Aged, Hempstead, N. Y.
Dr. Wesley Bowers, Southampton, N. Y.
Col. Henry Du Pont, Wilmington, Del.
Henry A. Colgate, Morristown, N. J.
The Dry Milk Company, Jasper, Mo.
Workman's Circle Camp, Sylvan Lake, N. Y.
Westchester Yacht Club, Mamaroneck, N. Y.

KAUSTINE COMPANY, INC.

ENGINEERS AND MANUFACTURERS

Kaustine Septic Tanks and Kaustine System Chemical and Septic Toilets

MAIN OFFICE AND FACTORY

PERRY, N. Y.

Consult Telephone Directory for Local Offices

Products and Engineering Services

KAUSTINE SUPER-SEPTIC TANKS; KAUSTINE ARMCO INGOT IRON SEPTIC TANKS.

KAUSTINE SYSTEM CHEMICAL and SEPTIC TOILETS.

KAUSTINE CHEMICALS.

Kaustine Products are endorsed by public health authorities.

KAUSTINE COMPANY, INC., is fully equipped to handle the engineering work of sewage disposal problems. Supplementing the work of the engineering division at the main offices are district offices manned by graduate engineers or by men especially trained for the work. By this arrangement the architects and the contractors are relieved of the details of sewage disposal plant, design and construction, for these men not only will furnish the necessary plans, but also will undertake the installation work if desired. Simply state your requirements. Kaustine Company will furnish all necessary plans and specifications. Write for the new A.I.A. Catalogue.

Design

KAUSTINE COMPANY, INC. are the originators of the metal septic tank and, as such, have kept in the forefront of the design of septic tanks for sewage disposal purposes. Improvements to the tanks in accordance with the best methods of sewage disposal are constantly being made, thus keeping the Kaustine Septic Tanks in the front rank of this class of equipment.

Kaustine Super-Septic Tanks

The Kaustine Super-Septic Tanks stand among those at the head of the line of sewage treatment tanks for rural and suburban installations. They are made in two styles: the vertical and the horizontal. By a system of internal baffles which are found only in these tanks, a clearer effluent is produced which results in a more rapid absorption of it.

The tables at bottom of first column show the various sizes and capacities of the Kaustine Super-Septic Tank. This tank is covered by a U. S. Government patent, No. 1616837.

CAPACITIES, DIMENSIONS, ETC., KAUSTINE VERTICAL SUPER-SEPTIC TANKS

Cat. No.	Dimensions, in.		Working capacity, gal.	Gage of metal	Wt., lb.	Number of persons designed to accommodate			
	Diam.	Height				Home	Hotel	Factory	Schoo
112	38	50	200	12	295	7	8	12	15
113	48	50	320	12	470	10	12	20	30
114	55	60	535	12	800	18	25	35	40
115	65	60	705	10	1290	25	35	40	55
116	75	60	1000	10	1650	35	50	70	85
117	92	60	1500	10	1950	30	75	110	130

SPECIFICATIONS STANDARD SIZES HORIZONTAL SUPER-SEPTIC TANKS

Cat. No.	Capacity, gal.	Length, ft.	Length, in.	Height, ft.	Height, in.	Width, ft.	Width, in.	Weight, lb.
S2250	2250	8	4	7	3	7	4	3600
S2800	2800	10	5	7	3	7	4	4000
S3400	3400	12	6	7	3	7	4	4400
S4000	4000	14	7	7	3	7	4	4900
S4600	4600	16	8	7	3	7	4	5400
S5200	5200	18	9	7	3	7	4	5900
S5800	5800	12	6	9	9	8	0	6500
S7800	7800	16	8	9	9	8	0	7800
S9800	9800	20	10	9	9	8	0	9100
S11800	11800	25	0	9	9	8	0	10400
S13800	13800	29	2	9	9	8	0	11700
S15800	15800	33	4	9	9	8	0	13000

Materials

Kaustine Super-Septic Tanks and Kaustine Armco Iron Septic Tanks and the Chemical Toilet and Septic Toilet Tanks are made exclusively of *Armco Ingot Iron* protected by a heavy coating of black plastic enamel inside and outside. There is only one grade of Kaustine quality products.

Kaustine Armco Ingot Iron Septic Tanks

Ofttimes price is a determining factor in the purchase of a septic tank. In that case, the Kaustine Armco Ingot Iron Septic Tank is recommended. It too is built of *Armco Ingot Iron* coated with black plastic enamel, but does not have the baffle which is a feature of the Super-Septic Tank. These tanks are made in two styles: the vertical tanks of 200 and 320-gal. capacities and the horizontal tanks of 200 to 5000-gal. capacities.

CAPACITIES, DIMENSIONS, ETC., KAUSTINE ARMCO INGOT IRON SEPTIC TANKS

Cat. No.	Dimensions, in.		Working capacity, gal.	Gage of metal	Number of persons designed to accommodate				Wgt., lb.
	Diam.	Height			Home	Hotel	Factory	School	
Vertical Septic Tanks									
62	38	48	200	14	6	8	12	15	260
63	48	48	320	14	10	12	20	25	330
65	52	60	490	14	18	25	35	40	400
Horizontal Septic Tanks									
82	38	48	200	14	6	8	12	15	260
85	52	60	500	14	..	25	35	40	395
810	52	120	1000	12	..	50	70	80	825
815	52	180	1500	12	..	75	105	120	1155
820	68	144	2000	7	..	100	140	165	2270
825	68	180	2500	7	..	125	175	210	2675
830	68	216	3000	7	..	150	200	250	3095
835	68	252	3500	7	..	175	235	290	3525
840	68	288	4000	7	..	200	270	330	3945
845	68	324	4500	7	..	225	305	370	4365
850	68	360	5000	7	..	250	340	410	4800

Kaustine System Toilets for Rural Homes

Where an indoor toilet is desired, but running water under pressure is not available, either a Kaustine System Toilet, chemical type, or a Kaustine System Toilet, septic type, is recommended. In the former sewage is held in a tight tank in which there is a solution of Kaustine Chemical which sterilizes the sewage and, together with the system of rotary agitation, breaks down the solids, rendering them liquid and easily disposed of. In the latter, sewage is discharged into a metal tank provided with an overflow where, without the use of chemical, under natural, biological processes, the sewage is digested. Liquid flowing out of the overflow is disposed of by means of tile lines laid with open joints in the ground adjacent to the installation.

Kaustine Chemical

Guaranteed to be of standard purity and strength, being many times stronger than phenol (carbolic acid). It is an odorless crystalline compound and renders sewage harmless and free from odor by destroying all organic matter and bacilli. It can also be used as a resolvent in the case of clogged drains and clogged cesspools.

THE NEW YORK SEWAGE DISPOSAL CO.

Sanitary Engineers Specializing in the Design and Construction of Sewerage Systems for Private Dwellings and Public Institutions

5621 Grand Central Terminal, NEW YORK, N. Y.

The Company and Purpose

This Company is organized to offer the proper solution of sanitation problems in planning country estates or institutions so that the architect and his client may be protected from the unintelligent exploitation of equipment of questionable value.

Services

Experts in the design and construction of sewage disposal, water supply and kindred utilities required under suburban conditions.

Engineering Staff

Our experts are graduate engineers of many years' experience, who study the local conditions before recommending a design not only as to physical requirements but with relation to the least cost.

Experience

We have been designing and building suburban utilities for many years and frequently have our plans approved by State and other health authorities.

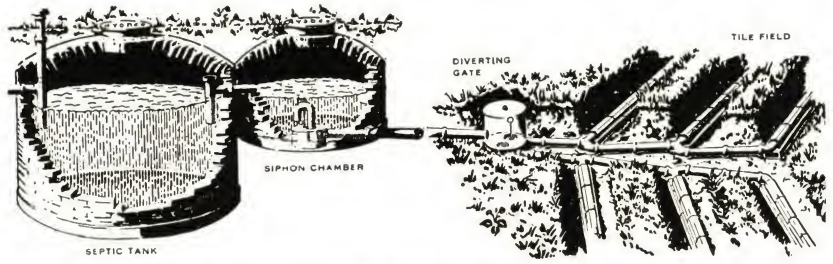
Equipment

Our equipment of trucks and machinery enables us to do all our work with our own workmen. We do not sublet work or divide responsibility.

Responsibility

Our financial strength is such that it enables us to undertake work ranging from the smallest cottage plant to that for institutions and municipalities.

Our continued success for twenty-five years is a guarantee worth your consideration.



Perspective Drawing of Small Sewage System Installation

Septic tank and siphon chamber as they would appear when in position. The sewage fills the tank and the floating particles are held back by the tee trap. Here decomposition is developed in the absence of oxygen. A high degree of liquefaction is obtained and they prove very satisfactory for private houses and small institutions where the effluent is disposed of through subsurface tiling.

The tile for the disposal of tank effluent is laid in trenches about 18 ins. deep, and the section, or fields, are separated by a two-way or a three-way diverting gate as shown

Description of Residential Sewage Disposal Plant

Sewer—Vitrified or iron pipe; standard engineering specifications.

Settling Tank—A tight masonry structure provided with special inlet and outlet devices, baffle and weir walls and other arrangements.

The particular design which may be selected depends upon the nature and volume to be treated.

Siphon Chamber — Receives liquid overflow and by means of an automatic siphon, discharges this effluent at periods. The siphon chamber produces periodic discharges filling uniformly the tile disposal field beyond, permitting a period of rest.

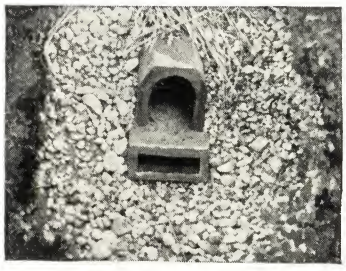
Tile Disposal Field—Made up of two or three divisions, or fields, of *special sewage irrigating tiles,* laid in a series of trenches following the contours. The quantity of absorption tiles in disposal fields is determined by a study of the ground, and amount and nature of sewage to be treated.

Special Diverting Gate—Provided so that siphon discharge may be deflected into either of the fields.

Special Terra Cotta Fittings—Designed to set along the distribution lines, permitting a uniform flow.

References and Installations

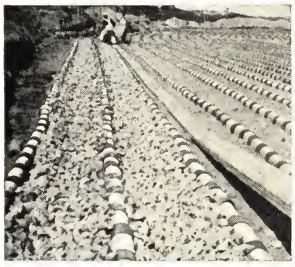
References and a list of installations comprising private plants, golf and country clubs, hotels, camps, developments, schools and hospitals sent upon request.



Showing the Irrigating Tile Sections in Position

Combination Septic Tanks and Leaching Well

For small cottages, garages, gate lodges, churches, etc.; this design, soil condition permitting, is very economical and effective. The septic tank is surrounded by the leaching well thereby saving on excavating and construction costs



Showing a Section of a Tile Field Installation

NUSTONE SEPTIC TANKS AND SEWAGE DISPOSAL SYSTEMS

NUSTONE PRODUCTS CORP. OF NEW JERSEY
For New York, New Jersey and Long Island
80 Railroad Avenue, TENAFLY, N. J.
Telephone, Englewood 3-6440 and 6441

BRANCHES
NEW YORK, N. Y., 101 Park Avenue—Telephone, Caledonia 5-8999
KINGSTON, N. Y., Field Court—Telephone, 268

NUSTONE PRODUCTS CORP. OF CONNECTICUT
For New England, and Westchester County (N. Y.)
222 Boulevard, NEW HAVEN, CONN.
Telephone, New Haven 67261

BRANCHES
NEW YORK, N. Y., 103 Park Avenue—Telephone, Ashland 4-4852
BRIDGEPORT HARTFORD DANBURY
STAMFORD DEVON SOUTH NORWALK
PORT CHESTER, N. Y. PHILADELPHIA, PA.

Organization and Material

Quality and service since 1886.

Our installation departments include graduates of colleges, and former officers of the U. S. Army for the engineering and sales work. For installation of the systems, we maintain permanent crews of men operating from our nearest office.

The tanks we use are made in our own factories or built on the property. Our precast septic tanks are made of carefully prepared and seasoned concrete—giving a composite stone that we guarantee for a lifetime.

Types of Septic Tanks

In addition to our precast concrete tank, we build concrete tanks on the job; brick constructed tanks; and cylinder tanks in battery form.

Features

Where separate line is not provided for kitchen waste, we include a grease trap arrangement with our system for the purpose of trapping the grease, so that it can be easily removed at proper intervals.

Cast iron manhole covers (one or more) are provided for all installations we make. The design of our tank permits us to bring this manhole cover close to the surface of the ground (with extra sections) no matter what the depth of the soil line may be.

Modern drainage methods are used for seepage.

The cost of our system installed is exceptionally low. Every detail of the work—from manufacture of the article, to the covering over of the finished job—comes under our own supervision, thus eliminating unnecessary overhead and other expenses.

Service

An engineer will inspect and report and will make recommendations, on request, without obligation. Plans and specifications will be submitted, if desired.

We keep in constant touch with the users of our systems, advising them when to remove grease, or do it for them at a nominal cost.

Brief Description of Systems and Their Installation

Attention is invited to the fact that this company has originated the grease trap arrangement—considered as very essential even though traps may be placed beneath sinks.

We have also originated the sectional arrangement to bring the manhole covers to any height desired, irrespective of the depth of the soil line.

Special type of drain tile has also been introduced by us, insuring seepage over every square inch of the trenches.

Sewer Line—This is usually vitrified tile pipe. Cast iron pipe is used where the pipe line is likely to get rough contact (as under driveways).

Precast Septic Tank—The size of the tank is judged according to standard specifications. The sewage enters the grease trap sections first, where it is detained long enough to permit the rising of the grease to the surface, and its retention in that section—most of the natural sewage in solution then being passed on to the second section.

The second section retains the liquefied sewage, passing on the water effluent to the third section, and from there it is carried off for amœbic bacterial treatment—and seepage—in the trenches.

Siphon—For the purpose of discharging the water effluent into the drainage field to obtain more far-reaching drainage, and also rest periods for the trenches between discharges.

Contour conditions, ground water and available space are the opposite factors to consider. Where these objectionable conditions do not exist, the siphon is advisable.

Disposal Field—Standard size and "fill" for trenches are used by us. Special type of tile is used to obtain the best drainage possible. Check basins (serving also as dry wells) are installed where considerable trench is used.

Distribution chambers are used—instead of branch pipe lines—in order to get more perfect distribution to the branch lines.

Partial List of Our Institutional and Individual Installations

Arthur S. Brisbane, Allaire, N. J.
Riverside Yacht Club, Riverside, Conn.
Greenwich Country Day School, Greenwich, Conn.
Percy A. Rockefeller Estate, Greenwich, Conn.
Wm. G. Rockefeller Estate, Greenwich, Conn.
Owen D. Young Estate, Riverside, Conn.
Coolidge Estate, Mount Kisco, N. Y.
Dr. Albert M. Greminger Estate, Bedford, N. Y.
Scott Residence, Westchester Biltmore, Rye, N. Y.
V. Green Residence, Greenhaven, Mamaroneck, N. Y.
Ruxton Estate, Greenwich, Conn.
Pinkham Estate, Stamford, Conn.
Dr. Thaddeus Hyatt Residence, Stamford, Conn.
Allen Estate, Port Chester, N. Y.
Holy Ghost Fathers Dormitory, West Norwalk, Conn.
Broad River School, West Norwalk, Conn.
Du Pont Fabrikoid Co., Fairfield, Conn.
Choate Preparatory School, Wallingford, Conn.
New Haven Orphan Asylum, New Haven, Conn.
Connecticut College, New London, Conn.
Corbin Estate, Hartford, Conn.
Summit Golf Club, Summit, N. J.
Tenakil Public School, Closter, N. J.
Standard Oil Co.—in various locations.
Bohack Stores—in various locations.
Nanuet Public School, Nanuet, N. Y.
Sheffield Farms, West Norwood, N. J.
Jas. J. Donahue, Mountain View, N. J.
Major B. C. Black Residence, Great Neck, N. Y.
University Gardens, Great Neck, N. Y.
New York Military Academy, Cornwall-on-Hudson, N. Y.
New York Tribune Summer Camp for Boys, Rhinebeck, N. Y.
Hopatcong Public School, Hopatcong, N. J.
Greenwood Lake Public School, Greenwood Lake, N. J.
Cedar Grove Municipal Building, Cedar Grove, N. J.
Camp Unser, Highland Mills, N. Y.
Bayonne Public Parks, Bayonne, N. J.
Beth Israel Cemetery, Woodbridge, N. J.
Northvale Public School, Northvale, N. J.
Stanley A. Russell Residence, Montclair, N. J.
Shupe Terminal Building, Newark, N. J.
New York Telephone Co., Eltingville, S. I., N. Y.
St. Cloud Public School, West Orange, N. J.
Cresskill Public School, Cresskill, N. J.
Home Bank & Trust Company, Darien, Conn.
Heather Residence, Westchester Biltmore, Rye, N. Y.
Milbrook Country Club, Greenwich, Conn.
Dr. Jimenez Estate, New Canaan, Conn.
Topping Estate, Round Hill Road, Greenwich, Conn.
St. Clement's Church, Stamford, Conn.
Bruce Park Memorial, Greenwich, Conn.
Dominick Residence, Khakum Woods, Greenwich, Conn.
Stamford Hall Sanitarium, Stamford, Conn.

Research

The table of requirements shown on this page was prepared after a careful survey of various Government and State Regulations, and after consultation with State officials. We have discarded the schedules of capacities now generally accepted, and have compiled our schedule to comply with State requirements.

Three different types of construction are advertised by us because of the number of States we work in. Precast Concrete Cylinder Tanks (battery style) are widely used in New Jersey and Pennsylvania. Concrete Septic Tanks (poured on the job) are popular in New York and New England. Brick Constructed Tanks are used a great deal on Long Island.

Space does not permit display of all three styles of construction. We install the type of construction you specify, and, if your specification does not mention style wanted, we guarantee to give a State approved type of tank; and we submit sketch for your approval.

Responsibility

A telephone call or letter to our nearest office will bring, without delay, an experienced engineer to your office to cooperate in whatever way possible.

Drainage Requirements

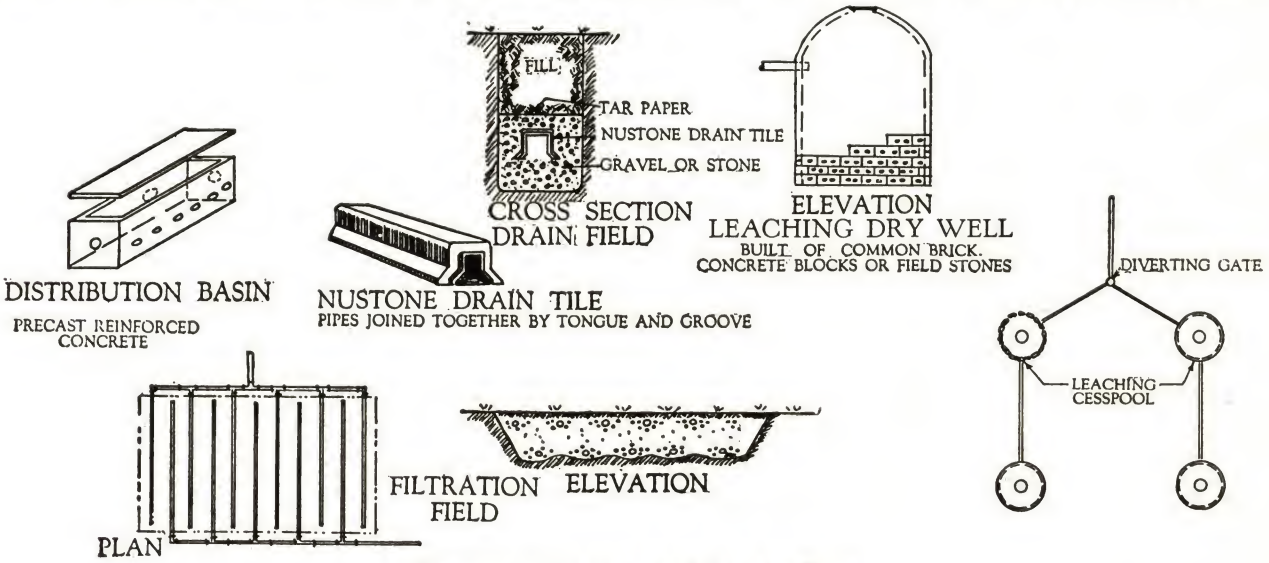
Subsurface drainage trench, open dry wells and filtration beds comprise the usual drainage methods. Where there is all sand or loam, trench work is preferable. Where sand is at a depth, dry wells are preferred. Where all clay is to be found, filtration and discharge is necessary. Where well water is on premises, special care must be given the seepage.

Specifications

When writing specifications state "Nustone" or equal, and also give the septic tank number and capacity as shown in schedule. Should contract be awarded to us, we will submit to you a detailed report of conditions and recommendations before proceeding with the work.

TABLE OF REQUIREMENTS

Tank No.	Total capacity, gallons	Number of persons									
		Residence	Estate	Hotel		School		Factory	Hospital	Institution (except hospital)	Camp
				Without laundry	With laundry	No showers	With showers				
N-2	250	6	.....	.....	.....	16	12	10	.....	.....	10
N-3	350	9	.....	.....	.....	24	18	14	.....	.....	14
N-4	500	12	.....	.....	.....	33	25	20	.....	.....	20
N-5	750	18	10	10	10	50	37	30	.....	.....	30
N-6	1000	25	14	14	10	66	50	40	.....	.....	40
N-7	1250	.....	17	17	12	82	62	50	.....	.....	50
N-8	1500	.....	20	20	15	100	75	60	.....	.....	60
N-9	1750	.....	33	33	23	152	116	93	.....	.....	93
N-10	2000	.....	40	40	30	200	150	120	.....	30	120
N-11	2250	.....	60	60	45	300	225	180	22	45	180
N-12	2500	.....	66	66	50	333	250	200	25	50	200
N-13	2750	.....	73	73	55	366	275	220	27	55	220
N-14	3000	.....	80	80	60	400	300	240	30	60	240
N-15	3250	.....	86	86	65	433	325	260	32	65	260
N-16	3500	.....	93	93	70	466	350	280	35	70	280
N-17	3750	.....	100	100	75	500	375	300	37	75	300
N-18	4000	.....	106	106	80	533	400	320	40	80	320
N-19	4500	.....	120	120	90	600	450	360	45	90	360
N-20	5000	.....	133	133	100	666	500	400	50	100	400
N-21	5500	.....	146	146	110	.....	550	440	55	110	440
N-22	6000	.....	.....	160	120	.....	600	480	60	120	480
N-23	6500	.....	.....	174	130	.....	650	520	65	130	520
N-24	7000	.....	.....	187	140	.....	700	560	70	140	560
N-25	7500	.....	.....	200	150	.....	.....	600	75	150	600
N-26	8000	.....	.....	213	160	.....	.....	640	80	160	640
N-27	9000	.....	.....	240	180	.....	.....	720	90	180	720
N-28	10000	.....	.....	266	200	.....	.....	800	100	200	800
N-29	12000	.....	.....	320	240	.....	.....	960	120	240	960
N-30	15000	.....	.....	400	300	.....	.....	.....	150	300	1200
N-31	20000	.....	.....	533	400	.....	.....	.....	200	400	.....
N-32	25000	.....	.....	666	500	.....	.....	.....	250	500	.....
N-33	30000	.....	.....	800	600	.....	.....	.....	300	600	.....
N-34	40000	.....	.....	.....	800	.....	.....	.....	400	800	.....
N-35	50000	.....	.....	.....	1000	.....	.....	.....	500	1000	.....
N-36	75000	.....	.....	.....	.....	.....	.....	.....	750	.....	.....



Diagrams of Drainage and Seepage Plans

RURAL UTILITIES, INC.

Sewage Disposal, Gas, and Water Supply

570 Lexington Avenue, NEW YORK, N. Y.

Products and Service

We design and construct in rural and suburban districts those services usually provided by public service organizations or city departments in the more densely populated areas, namely, Water, Sewage, Gas, etc.

Water Supply

Our services include: first, preliminary investigation and recommendation of source of water supply, boring of test wells, analysis of water, etc.; second, construction of wells, shallow or deep, building of pump house and installation of pumps or turbines and other equipment; third, engineering supervision.

Standard pumps are supplied—the type selected depends on particular requirements.

Sewage Disposal

The disposal of sewage requires two treatments, primary and secondary.

Primary Treatment—The primary treatment is accomplished by means of a septic tank which has the function of (1) settling solid matter (2) of breaking down solid matter through action of anaerobic bacteria.

Requirements of a Septic Tank—

A septic tank should be:

(1) Tight—should not leak sewage or admit light or air.

(2) Large enough in one body so that inrush of sewage will cause minimum disturbance.

(3) Properly proportioned—length should be approximately 1½ times width, depth 1 to 1¼ times width—and properly trapped to prevent inrush of sewage.

(4) Have an easy access from surface for cleaning.

Rural Septic Tanks meet all these requirements.

Secondary Treatment—After leaving the septic tank the effluent should be reasonably clear but it is still dangerous containing a high percentage of bacteria. This effluent can be disposed of by means of tile field, leaching well, sand filter or some other method. The nature of the ground plays such an important factor in this part of the system that we can give no rule, but prefer to send an engineer to examine each project and make a soil test to determine the proper method of treatment.

Rural Septic Tanks

Rural Tanks are built in such a manner as to give large size without excessive weight, which allows them to handle peak loads without disturbance, giving a good clear effluent at all times.

They are built of rings, or sections of rings, 6 ft. in diameter, and are adaptable to a number of different capacities, as listed below. These rings may also be used for siphon compartments and other forms of tanks.

Working capacity, gals.	Rings	Inside diam., ft.	Height, in.		Number of persons	
			Flow line	Over all	Residences	Schools
820	3	6	47	63	5- 7	20- 50
1150	4	6	66	79	7-11	40- 70
1480	5	6	85	98	11-15	60- 90
1810	6	6	104	117	15-18	80-110

Special Tanks—While we specialize in the concrete precast tank, we also furnish steel, brick or poured concrete, depending upon type of installation desired.

Automatic Siphon

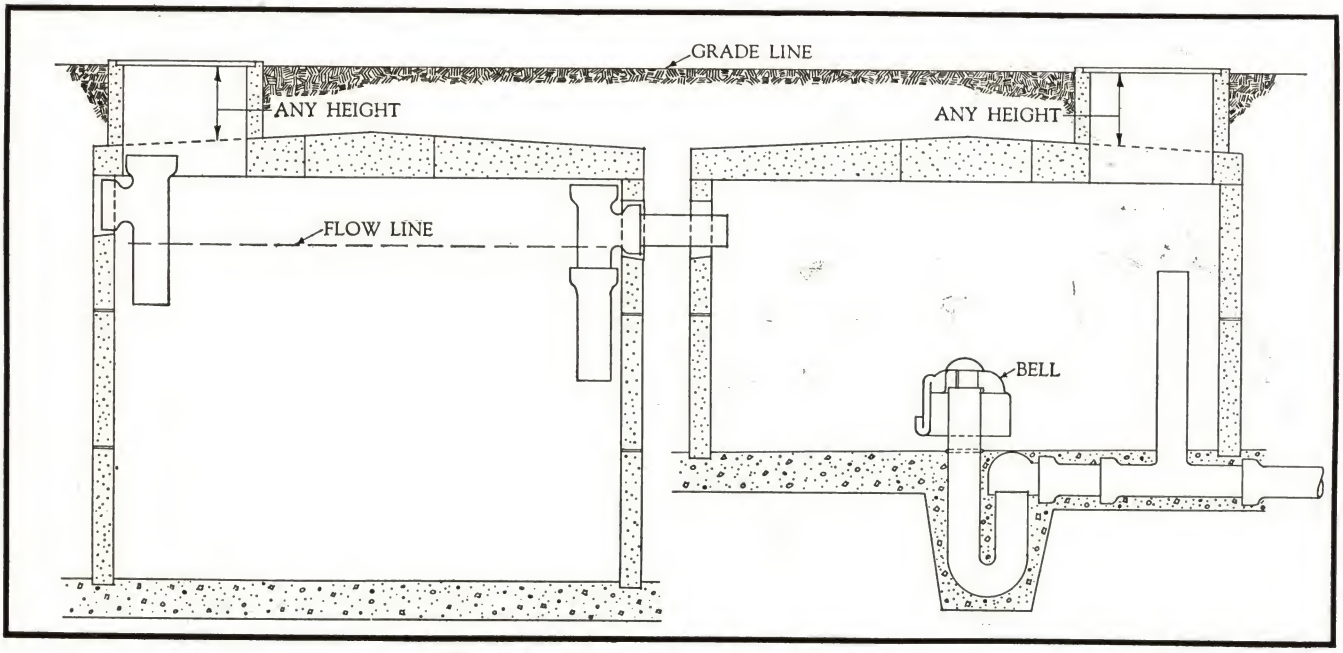
While the use of a siphon compartment is not absolutely essential, we strongly recommend its use, and on larger work a double alternating siphon which eliminates the often-neglected diverting gate.

References

From our list of clients, we mention:

Hyde & Shepherd; Morris & O'Connor; Goodwin, Thompson & Patterson; Johnston Livingston.

We would be glad to furnish a full list to any one interested.



A Typical Rural Utilities Sewage Disposal Installation

R. D. SIMPSON COMPANY

Sewage Disposal Equipment

136 East Gay Street
COLUMBUS, OHIO

Products

SEWAGE DISPOSAL EQUIPMENT; SIMPSON AUTOMATIC TIPPING TROUGHS, SIMPSON EQUIDOSE DISTRIBUTORS and REVOLVING ARM DISTRIBUTOR.

A Rotating Distributor

We have very recently developed a ball bearing revolving arm distributor, scientifically arranged for equal distribution over filter bed. Recommended for industrial plants.

Centralized School House or Country Club, Institution or Industry Lath Filter Plant Design

A lath filter plant includes a settling tank, one or more lath filters and a secondary settling tank. Under gravity operation ordinarily, the raw sewage flows successively through the settling tank and an inspection or surge chamber, thence through 2-in. galvanized steel pipe located on the longitudinal center line of the lath unit into one end of a tipping trough. The liquid is distributed over the top of the laths by Simpson Equidose Distributors, which are suspended a short distance above the laths and are alternately flooded. The trough is supported between the two units of the filter and does not rest on the lath.

Catalogue covering details of equipment and lath filter plant design sent on request.

Simpson Automatic Tipping Trough

For trickling filter influent distribution.

Especially adapted to the application of trickling filters to the treatment of sewage.

Used in conjunction with Equidose Distributors.

Intermittent controlled flooding — approximately uniform distribution on filtering material.

Small loss of head—siphons and dosing tanks eliminated; non-clogging operation; very limited attention required; unaffected by freezing.

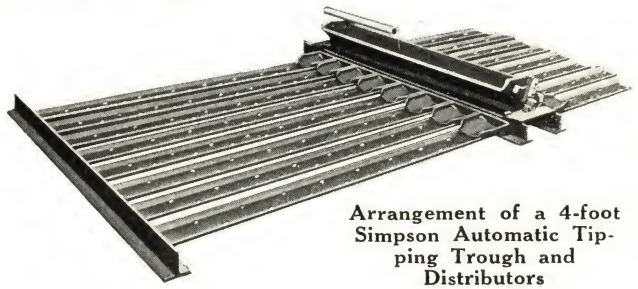
Especially adapted for replacement of wornout wooden tipping troughs.

Maximum practical flooded area, 12-ft. trough, 120 sq. ft.; capacity per tip, 0.37 gal. per lin. ft. of trough.

Made in lengths up to 15 ft.

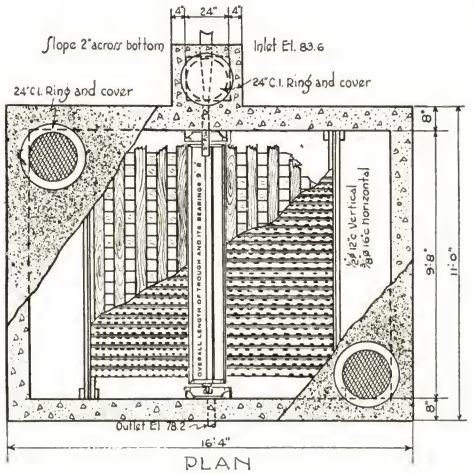
Simpson Equidose Distributors

These distributors are made of 16 in. gauge steel—channel shapes and are perforated with many half-inch holes affording uniform distribution and also practically eliminating suspended matter deposition with resultant clogging. They assure the longest, most economical and satisfactory service because they resist rot, heat, atmospheric conditions, moisture, etc. Rigid, non-warping, and will not sag.

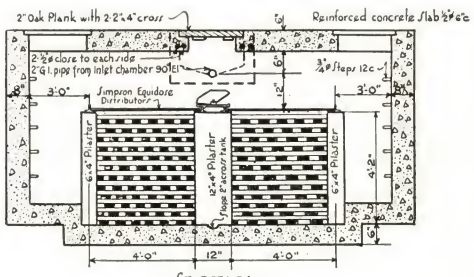


Arrangement of a 4-foot Simpson Automatic Tipping Trough and Distributors

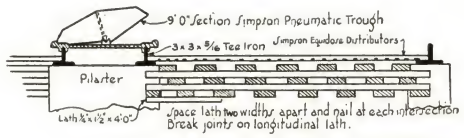
Patent applied for



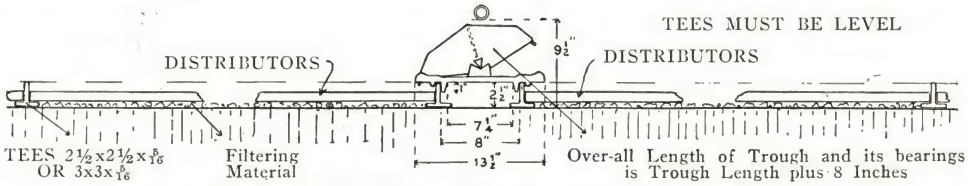
PLAN



SECTION



TIPPING TROUGH & LATH SPACING DETAIL



Assembly Automatic Tipping Trough and Equidose Distributors

SAN-EQUIP INC.

Manufacturers of Complete Septic Sewage Disposal Systems

East Brighton Avenue, SYRACUSE, N. Y.

BALTIMORE, H. P. Supplee, 530 North Charles St.
BOSTON, T. R. McElroy, 46 Everdean St.
CHICAGO, Geo. E. Robertson, P. O. Box 437
CLEVELAND, S. L. Carpenter, 14935 Delaware Ave., Lakewood
EAST ORANGE, N. J., M. F. Greene, 67 Washington St.
FORT WORTH, TEX., Allen, Sproull & Allen, Burk Burnett Bldg.
LOS ANGELES, H. W. Brautigam, 923 East Third St.
MEMPHIS, TENN., E. L. Goldstein, Tennessee Hotel
MIAMI, FLA., Jos. H. Nauss, 468 W. Flagler St.
PHILADELPHIA, PA., W. R. Jouett
SEATTLE, WASH., F. C. Neupert, 330 Central Bldg.
SPRINGFIELD, MASS., W. L. Todd, 804 Belmont Ave.

Distributers are Plumbing Jobbers—Additional Warehouse Service at all Important Trade Centers

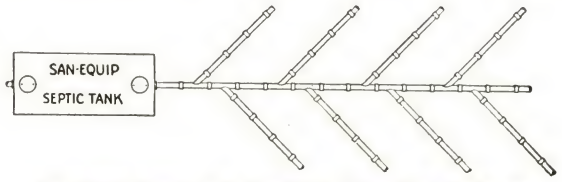
A DEPENDABLE TROUBLE-FREE DISPOSAL SERVICE

A dependable, trouble-free disposal service is assured only when a correctly designed septic tank is combined with adequate drainage into one unified system. San-Equip offers such a system for suburban and rural homes, camps, schools, factories and other unsewered buildings.

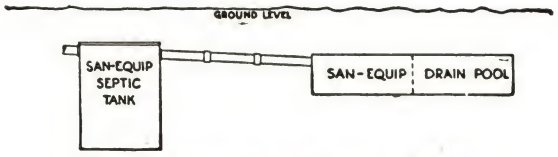
San-Equip "CERTIFIED"

The treatment unit of this complete system is a San-Equip Septic Tank. Drainage consists of either San-Equip Filter Pipe or San-Equip Drain Pool for maximum efficiency.

As assurance of adequate equipment properly installed, a Certificate of Approved Equipment accompanies each San-Equip System. When posted in the building, it serves as a permanent record of the installation.



San-Equip Septic with San-Equip Filter Pipe Drainage

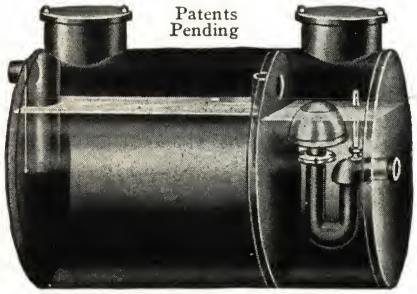


San-Equip Septic with San-Equip Drain Pool

San-Equip Siphon Septic System

This San-Equip System embodies the outstanding improvement in septic design—the combination of septic process and siphon discharge in one compact unit.

Operation—The siphon discharges treated sewage at four to six-hour intervals in sufficient volume to send the effluent to every part of the filter field. This provides equal distribution of the drainage load—keeps the entire tile field active—reduces possibility of overloading or clogging. Intervals of rest between discharge periods allow cleansing of drainage field.



San-Equip Siphon Septic System

Design—A horizontal type, two-chambered tank with the siphon unit in the second chamber. Has liberal baffles, set-in collars and full partition. No. 725 and larger sizes have three manholes placed for convenient inspection of tank. All outlet openings are 4-in. diameter with intake openings as specified. Siphon chamber capacity may be changed if so specified.

Material—Special rust-resisting, copper-bearing iron, protected from moisture, acids and soil corrosion by a heavy enamel of mineral asphalt melted on both inside and outside. Tanks Nos. 703 to 707 are 14-gauge; Nos. 710 and 715, 12-gauge; larger sizes $\frac{3}{16}$-in. plate.

SAN-EQUIP SIPHON SYSTEM SIZES AND RATINGS

No.	Net gal.	Siphon discharge, gal.	Number of people		Dimensions	Size of intake pipe	Weight, lb.	Price
			Home	School				
703	240	60	7	15	48″x48″	4″	400	$ 72
705	350	80	12	25	52″x60″	4″	495	96
707	550	120	25	50	52″x90″	4″	695	132
710	750	160	40	75	52″x10′	6″	1025	174
715	1125	225	70	110	52″x15′	6″	1375	266
720	1500	300	85	155	69″x11′8″	6″	2475	344
725	1875	375	115	200	69″x14′7″	6″	2975	422
730	2250	450	140	245	69″x17′6″	8″	3425	500
735	2625	525	170	290	69″x20′5″	8″	3875	578
740	3000	600	195	330	69″x23′4″	8″	4325	646
745	3375	625	220	370	69″x26′3″	8″	4775	734
750	3750	750	250	410	69″x29′2″	8″	5225	812

Ask for blue prints of larger systems up to 10,000 gal.

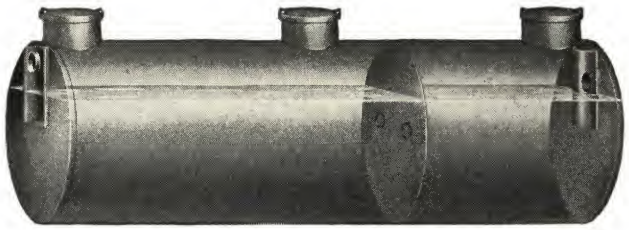
San-Equip Septic Tanks—(Standard Design)

These two-chambered septics have become standard equipment for unsewered buildings. Thousands of installations over a twelve-year period have proved San-Equip operating efficiency and durability.

Design—Follows U. S. Public Health Service recommendations. Includes reinforced construction, full partition, liberal baffles and set-in collars.

Materials—Special rust-resisting, copper-bearing iron. Protected from moisture, acids and soil by heavy coating of mineral asphalt melted on inside and out.

Horizontal Type Tanks for Schools, Factories, Parks, Clubhouses—San-Equip Septics of 500-gal. capacity and larger are horizontal tanks as shown. Nos. 405 to 925, inclusive, have two manholes placed for convenient inspection of the tank. Larger sizes have three manholes. No. 405 is made of 12-gauge iron; Nos. 410 and 915 are 12-gauge; Nos. 920 up $\frac{3}{16}$-in. plate.

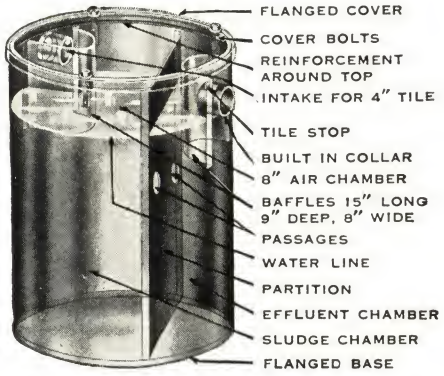


SAN-EQUIP SEPTIC HORIZONTAL TANK SIZES AND RATINGS

No.	Net gal.	Number of people			Dimensions	Size openings	Shipping wgt., lb.	Price
		Home	School	Factory				
405	500	10 to 20	40	35	52″ diam.x60″	4″	425	$ 76
410	1000	20 to 40	80	70	52″ diam.x10′	6″	925	148
915	1500	40 to 75	120	105	52″ diam.x15′	6″	1300	226
920	2000	75 to 100	165	140	69″ diam.x11′8″	6″	2400	304
925	2500	100 to 125	210	175	69″ diam.x14′7″	6″	2850	382
930	3000	120 to 150	250	200	69″ diam.x17′6″	8″	3300	460
935	3500	140 to 175	290	235	69″ diam.x20′5″	8″	3750	538
940	4000	160 to 200	330	270	69″ diam.x23′4″	8″	4200	616
945	4500	180 to 225	370	305	69″ diam.x26′3″	8″	4650	694
950	5000	200 to 250	410	340	69″ diam.x29′2″	8″	5100	772

Specifications, prices and installation plans for tanks to 10,000 gal. on request.

Vertical Tanks for Homes and Camps—San-Equip Septic Tanks for the small installation are upright tanks as shown. Made of 14 gauge copper-bearing iron with full partition and removable flanged cover.



SAN-EQUIP SEPTIC VERTICAL TANK SIZES AND RATINGS

No.	Net gal.	Working capacity, gal.	Number of people			Dimensions	Size openings	Shipping wgt., lb.	Price
			*Home	School	Factory				
402	245	200	4 to 6	15	12	38″ diam.x48″	4″	260	$29
403	360	300	6 to 9	25	20	48″ diam.x48″	4″	350	39
404	550	490	10 to 18	35	30	52″ diam.x60″	4″	410	62

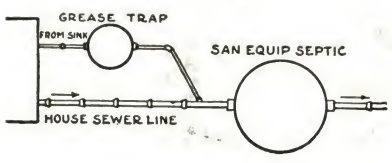
*Lower figures in home ratings column are recommended by health officials for most satisfactory service. In no instance, even for temporary use, should maximum ratings shown be exceeded.

San-Equip Grease Trap

For use with the septic system wherever there is a large amount of grease and kitchen waste. Requires occasional skimming.

Made of rustproofed copper-bearing iron. Standard openings 2-in. threaded couplings. Openings for 2-in. or 4-in. soil pipe if specified.

No. GT 40	40-gal. capacity	22½x24 in.	61 lbs.	$15.00
No. GT 60	60-gal. capacity	22½x36 in.	79 lbs.	18.00



San-Equip Drainage

Correct operation of the septic tank depends upon the proper installation of adequate drainage. Soil tests desirable on larger installations for computing necessary drainage requirements. Write for details or advice.

San-Equip Filter Pipe

An improved pipe—perforated to increase the drainage area twelve to twenty times per foot over ordinary tile. Less pipe is required with a proportionate saving

Patents Pending

in labor and materials. Lays easier without breakage. Tight joints maintain alignment and prevent seepage of dirt into the line.

Made of 16 gauge copper-bearing iron, rustproofed with mineral asphalt same as the San-Equip Septics.

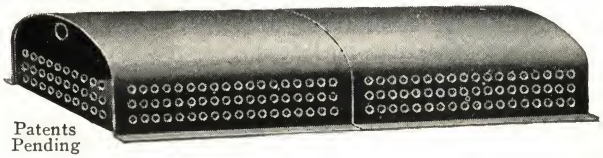
For 24-hour service where soil is porous and drainage favorable, specify 12 to 15 ft. of San-Equip Filter Pipe per person. In tight soil increase capacity up to 20 ft. per person. Complete information on amount of pipe for part time service furnished on request.

San-Equip Filter Pipe is packed in cartons for convenient handling.

No. 420	Carton of 10 2-ft. lengths of 4-in. pipe	$5.00
No. 425	Carton of 2 2-ft. lengths unperforated pipe and 4 single Y fittings 4x24 in.	5.00
No. 445	45° angle fitting 4x12x12 in., each	.50

San-Equip Drain Pool

A scientifically designed seepage pool for use in place of a filter field where the soil is porous, drainage area limited and where there is no danger of water supply

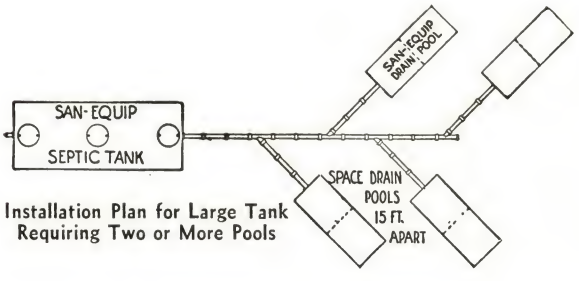


Patents Pending

pollution. Seepage takes place nearer the surface of the ground where soil porosity is most favorable. Perforations in sides and ends of the pool plus the open bottom give a total drainage area of over 40 sq. ft.

The capacity of a single drain pool is sufficient for 200 and 300-gal. septics. For larger tanks, two or more pools should be used—with the total capacity equal to that of the septic if drainage conditions are favorable.

No. 250 DP	250-gal. capacity	Weight 175 lb.	$24.00



Installation Plan for Large Tank Requiring Two or More Pools

STROUDSBURG SEPTIC-TANK CO.

312 Main Street, STROUDSBURG, PA.

BRANCH OFFICES

NEW YORK, N. Y., 74 Trinity Place and 110 East 42nd Street
HAZLETON, PA., 312 Hazleton National Bank Building
BALTIMORE, MD., 423 St. Paul Place
READING, PA., American Casualty Building
BOSTON, MASS., 43 South Market Street
PITTSBURGH, PA., 5824 Phillips Avenue
PHILADELPHIA, PA., 3701 North Broad Street
SCRANTON, PA., First National Bank Building
ALLENTOWN, PA., 816 Chew Street

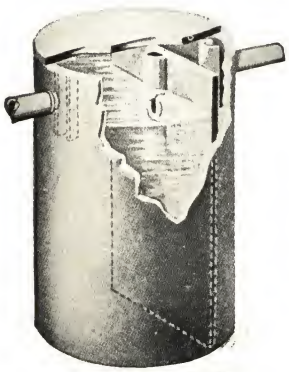
Products

SEWAGE DISPOSAL SYSTEMS; SEPTIC TANKS; GREASE TRAPS.

Also manufacturers of Syphon Systems; Concrete Drain Tile and Reinforced Concrete Sewer Pipe; Cast Iron Manholes, Covers and Fittings for sewage disposal systems. Write for Bulletin No. 101.

TRADE-MARK

Sep-Tank Sewage Disposal Systems



Sep-Tank

The Sep-Tank sewage disposal system consists of one or more Sep-Tanks and necessary drain tile and employs the L.R.S. system of sewage disposal devised by the United States Public Health Service. Sep-Tanks have been commended by various State boards of health and other eminent authorities on sanitation.

Sep-Tanks—Sep-Tanks are permanent, made of concrete, thoroughly reinforced by steel fabric to prevent cracking, and waterproofed to prevent leaking and absorption. The best grades of portland cement, selected silica sand and special steel reinforcing are used.

Sep-Tanks are cylindrical in shape and the sides and bottoms are moulded in one piece. With no joints to open after installation, leakage is prevented and sufficient water in the tank is assured at all times to promote septic action. Covers are also made of reinforced concrete, moulded separately and waterproofed. The corrosive action of the acids in the sewage will not affect Sep-Tanks.

Operation—The Sep-Tank has sufficient depth to insure complete digestion of sewage and sufficient area for a proper bacterial mat. Flow of sewage through the Sep-Tank is retarded by curved pipes or baffles, preventing agitation.

Important Information and Engineering Service for Architects and Engineers—When you start plans for a home, school, factory, or any type of building which is to be built in an *unsewered location,* and you desire to use modern sewage disposal equipment, please consult our engineers in regard to recommendation for proper installation of septic tank equipment. Very often after plans and specifications are made and building started, it is found almost impossible to properly install the sewage disposal equipment.

In other words, sewage disposal should be a *primary consideration* and not a secondary one. You can save labor, time, and money by consulting us when planning your project.

We furnish detailed plans and specifications of the sewage disposal plant to the architect and engineer. We also furnish the services of an engineer to supervise installation work.

We manufacture, design and install sewage disposal systems for estates, country clubs, schools, camps, and all other types of institutions.

Many Users—Over 70,000 tanks of this design are now in use.

SINGLE UNIT SEP-TANK SYSTEMS FOR SMALL SINGLE HOUSES

Sep-Tank No.	Size, in.	Capacity, gal.	Number of persons served, etc.	Approx. weight, lb.
20	32x54	200	5 persons; 1 bath	1450
21	38x54	250	7 persons; 1 bath	1600
22	44x54	300	10 persons; 1 bath	1750

***BATTERY SYSTEMS**

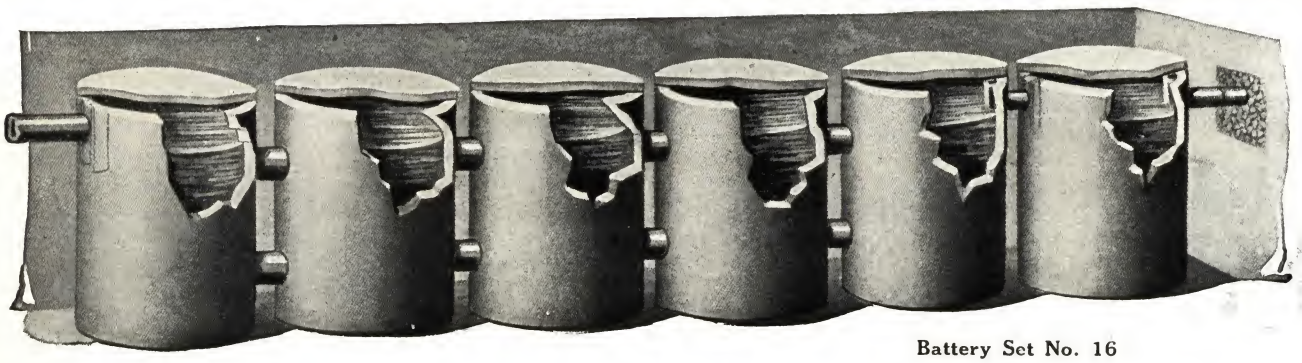
Battery No.	Number and size of liquefying tank, in.	Number and size of effluent tank, in.	Total cap., gal.	Number of persons served			Approx. weight, lb.
				Residences	Factories	Schools	
12	1-44x52	1-28x42	450	15	30	45	2600
12-S	2-44x52	.....	600	22	35	52	3900
13	2-44x52	1-44x52	900	30	45	60	4650
14	3-44x52	1-44x52	1200	45	67	90	5600
15	4-44x52	1-44x52	1500	60	90	120	7000
16	5-44x52	1-44x52	1800	80	120	160	8400
17	6-44x52	1-44x52	2100	100	150	200	9800
18	7-44x52	1-44x52	2400	125	175	225	11350

*For large installations to accommodate large residences, schools, hotels, factories, etc., where the single units are too small to take care of the sewage. The seven batteries listed above are carried in stock, but we can arrange tanks in batteries up to any number required. We manufacture battery systems with each tank having a capacity of 400 or 1000 gal. The above listed battery units are of 300-gal. capacity each.

Grease Traps of Reinforced Concrete

On all the larger buildings the use of a grease trap with the septic tank system is essential. Kitchen, pantry and laundry wastes should discharge directly into the grease trap before discharging into the septic tank system. Grease clogs sewer lines and hinders the operation of the septic tank system, as it is not subject to liquefaction by bacterial action. Several different sizes of grease traps are available, as follows:

No.	Cap., gal.	Outside, in.		Inlet to bottom, ft. in.	Weight, lb.
		Diam.	Height		
0	50	27	40	2 7	500
1	75	32	44	2 8	750
2	175	36	56	3 7	1300
3	250	42	56	3 7	1450
4	300	48	56	3 7	1600
5	400	53	69	4 4	2800



Battery Set No. 16

THE LITTLE GIANT MFG. CO.

Manufacturer of Sentinel Safety Sewer Valve

1401 3rd Avenue South, MINNEAPOLIS, MINN.

Product

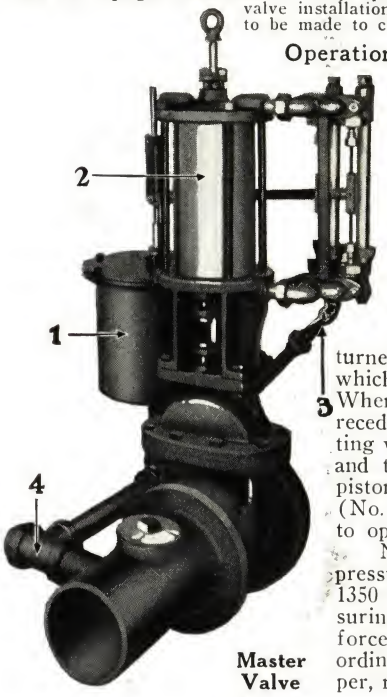
SENTINEL SAFETY SEWER VALVES.

For Tu-bu-lur Radiator Brackets, Little Giant Radiator Hangers, Concrete Inserts and Temporary Radiator Legs, see Manufacturers' Index.

Sentinel Safety Sewer Valve

The Sentinel Safety Sewer Valve automatically prevents the backup of sewers through floor drains and fixtures. It closes immediately when backup occurs and opens as soon as water level recedes. This valve gives positive protection to property and merchandise and eliminates a dangerous health menace. It functions without human attention or electric current.

Sizes and Installation—Scale below shows the dimensions of the valve in sizes from 3 to 16 in. Valves are also made in 2-in. size and in larger sizes up to 24 in. The standard valve has hub ends but can be furnished with flanged or screw ends if specified. The standard model is built for upright installation in any specified position. On a single valve installation there is only one connection to be made to city water supply.



Master Valve

Operation—The valve is operated with city water connected to specially designed control valves on the hydraulic cylinder. The water supply is controlled by the cause of the trouble in the sewer. When the sewer pipe fills by reason of backup, the float in chamber (No. 1) rises to the top, causing the city water supply to be turned on at top of cylinder which forces the valve to close. When the water in sewer line recedes, the float drops, shutting water off at top of cylinder and turning on water beneath piston at bottom of cylinder (No. 2) which forces the valve to open.

Note—50 lbs. of water pressure creates approximately 1350 lbs. hydraulic pressure, assuring positive action. This force is sufficient to cut any ordinary substances such as paper, rags, and wood up to ½ in. in thickness. Only metal or stones can prevent the valve from fully closing. The valve will operate on water pressure as low as 20 lbs.

The water remaining in the hydraulic cylinder when the pressure is reversed is discharged under hydraulic pressure through exhaust pipe (No. 3) through strainer (No. 4) and into the sewer pipe on sewer side of valve. This flushing action keeps the strainer clean at all times. The purpose of the strainer is to prevent any heavy substance from entering the float chamber.

The valve is constructed of the highest grades of materials: monel metal, bronze, brass, copper and cast iron being used in its construction. It meets the requirements of the best mechanical critics as well as all sanitary requirements and being a safety device, its manufacturers have spared no expense in constructing it perfectly.

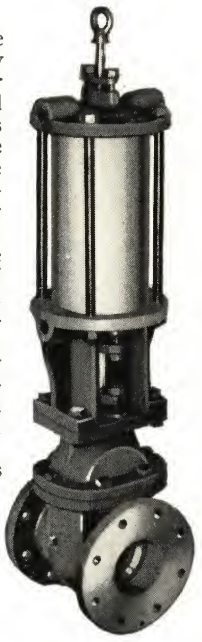
Sentinel Safety Auxiliary Valves

Sentinel Safety Auxiliary Valves are used exclusively with the Sentinel Safety Sewer Valve and are placed on water supplies of any source or on additional sewers where more than one sewer serves the same building. These valves are cross-connected with the Master Valve (water supply, top and bottom) and function in unison with it. When the sewer backs up and the Master Sentinel Valve closes, the auxiliary valve closes with it. The water supply to the building is thus shut off in order to prevent the plumbing fixtures being used and the sewage water from flooding the basement through basement fixtures. When placed on sewer lines, the auxiliary will close and open in unison with the Master Valve. One Master Valve will control a series of auxiliary valves placed either on sewer lines or water supplies.

Electric switches, rheostats, and alarms can also be made to function with both the Master and Auxiliary Valve where it is desirable to shut off ice machinery or other equipment when sewers are not open.

These valves are installed in all classes of buildings—industrial, commercial and domestic.

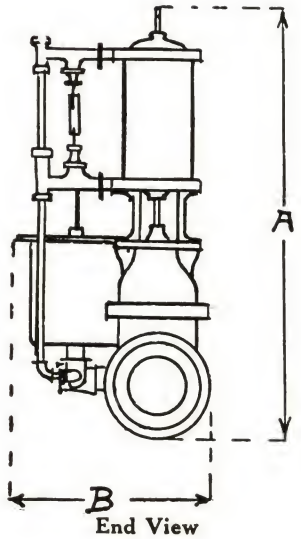
Prices, details and recommendations will be furnished gladly on request.



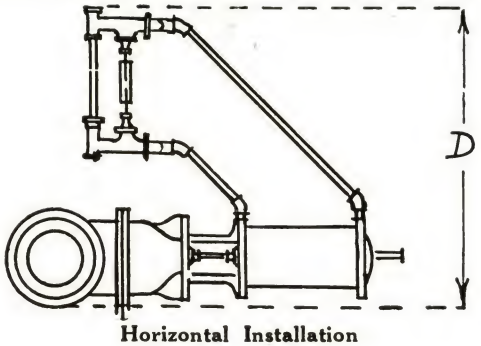
Auxiliary Valve

SENTINEL SAFETY SEWER VALVE DIMENSIONS

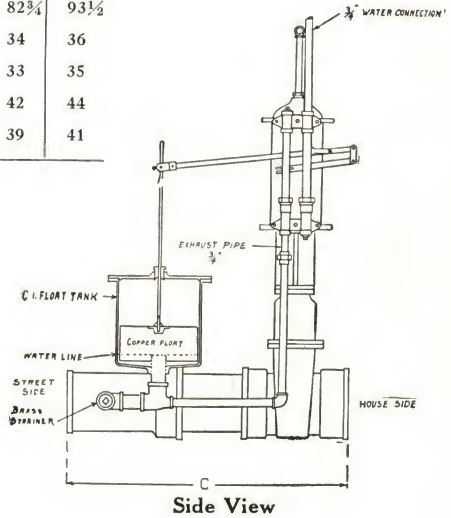
Size, in.		3	4	5	6	8	10	12	14	16
Dimension	A	33	38½	41⅜	50⅜	58	66⅞	75¾	82¾	93½
	B	23	24	25	26	28	30	32	34	36
	C	23	25	25	26	27	29	31	33	35
	D	31	32	33	34	36	38	40	42	44
Over-all length		28	29	30	31	33	35	37	39	41



End View



Horizontal Installation



Side View

AMERICAN FOUNDRY & MFG. CO.

American Seep-proof Floor and Roof Drains and Swimming Pool Equipment

Eleventh and Hebert Streets, ST. LOUIS, MO.

Products

American Foundry & Mfg. Co. St. Louis, Mo.

SEEP-PROOF FLOOR DRAINS, with and without Traps and Inside Strainers, for cement, tile or other composition floors, shower and urinal stall receptors; SEEP-PROOF PROMENADE DRAINS; SEEP-PROOF ROOF DRAINS; EXPANSION JOINT CONNECTION; SWIMMING POOL FITTINGS.

Also manufacture all types of Plumbing, Water, Gas and Hardware Specialties, as, Hydrants, Bubble Fountains, Sinks, Grease Traps, Cesspools, Closet Tanks, Grates, Service Boxes, Steam Traps, Valves, etc.

Materials

Cast iron, brass. Adjustable brass heads with removable strainer regularly furnished nickelplated; brass tops regularly furnished polished, unless otherwise specified. Strainer heads chromium plated or white metal at extra cost. Made also in galvanized cast iron or all-brass at extra cost.

Seep-proof Drains and Traps with and without Seepage Passages

In the development of these SEEP-PROOF Drains, the method of installation and the principles of sanitation were given careful consideration. Two distinct styles that will fulfill the most exacting requirements are offered.

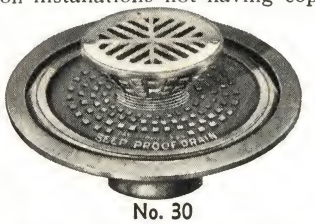
First Type—Recommended for concrete or any other composition floor, and will be furnished with Fig. 190 strainer head *without* seepage passages unless otherwise specified. The surfaces of the drain pan are scoriated, an annular groove is also provided in the pan, the drain body is plain cast iron. This combination, when embedded in concrete will make one homogeneous mass. Consequently the surrounding material will not contract from the drain, thus eliminating the possibility of seepage. (See sectional illustration.)

Second Type—Recommended for concrete and lead pan work, and will be furnished with Fig. 200 strainer head *with* seepage passages unless otherwise specified. The surface of the drain pan is perfectly smooth, slightly dished to the center affording the proper support for sheet lead or copper flashing. It is also equipped with an adjustable brass flashing connection or clamping device. (See sectional illustration.)

Clamping Device—The adjustable brass flashing connection screws down and clamps flashing to the surface of the drain and in addition it has a finished bevel edge, for tinning, to make a solder joint. It is also removable so that the lead pan can be put into place and hole cut out to exact size of threaded opening in drain body.

Seepage Passages—We do not recommend this arrangement on installations not having copper or lead pan safes.

Types of Drains



No. 30

No. 30 Floor Drain without Trap—Cast iron body, Fig. 190 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass at extra cost. ***No. 30SP***—With hub outlet for soil pipe.

No. 40 Floor Drain without Trap with Brass Flashing Connection—Cast iron body, Fig. 200 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass at extra cost. ***No. 40SP***—With hub outlet for soil pipe.

No. 40

No. 32

No. 32 Floor Drain and Trap—Cast iron body, Fig. 190 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass and with deeper seal traps at extra cost. ***No. 33***—With hub outlet for soil pipe.

No. 42 Floor Drain and Trap with Brass Flashing Connection—Cast iron body, Fig. 200 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass and with deeper seal traps at extra cost. ***No. 43***—With hub outlet for soil pipe.

No. 42

No. 34

No. 34 Floor Drain and Trap—Cast iron body, Fig. 190 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass at extra cost. Strainer heads for porcelain receptors also furnished. ***No. 35***—With hub outlet for soil pipe.

No. 44 Floor Drain and Trap with Brass Flashing Connection—Cast iron body, Fig. 200 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass at extra cost. Strainer heads for porcelain receptors also furnished. ***No. 45***—With hub outlet for soil pipe.

No. 44

No. 36

No. 36 Shallow Pattern Floor Drain and Trap—Cast iron body, Fig. 190 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass at extra cost. Strainer heads for porcelain receptors also furnished. ***No. 37***—With hub outlet for soil pipe.

No. 46 Shallow Pattern Floor Drain and Trap with Brass Flashing Connection—Cast iron body, Fig. 200 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass at extra cost. Strainer heads for porcelain receptors also furnished. ***No. 47***—With hub outlet for soil pipe.

No. 46

No. 31

No. 31 Floor Drain and Trap with Brass Seal Tube—Cast iron body, Fig. 190 adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass at extra cost.

No. 38

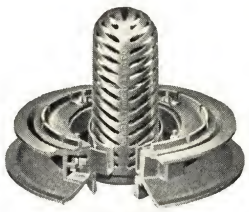
No. 38 Floor Drain and Trap without Seal—Cast iron body and adjustable brass head with removable strainer. Threaded outlet, female iron pipe. Made also in galvanized cast iron body or all-brass at extra cost.

Literature

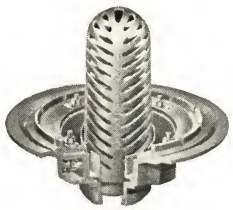
Catalogue No. S-32 mailed upon request.

No. 105
With or without cast iron inside strainer

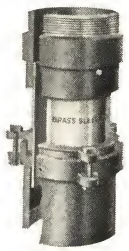
No. 107
With or without cast iron inside strainer



No. 1101
For concrete roofs



No. 1103
For wood roofs



No. 1110

No. 105 Floor Drain—Cast iron with heavy grate. Especially adapted for concrete or tile floor installation when a large area is to be drained. Threaded outlet female iron pipe. Also furnished with hub outlet for soil pipe. Has no inside strainer. Made also in galvanized cast iron or with brass top and strainer at extra cost. ***No. 105B***—Is with inside strainer.

No. 107 Floor Drain—Cast iron. This is a larger and heavier construction than No. 105. Threaded outlet female iron pipe. Also furnished with hub outlet for soil pipe. Has inside strainer. Made also in galvanized cast iron or with brass top and strainer at extra cost. ***No. 107C***—Is without inside strainer.

No. 1101 Roof Drain—Cast iron body, dome strainer, extra deep sediment cup and gravel guard clamping ring. For concrete roofs constructed with tar and gravel, tile or built-up roofing felts. Threaded outlet, female iron pipe. Also furnished hub outlet for soil pipe. Made also in galvanized cast iron or all-brass at extra cost.

No. 1103 Roof Drain—Cast iron body, dome strainer, extra deep sediment cup and gravel guard clamping ring. For wood roofs constructed with tar and gravel, composition roofing or built-up roofing felts. Threaded outlet, female iron pipe. Also furnished hub outlet for soil pipe. Made also in galvanized cast iron or all-brass at extra cost.

Gravel Guard Clamping Ring—The combination gravel guard clamping ring in conjunction with the extra heavy bronze adjustable clamping bolts holds the roofing felt in place against the drain body, making a permanent joint and eliminating the use of flashing. (See sectional illustration.)

Nos. 1101CD and 1103WD Promenade Drains—Cast iron roof drain bodies No. 1101 and No. 1103 equipped with cast iron extension sections having a square top and round flat grate, for use on promenade decks (see cross section diagram for detail of construction). Threaded outlet female iron pipe. Also furnished hub outlet for soil pipe. Made also in galvanized cast iron or cast iron body with cast brass polished top and strainer at extra cost.

Always state the dimensions (H) top of grate to surface of waterproofing and size of tile if any for dimension (J) as these extension sections can be made to suit any requirement. Otherwise drains will be furnished with standard dimensions as shown in tables.

No. 1110 Expansion Joint Connection—Cast iron body, heavy gauge brass sleeve. The traverse surface is smooth and non-corrosive. Packing ring made of graphite braided packing held in place by a gland ring tightened by three extra heavy bolts with bronze nuts. Length of traverse, 3 in., permitting an expansion or contraction of 1½ in. either way. Top connection threaded male iron pipe. Bottom connection threaded female iron pipe. Bottom connection also furnished with spigot end for soil pipe at no additional cost.

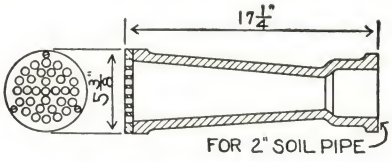
Fig. 190
Adjustable head *without* seepage passages, regularly furnished with flat strainer

Fig. 200
Adjustable head *with* seepage passages, regularly furnished with flat strainer

Fig. A
Strainer head for porcelain receptors having 4½-in. diameter counterbore, and 3½-in. diameter outlet

Fig. B
Strainer head for porcelain receptors having taper counterbore from 4¾-in. diameter to 3½-in. diameter outlet

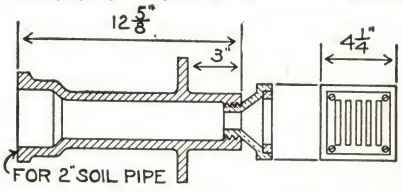
Any of the above adjustable heads can be equipped with convex or concave strainers or with seepage passages at no additional cost



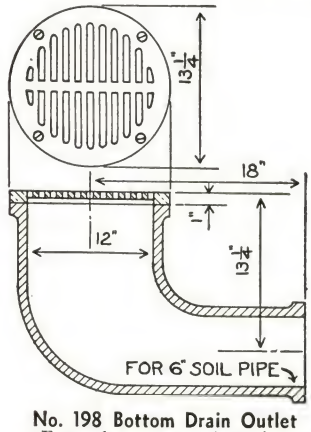
No. 197 Recirculating Inlet
Extra heavy cast iron body, heavy polished brass strainer. Price, each, $9.50

Swimming Pool Fittings

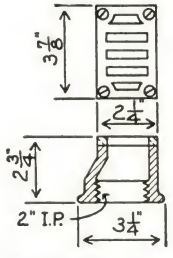
We manufacture a complete line of cast iron and brass swimming pool fittings. These fittings include scum gutter drains, recirculating inlets and outlets, overflow drains, bottom drain outlets, side drain outlets, etc. All strainers are of polished cast brass. The bodies are of cast iron painted. Strainers chromium plated or white metal at extra cost. Made also in galvanized cast iron or all-brass at extra cost. The accompanying diagrams detail only a part of our line. Send for additional information when interested.



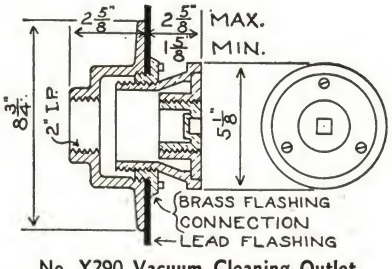
No. Y297 Recirculating Inlet
Cast iron body, adjustable polished brass strainer head. Price, each, $8.00



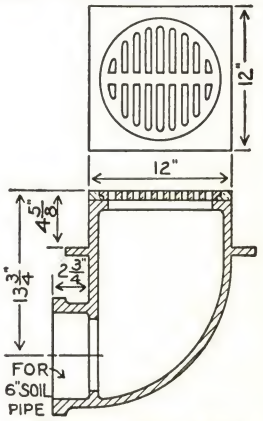
No. 198 Bottom Drain Outlet
Extra heavy cast iron body, heavy polished brass strainer. Price, each, $40.00



No. 196 Overflow Gutter Drain
Extra heavy cast iron body, heavy polished brass strainer. Price, each, $4.00

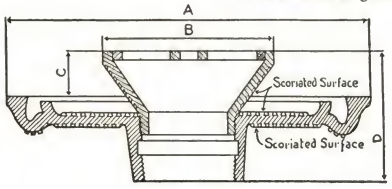


No. Y290 Vacuum Cleaning Outlet
Cast iron body, adjustable polished brass head with plug. Price, each, $9.00



No. Y298 Bottom Drain Outlet
Cast iron body, polished brass top and strainer. Price, each, $35.00

Dimensions given in table are for Roughing-in only and may vary ¼ in.



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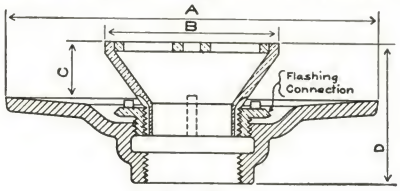

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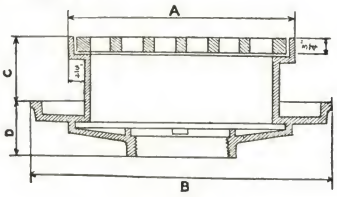

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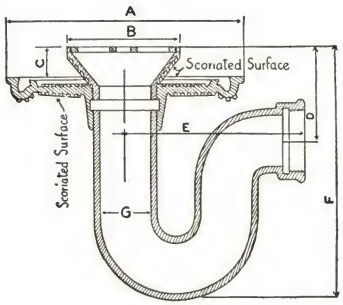

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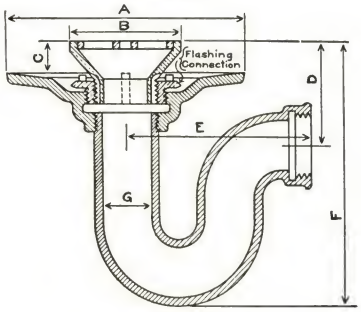

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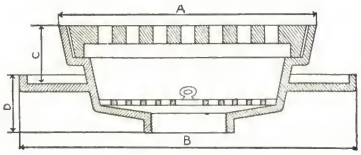

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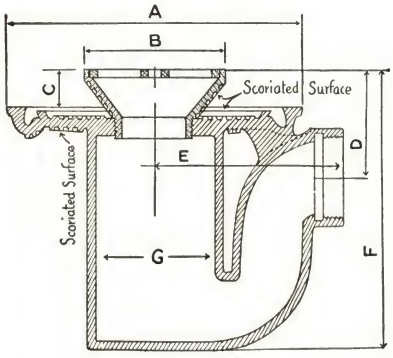

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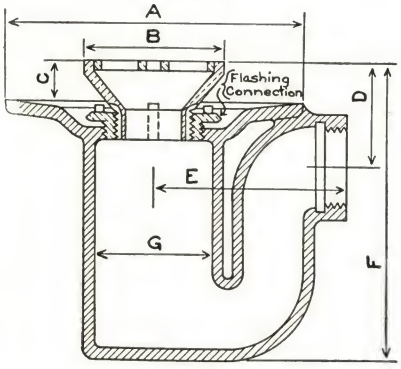

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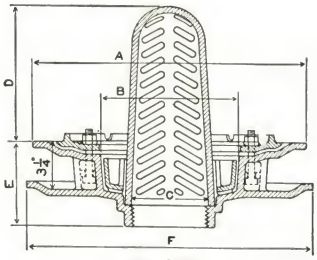

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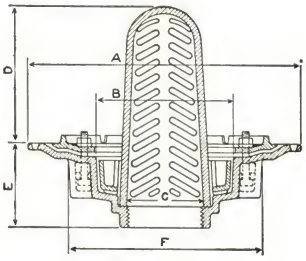

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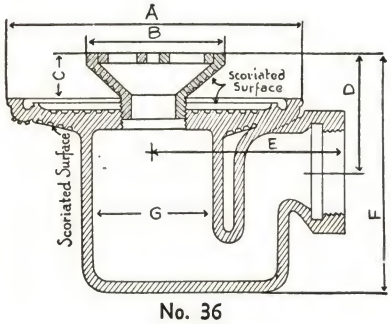

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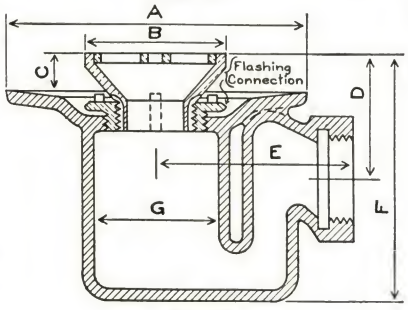

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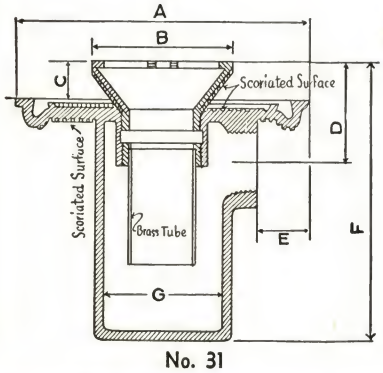

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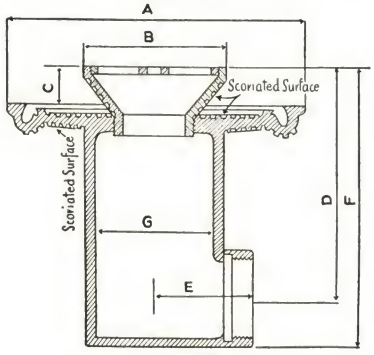

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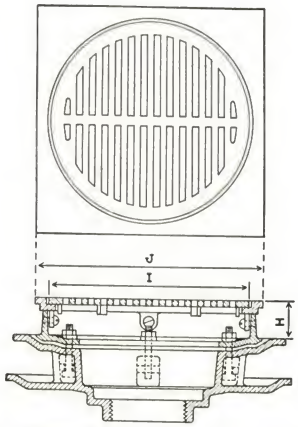


No. 1101CD for Concrete Construction
No. 1103WD for Wood Construction

CROSS-SECTION DIAGRAMS OF SEEP-PROOF DRAINS

SEEP-PROOF FLOOR DRAINS AND TRAPS

No.	Outlet, ins.	N. P. strainer, ins.	Dimensions, inches, see each diagram A	B	C	D	E	F	G	Seal	Price, each
30	1½	3	7½	3¼	1⅛	3⅛					$ 4.00
30	2	4	9	4¼	1⅛	3⅛					5.50
30	3	5	10½	5¼	1⅛	3⅜					7.50
30	4	6	11½	6¼	1⅛	3⅜					9.00
40	1½	3	7	3¼	1¾	3⅜					5.00
40	2	4	8½	4¼	1¾	3⅜					6.50
40	3	5	10	5¼	1¾	3¾					8.50
40	4	6	11	6¼	1¾	3¾					10.00
32	1½	3	7½	3¼	1⅛	5	6¾	10½	1½	2½	6.00
32	2	4	9	4¼	1⅛	5¼	7	11	2	2½	8.00
32	3	5	10½	5¼	1⅛	3⅞	8¾	11⅛	3	2½	11.00
32	4	6	11½	6¼	1⅛	4⅜	9¾	13¼	4	2½	13.50
42	1½	3	7	3¼	1¾	5¼	6¾	10¾	1½	2½	7.00
42	2	4	8½	4¼	1¾	5½	7	11¼	2	2½	9.00
42	3	5	10	5¼	1¾	4⅛	8¾	11⅜	3	2½	12.00
42	4	6	11	6¼	1¾	4⅝	9¾	13½	4	2½	14.50
34	1½	4	9	4¼	1⅛	2⅞	5½	8¼	4	2½	10.00
34	1½	5	9	5¼	1⅛	2⅞	5½	8¼	4	2½	11.00
34	1½	6	9	6¼	1⅛	2⅞	5½	8¼	4	2½	12.00
34	2	4	9	4¼	1⅛	2⅞	5¾	8¾	4	2½	10.50
34	2	5	9	5¼	1⅛	2⅞	5¾	8¾	4	2½	11.50
34	2	6	9	6¼	1⅛	2⅞	5¾	8¾	4	2½	12.50
34	3	5	9	5¼	1⅛	3⅝	7⅜	10	4	2½	14.50
34	3	6	9	6¼	1⅛	3⅝	7⅜	10	4	2½	15.50
34	3	7	9	7¼	1⅛	3⅝	7⅜	10	4	2½	16.50
34	4	6	10½	6¼	1⅛	4⅜	10½	12	4	2½	18.50
34	4	7	10½	7¼	1⅛	4⅜	10½	12	4	2½	20.50
34	4	8	10½	8¼	1⅛	4⅜	10½	12	4	2½	22.50
44	1½	4	8½	4¼	1¾	3½	5½	8¼	4	2½	11.00
44	1½	5	8½	5¼	1¾	3½	5½	8¼	4	2½	12.00
44	1½	6	8½	6¼	1¾	3½	5½	8¼	4	2½	13.00
44	2	4	8½	4¼	1¾	3½	5¾	9¼	4	2½	11.50
44	2	5	8½	5¼	1¾	3½	5¾	9¼	4	2½	12.50
44	2	6	8½	6¼	1¾	3½	5¾	9¼	4	2½	13.50
44	3	5	8½	5¼	1¾	4¼	7⅜	11⅛	4	2½	15.50
44	3	6	8½	6¼	1¾	4¼	7⅜	11⅛	4	2½	16.50
44	3	7	8½	7¼	1¾	4¼	7⅜	11⅛	4	2½	17.50
44	4	6	10	6¼	1¾	5	10½	12	4	2½	19.50
44	4	7	10	7¼	1¾	5	10½	12	4	2½	21.50
44	4	8	10	8¼	1¾	5	10½	12	4	2½	23.50
36	2	4	9	4¼	1⅛	2½	6½	6¾	4	1¾	10.50
36	2	5	9	5¼	1⅛	2½	6½	6¾	4	1¾	11.50
36	2	6	9	6¼	1⅛	2½	6½	6¾	4	1¾	12.50
36	3	5	9	5¼	1⅛	3⅞	8¼	7¾	4	1¾	14.50
36	3	6	9	6¼	1⅛	3⅞	8¼	7¾	4	1¾	15.50
46	2	4	8½	4¼	1¾	3⅜	6½	7⅛	4	1¾	11.50
46	2	5	8½	5¼	1¾	3⅜	6½	7⅛	4	1¾	12.50
46	2	6	8½	6¼	1¾	3⅜	6½	7⅛	4	1¾	13.50
46	3	5	8½	5¼	1¾	4	8¼	8⅛	4	1¾	15.50
46	3	6	8½	6¼	1¾	4	8¼	8⅛	4	1¾	16.50
31	1½	4	9	4¼	1⅛	3	1⅝	8⅜	4	2½	10.00
31	2	4	9	4¼	1⅛	3¼	1⅝	8⅞	4	2½	10.50
38	1½	4	9	4¼	1⅛	6⅝	3	9	4		10.00
38	1½	5	9	5¼	1⅛	6⅝	3	9	4		11.00
38	1½	6	9	6¼	1⅛	6⅝	3	9	4		12.00
38	2	4	9	4¼	1⅛	6⅞	3	9	4		10.50
38	2	5	9	5¼	1⅛	6⅞	3	9	4		11.50
38	2	6	9	6¼	1⅛	6⅞	3	9	4		12.50
105	2–3–4	9¾*	10½	14	3	2½					6.00
105	5	12¾*	13¼	16½	3	2½					9.00
105	6	12¾*	13¼	16½	3	2½					9.00
107	2–3–4	10½*	12	15¼	2⅝	3					9.00
107	5	13 *	14	17½	2⅝	3					12.00
107	6	13 *	14	17½	2⅝	3					13.00
107	8	13 *	14	17½	2⅝	3					15.00

No. 105B. Add for inside strainer $1.00. No. 107C. Deduct for inside strainer $1.00.

*Diameter in., of grate.

Seep-proof Roof Drains

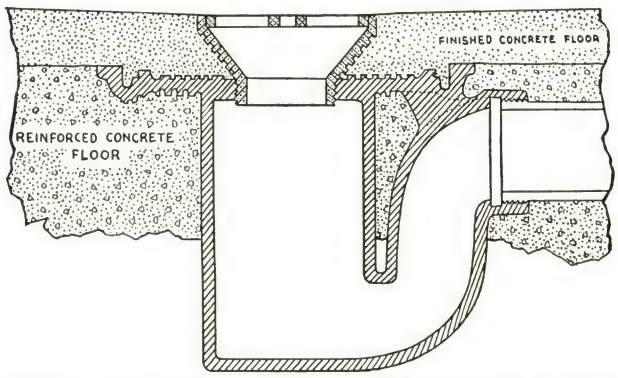
1101	2–3–4	8⅛†	16	8⅛	4½	8	5	17½		$15.00
1101	5	10⅜†	18¼	10⅜	6½	8	5¼	19¾	†	17.00
1101	6	10⅜†	18¼	10⅜	6½	8	5¼	19¾	Diam.	19.00
1101	8	12¼†	20⅛	12¼	8½	8	5½	21⅝	of	27.00
1103	2–3–4	8⅛†	16	8⅛	4½	8	5	10⅜	inlet,	14.00
1103	5	10⅜†	18¼	10⅜	6½	8	5¼	12⅝	in.	16.00
1103	6	10⅜†	18¼	10⅜	6½	8	5¼	12⅝		18.00
1103	8	12¼†	20⅛	12¼	8½	8	5½	14½		26.00

PROMENADE DRAINS

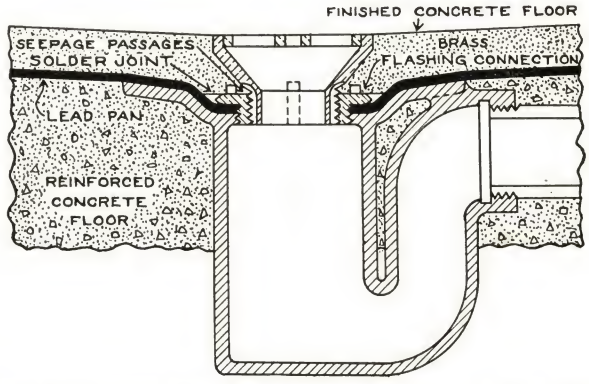
No.	Outlet, in.	Inlet, in.	H	I	J	For other dimensions See Nos. 1101 and 1103 above	Price, each
1101CD	2–3–4	8⅛	2	11¾	13¼	Note: Prices listed in	$16.00
1101CD	5	10⅜	2	13¾	15¼	tables apply to regular	18.00
1101CD	6	10⅜	2	13¾	15¼	drains as described under	20.00
1101CD	8	12¼	2	15¾	17¼	their respective numbers.	28.00
1103WD	2–3–4	8⅛	2	11¾	13¼	Drains made up with gal-	15.00
1103WD	5	10⅜	2	13¾	15¼	vanized cast iron body.	17.00
1103WD	6	10⅜	2	13¾	15¼	All-brass, white metal, or	19.00
1103WD	8	12¼	2	15¾	17¼	chromium plated strainer	27.00
						heads, at extra cost.	

EXPANSION JOINT CONNECTIONS (SEE SECOND PRECEDING PAGE)

No.	Outlet, in.	Inlet, in.		Price, each
1110	2	2	Length over all, 12 in.; length of traverse,	$ 4.00
1110	3	3	3 in.; inlet threaded male iron pipe; out-	4.50
1110	4	4	let threaded female iron pipe; also fur-	5.00
1110	5	5	nished with spigot outlet for soil pipe;	6.00
1110	6	6	also furnished galvanized at added cost.	7.00
1110	7	8		10.00

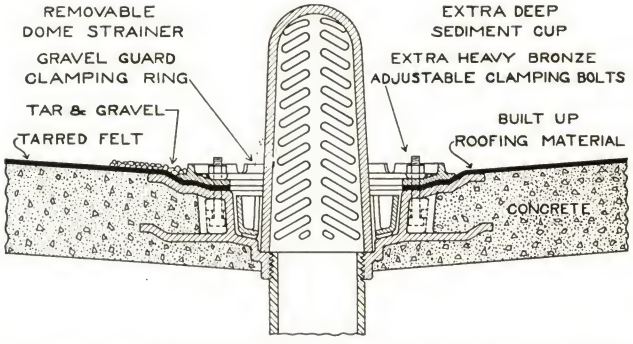


Method of Installing First Type Seep-proof Drains with Scoriated Surfaces, in General Concrete Floor Construction

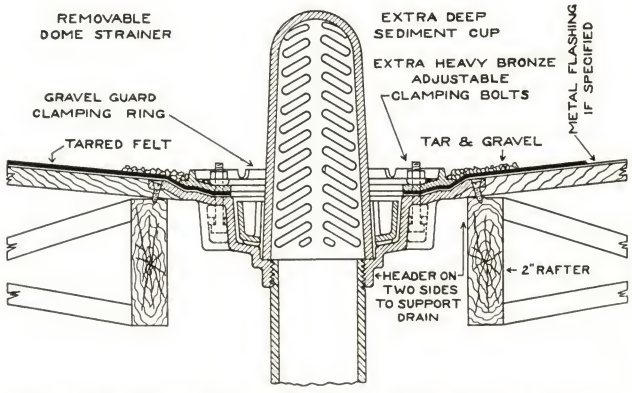


Method of Installing Second Type Seep-proof Drains with Brass Flashing Connection, Under Shower and Urinal Stalls, or in Concrete Floor Construction When Lead Pans or Flashing Is Used

Note the absence of any obstruction to retard drainage of seepage water



Proper Type of Drain and Method of Installation in Concrete Roofs



Correct Method and Type of Drain for Installation in Wood Roofs

BLAKE SPECIALTY COMPANY

Manufacturers of Special Plumbing Fittings
ROCK ISLAND, ILL.

BRANCH OFFICES IN ALL PRINCIPAL CITIES OF THE UNITED STATES
Agencies in Canadian Provinces, Cuba, Central and South America

Products

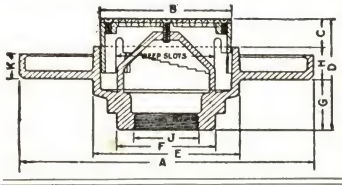
A full line of SHOWER, ROOF, INDUSTRIAL, FLOOR, SWIMMING POOL, HOSPITAL and GARAGE DRAINS; special PLUMBING FITTINGS including GREASE TRAPS and WALL HUNG CLOSET FITTINGS.

Space in these pages will not permit the illustrating of our entire line because of its extensiveness. Please refer to our catalogue for further information.

Blake-Simplex Safety Waste Drain, Shallow Pattern, K-28

Sizes 1½ to 2 ins. only 3⅛ ins. high.

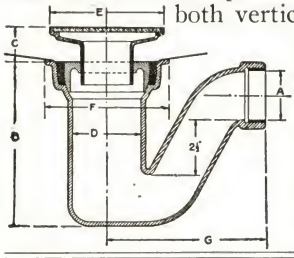
Extra heavy cast iron body with nickelplated brass adjustable head. Recommended for urinals, showers or wherever an installation requires an independent trap in floors of marble, concrete or any composition. Contains feature of accessible, non-clogging, safety waste weep slots and adjustment of strainer level even after finished floor is laid.



Outlet, in.	A in.	B in.	C in.	D in.	Strainer, in.	Regular	Body Galvanized	All brass	Flashing Rings, add	Weight, lbs.
1½ & 2	9	4 1/16	1¼	3⅛	4 1/16	$6.50	$7.50	$10.00	$1.00	8
3	10½	6⅛	1½	3⅝	6⅛	10.00	11.50	15.00	1.10	12
4	13½	8¼	1½	3¾	8¼	14.00	16.75	25.00	1.25	22

Blake-Testite Adjustable Shower Drains With Trap-Spigot Outlet No. 201B

Designed for use in shower, wash or toilet rooms with cement, tile or composition floors. Strainer adjustable, both vertical and at any angle up to 15°, due to center casting being loose for caulking.



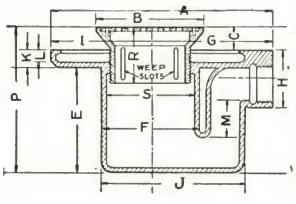
Drainage leaks are eliminated by the Blake-Testite feature of securely caulking the metal-safe pan into the body of the drain, thereby providing a permanent pressure tight condition. Furnished with or without seepage holes. Can also be furnished iron pipe outlet at slight advance in price.

No.	A	B	C	E	G	Wt. lbs.	Nickel-plated	Galv. body
201B	2	7¼	⅞ to 2	5	9	14	$10.00	$11.50
201B	2	7¼	⅞ to 2	6	9	14½	12.00	13.50
201B	3	9¼	⅞ to 2	6	11	22	16.00	19.00
201B	3	9¼	⅞ to 2	8	11	23	18.00	21.00
201B	4	11¼	⅞ to 2	8	13	28	22.00	25.50
201B	4	11¼	⅞ to 2	10	13	30	23.75	27.50
201B	4	11¼	⅞ to 2	12	13	32	31.25	35.00

Nickelplated brass strainers regularly furnished; plain or polished brass if desired. For chromium plated strainers, add 5% to above list prices.

Blake-Simplex Safety Waste Drain With Trap K-76

Shallow pot, nickelplated brass adjustable head; government type; extra heavy cast iron body. Contains all our safety features.



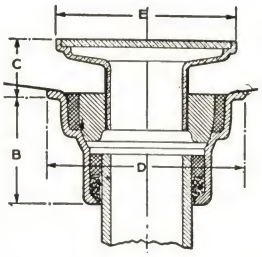
Recommended for showers or floors in toilet rooms, hospitals or other institutions where the floor construction requires a shallow drain and trap. Water seal is 2 inches.

SIZES AND PRICE LIST K-76 DRAIN

Waste, in.	A	B	Regular	Body Galvanized	All brass	Flashing Rings Add to list	Weight, lbs.
2	10	4⅞	$12.00	$14.00	$20.00	$1.00	15
3	14¼	5½	15.00	18.50	34.00	1.10	25

Blake-Testite Adjustable Shower Drain Without Trap, Hub Outlet No. 202A

Designed for use in rooms with cement, tile or composition floors where a trap at the drain is not required. Strainer adjustable both vertical and at any angle up to 15°. Adjustments permit leveling with finished floor. Compact, takes up little depth. Furnished also in screw outlet.



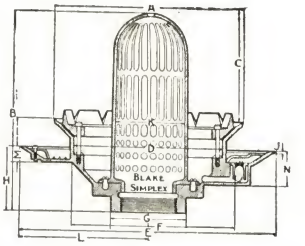
Size, in.	E	B	Wt. lbs.	Nickel-plated	Galv. body
1½	4	3	4	$5.50	$6.00
1½	5	3	4½	6.50	7.00
2	5	3	5	6.50	7.00
2	6	3	5½	7.00	7.75
3	6	3⅜	8	8.00	9.00
3	8	3⅜	9	12.00	13.00
4	8	3¾	12	13.00	14.50
4	10	3¾	13	15.75	17.50
4	12	3¾	14	23.25	25.00

Note:—Strainer has vertical adjustment C, of ⅞ to 2 in.
Nickelplated brass strainers regularly furnished; plain or polished brass if desired. For chromium plated strainers, add 10% to above prices.

Blake-Simplex Safety Waste Drain For Concrete Roofs, K-105

Provided with safety non-corrosive check valve.

Constructed for concrete roofs, but also adapted for wood or composition roofs. The safety waste ring or double drainage feature is equipped with a conductor trough which takes the water from all around to one outlet.



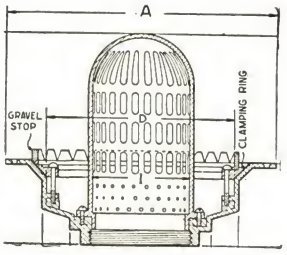
This outlet is protected by the float check valve which protects building from leakage due to stoppage of the conductor pipe. Strainer dome is locked to body of the fitting which is positive proof against tilting out of place. The beveled clamping ring makes a tight joint on the roofing material. Large sediment chamber protects conductor pipe from stoppage and provides ready removal of rubbish without exposing downspout. Made for screw or soil pipe.

Size, in.	E	A	B	Black	All Galvanized	Dome only galvanized black body	Rough brass dome, black body	Rough brass Dome, galv. body	Weight lbs.
2	11	8¼	7½	$13.00	$15.00	$14.00	$16.00	$18.00	15
3	14⅜	11¼	12½	16.00	20.00	18.00	22.00	26.00	32
4	14⅜	11¼	12½	17.00	21.50	19.50	24.00	28.50	35
5	15¾	12¾	12½	18.00	23.50	21.00	29.00	34.50	45
6	17½	14½	13	20.00	26.00	23.50	32.00	38.00	50
8	19½	16⅜	15	26.00	34.50	31.00	50.00	58.00	70

If drains are wanted with side outlet, add 10% to above.

Blake-Simplex Roof Drain for Wood Roofs, K-106

Same as drain No. K-105, except the safety waste pan. The clamping ring for roofing felt is the same. The anti-tilting locked dome strainer is included and it has the same large sediment chamber. Also very serviceable for concrete roofs if metal flashings are used.



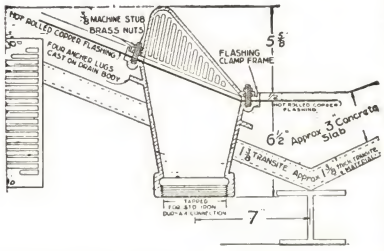
SIZES AND LIST PRICES, K-106 DRAIN

Size, in.	A	Black	All galvanized	Dome only galvanized	Dome only rough brass	Weight, lbs.
2-inch	10½	$12.00	$14.00	$13.00	$15.00	12
3-inch	15	13.00	17.00	14.00	19.00	28
4-inch	15	14.00	18.00	15.50	21.00	30
5-inch	16¼	15.00	20.00	17.00	26.00	40
6-inch	17¼	17.00	22.50	19.00	29.00	44
8-inch	19½	24.00	31.50	28.00	48.00	63

No extra charge for outlet to be hub end for soil pipe to slip up and caulk inside. If drains are wanted with side outlet, add 10% to above list.

Blake Anti-freeze Roof Drain for Sawtooth or Valley Roofs—K-108-A

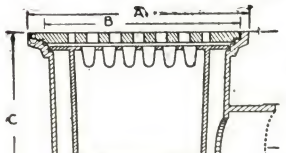
An entirely new design intended for the purpose of avoiding accumulations of ice and rubbish around the strainer. It is without a sump, and the arrangement of the strainer is such that it does not permit stoppage. Clamping ring securely holds roofing material or other safety metal flashings.



Strainer is fastened with square head brass bolts. Made for any pitch of roof in one size, for either 4 or 6-in. pipe. Either screwed or hubbed for soil pipe.

Size, in.	Black	All galvanized	Dome only galvanized	Dome only rough brass	All rough brass	Weight, lbs.
4	$15.00	$18.00	$15.75	$19.00	$23.00	23
6	17.00	20.00	17.75	21.00	26.00	26

Blake Extra Heavy Floor Drain K-44-A With Mud or Refuse Bucket and Hinged Strainer

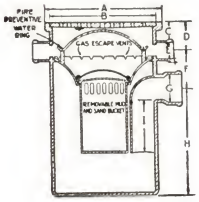


Suitable for schools, warehouses, dairies or any institution where refuse is to be caught and the clearer water can escape. Bucket lifts out. Strainer can be arranged with slightly elevated V-shaped bars for school pupils to scrape shoes on. Bucket will catch the dirt.

A-13¼ x 14 in. C-1 in. Weight 85 lbs.

Plain black	All galvanized	With grate only galvanized	With grate and bucket galvanized	With malleable grate add to list	With malleable bucket add to list
$20.00	$30.00	$21.50	$24.00	$2.50	$4.75

Blake Garage Drains K-1135



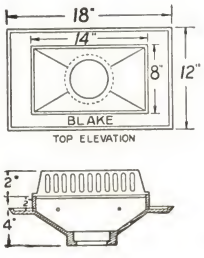
Embodies every element of safety. Complete separation of oil, mud and gas. No fire risk. Small and large patterns, for use in private and public garages, etc. Can be furnished without vent or one or two vent openings. Mud buckets are easily removed.

Size, in.	A	D	E	F	G	H	Regular	Without inside trim.
S-16x18	16	4½	2 S.P.	1⅛	4 S.P.	12⅜	$44.00	$36.00
L.21x30	21	5	2 S.P.	7	4 S.P.	18	90.00	77.00

Blake Gutter Drain 511-B

With safety pan and semi-dome strainer. Also made flat.

A very serviceable heavy drain suitable for narrow gutters in terrace or balcony floors or any other location where a narrow gutter requires a drain with large water way. Furnished in outlets from 4 to 6 in. for either screw or soil pipe. Also furnished with brass top.

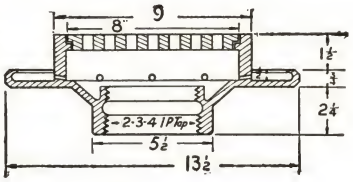


	Plain	Galv.	With pol. brass or N. P. pol. top: Black	With pol. brass or N. P. pol. top: Galv.	Wt. lbs.
No. 511-B	14.00	18.00	26.00	30.50	35
No. 511-BA Same drain with flat strainer	12.00	15.50	21.00	24.50	30

For chrome plating add 10% to list prices of brass top. For clamping ring with 511B add $2.00.

Blake Standard Industrial Drain K-42-B With Seepage Safety Pan

Shallow in depth—for use with metal pan, concrete construction. Extra heavy construction with heavy top grate. Top grate is anti-tilting. Has our accessible safety waste outlet, wherein the seepage parts can be cleaned at any time in the event of clogging, without damage to the floor construction. Suitable for warehouses, factories, etc. Can be furnished with brass top and strainer. Outlet is threaded inside of bowl for closing with iron or brass plug.

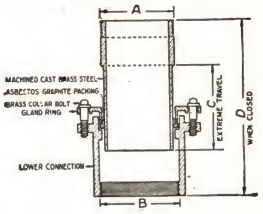


Black	Galvanized	With finished brass strainer and rim, add to list	Flashing rings, add to list	Weight. lbs.
$8.50	$12.50	$7.00	$1.25	23

Blake Expansion Joints K-109 for Roof Drains

With Cast Brass Sleeve

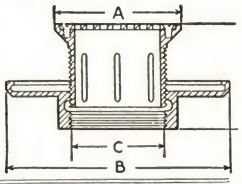
Body of heavy cast iron. Brass sleeve is smooth turned heavy cast brass in one piece continuous to top. Threaded for iron pipe and reinforced at threaded end. A graphite saturated asbestos packing ring, held in place by a taper gland ring is expanded against the sleeve by screwing down three brass bolts, making a positive air and water-tight joint.



Size	A	B	C	D	Price	Wt. lbs.
2"	..	..	..	..	$4.75	
3"	3" I. P.	3" I. P.	2	6	5.00	10
4"	4" I. P.	4" I. P.	2	6	6.00	12
5"	5" I. P.	5" I. P.	2	6	7.00	15
6"	6" I. P.	6" I. P.	2	6	8.00	22
8"	8" I. P.	8" I. P.	2	6	11.50	23

Blake Safety Waste Drain K-25-S Less Trap

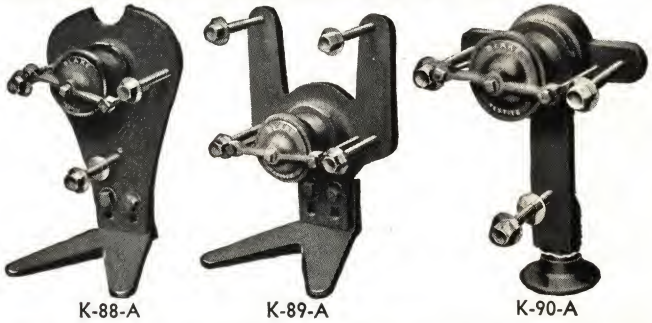
Nickel-plated, brass adjustable head with screw neck. Iron pipe size, very shallow pattern. Extra heavy cast iron body. Adjustment range is 1 inch. Recommended for urinals, showers or wherever an installation requires any independent trap in floors of marble, concrete or any composition. Specify if for urinal as top must be arranged to fit. No extra charge.



Size in.	A	B	Max.	Min.	Regular	Body galvanized	All brass	Add to list for flashing rings
2	4	7½	3¾	3	$5.50	$6.00	$9.50	$1.00
3	5	9	4½	3½	8.00	8.75	13.50	1.10
4	6	10½	4¼	3½	10.00	11.00	15.60	1.25

Blake Carrier Chairs, Hanger Supports and Drainage Fittings for Wall Hung Closets

Space limits the illustration of our immense variety of this class of material, but by reference to our regular catalog, full information may be obtained for the servicing of any installation. No job is new to us, and complications are easily overcome due to our experience and unlimited facilities for special work. All of our carriers and fittings are designed for durability, sanitation, ease of installation and for a minimum cost with small labor charges. Our fittings are made for use with any type of manufacturer's closet bowl. Tell us your requirements and we will supply exactly what you need.



K-88-A K-89-A K-90-A

K88A—A sturdy carrier for blowout bowl with adjustable foot and adjustable closet connected in any length desired. Feet can also be made longer if desired. Stub bolts are ⅝ in. thick and need no cutting off. Furnished complete with all accessories including N. P. cap nuts, washers and test caps.

List $11.00 each; Chrome nuts and washers, extra 60c; white metal nuts and washers, extra $1.50.

K89A—Identically the same as K88A, except that it is designed for syphon jet bowl. Same accessories and same price.

K90A—Heavy hanger support for blowout bowl and tapped to suit any manufacturer's bowl. Accessories are the same as with K88A or K89A. List $7.00.

THE CENTRAL FOUNDRY COMPANY

SUBSIDIARY OF THE UNIVERSAL PIPE AND RADIATOR COMPANY

Solus Oil and Gasoline Separator for Garages, etc.

GENERAL OFFICES
Graybar Building, 420 Lexington Avenue, at 43rd Street
NEW YORK, N. Y.

BRANCH OFFICES

BESSEMER, ALA., Central Foundry Building
BOSTON, MASS., 105 Cummings Street
BROOKLYN, N. Y., 9628 Metropolitan Avenue
CHICAGO, ILL., 332 So. Michigan Avenue
DALLAS, TEX., Praetorian Building
HOUSTON, TEX., 4111 Conner Street
LOS ANGELES, CAL., 214 No. Alameda Street
NEW YORK, N. Y., 420 Lexington Avenue
NEWARK, N. J., 131 Lockwood Street
PHILADELPHIA, PA., 2401 Chestnut Street
ST. LOUIS, MO., 4451 Duncan Avenue
SAN FRANCISCO, CAL., 100 Potrero Avenue

For Nuhub Cast Iron Soil Pipe and Fittings, see name in Manufacturers' Index

The

SOLUS

Trade-Mark

OIL AND GASOLINE SEPARATOR

Linnmann System
Protected by U. S. and Foreign Patents

Advantages

Garage drainage systems made safe against explosions. Also for filling stations; airports; dyehouses; cleaning establishments; paint factories; manufacturing plants; engine rooms; reclamation; sewage disposal protection; aboard ship; and all drainage service requiring the interception and separation of gasoline and allied volatile liquids.

The Solus is exclusive in modern design and construction, offering many marked improvements in the elimination of the oil and gasoline drainage hazard. Five years of actual service in the largest cities of England, Germany, France, Austria, Japan, as well as in America, confirms its extraordinary efficiency in keeping explosive elements out of drains and sewers.

Features of Construction

(1) Specific Gravity—Guarding outlet pipe (P) is brass float (M) which is sensitive to, and actuated by, difference in specific gravity of water and oil. This brass float floats in water and sinks in oil and gasoline. When over-accumulation of oil and gasoline at top two chambers is not removed, brass float (M) sinks and safety valve (float-valve) inside brass float simultaneously closes outlet pipe.

(2) "Clean-out Warning Signal"—This never fails.

(3) Outlet Remains Closed—Outlet remains closed until over-accumulation of oils and gasoline has been removed.

(4) Perfect Vent Protection—Prevents oil and gasoline fumes and sewer air entering building.

(5) Cleaning Hazards Eliminated—Simply lift floor cover; no dangerous suffocating pit to climb down into.

(6) Easier and Quicker to Install—All-one-piece casting—no concrete vault to build. No vault pit to dig.

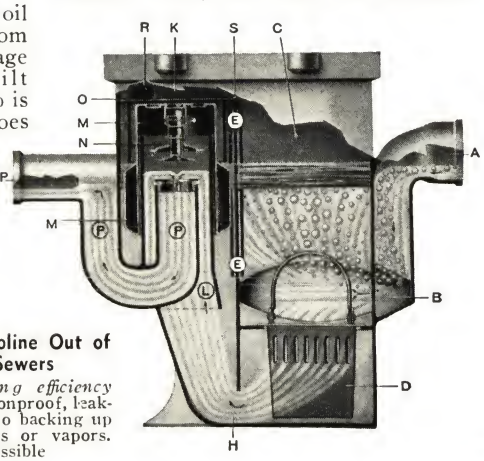
Body of the Solus Oil and Gasoline Separator, made of extra heavy, non-corroding cast iron, is divided by a partition wall into two chambers (C) and (K) all of which together with inlet, outlet and interior piping are cast in one piece. Float and float-valve guarding outlet is brass.

(7) Only Four Pieces and Covers—The rugged two-chambered all-one-piece cast iron body; the brass float (M); the inspection cover (O); the silt bucket (D) and the two floor covers. (Only one over-all cover with Size No. 1.)

(8) Nothing to Get Out of Order—Entirely automatic, yet no mechanism to become clogged or disconnected. No swing or flap check valves.

(9) Cleaning So Easy and So Safe that No Workman Will Shirk the Job—Just lift floor cover. No climbing down into a wet, slimy, suffocating pit. No exposure to deadly fumes. All cleaning is done from garage floor.

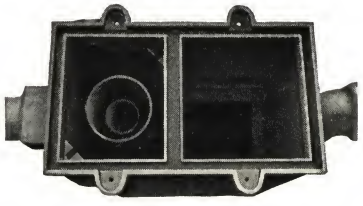
Merely lift floor cover of separating chamber (only two bolts to remove), take out layer of oil and gasoline from surface of drainage water, empty silt bucket and the job is done. (Cleaning does not interfere with inflow of floor drainage.) *Neglect to clean closes outlet completely, automatically.*



At Right:

Keeps Oil and Gasoline Out of Drains and Sewers

99.8% separating efficiency guaranteed. Explosionproof, leakproof; foolproof. No backing up of dangerous liquids or vapors. Self-siphonage impossible



At Left:

All One-piece Casting

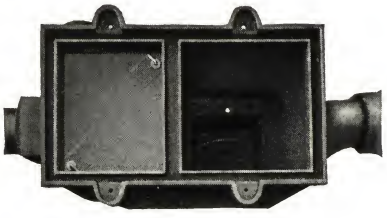
At left is float chamber (outlet chamber) with tubular member. At right is the separating chamber (inlet and cleanout chamber)

At Right:

Inspection Cover

(Fixed Hood Forming Air Seal)

Inspection cover is fastened down over float chamber (K) under floor cover by simple turn of two bolt handles. Air seal prevents all liquid passing over top of tubular member. Easily accessible for inspection and sealing by authorities



Three Sizes—Larger Sizes on Special Order

The Solus Separator comes in three regular sizes for all commercial requirements. Factories using large quantities of oil and gasoline in manufacturing processes and requiring separators of greater capacity, are invited to consult with our industrial service engineers who will submit estimates on sizes of exact suitability

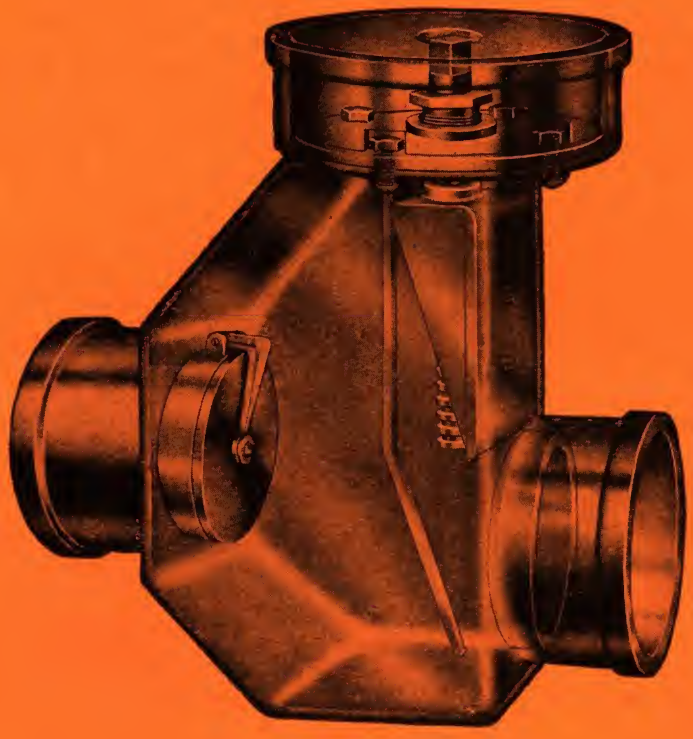
WEIGHTS, CAPACITIES, DISCHARGE PER MINUTE

Size	Weight, lbs.	Washers in Garage	Discharge, gals. per min.
1	365	2	16
3	470	4	32
5	755	10	64

ARCHITECTS AND ENGINEERS CATALOG

No. 32

DRAINAGE SPECIALTIES



NORMAN BOOSEY MANUFACTURING CO.

5140 HAMILTON AVENUE DETROIT, MICHIGAN

NORMAN BOOSEY MFG. CO.

Drainage Specialties

5140 Hamilton Avenue, DETROIT, MICH.

PRODUCTS

Areaway and Factory Drains
Backwater Drainage Control Valves (automatic and manually operated)
Backwater Floor Drains
Backwater Plenum Chamber Drains
Backwater Tile Drain Sumps
Deck and Gutter Drains
Factory Drains
Floor, Drinking Fountain and Urinal Drains
Garage Sumps
Ramp Garage Drains
Roof Sumps
Seepage Drains
Shower Drains

INTRODUCTION

Long experience and specialization have produced the Boosey line of drains. Careful analysis of the design of each individual unit will impress the most discriminating of the outstanding practicability and high quality of the line. There is a particular Boosey drain specially adapted for every purpose.

Especial attention is called to the various drains and devices which, when properly installed, assure a dry, odorless basement under all conditions. On this and the following page, for the convenience of the architect and the sanitary engineer, is suggested a practical solution of the basement drainage problem.

The solution of this problem has required a great deal of time and effort since it requires engineering skill that is not demanded by the average plumbing code. However, codes recognize this problem and provide for it by including a clause of this kind—"In localities where street sewers become gorged during heavy rains and there is danger of basements being flooded with sewage, cast iron sewers with separate control for basement drainage is recommended." This clause recognizes the fact that abnormal conditions put the solution of this drainage problem squarely up to the architect and engineer.

The nominal added cost of such a system of drainage is well warranted in the original installation when the damage and unsanitary conditions of flooded basements and the additional costs of even partial correction in the way of alterations are taken into consideration.

Complete information, including prices, on the entire line in cast iron, painted or galvanized, with hub, tapped or spigot outlets, bronze metal strainers polished, nickel or chromium plated, contained in convenient 200 page folder A.I.A. 29-C. Mailed on request.

A GRAVITY DRAINAGE SYSTEM THAT GUARANTEES A DRY ODORLESS BASEMENT

The 1-2-3-4 System of gravity drainage using Boosey's drainage controls prevents the flooding of basements with sewage, provides for the free circulation of fresh air through the storm water system and eliminates any chance of air from the street sewer entering the basement through the floor drain. It also provides an approved method of venting public sewers through the sanitary drainage system of buildings, thereby greatly diminishing the escape of foul odors from public sewers at manholes and curb drains at street levels. This construction also prevents the heaving and cracking of basement floors during the back-pressure period.

A. Drainage control valve both automatic and manually operated, placed in the No. 4 line to prevent street sewage backflowing through basement fixtures and flooding basement. (Valve—Boosey's No. 109)

B. Drainage control valve both automatic and manually operated, placed in the No. 2 line to prevent storm water from conductor lines backflowing through floor drains and seepage tile and flooding basement. (Valve—Boosey's No. 109)

C. Cast iron tile drain sand trap, with backwater valve above trap seal to prevent water from floor drains backflowing into seepage tile lines around basement wall during the closed period of control valve on line No. 2. (Tile Drain Sand Trap—Boosey's No. 117)

D. Cast iron; relief sump, size 18x30 ins., into which the excess seepage water from tile lines and discharge from floor drains empty during the period when control valve on storm water line No. 2 is closed. Placed in sump is either hydraulic or electric pump to automatically remove water from sump whenever the water rises in sump to within 6 ins. of the basement floor line. The discharge from sump pump can be connected to storm water sewer anywhere on the sewer side of the control valve on the storm water system. The removal of seepage water prevents wet walls and the cracking and heaving of basement floor. (Relief Sump—Boosey's No. 635)

E. Rainwater trap on line No. 1. When located at a point on main storm water line between the public sewer and the first conductor branch, only one trap is necessary to prevent sewer air from passing up through the conductor lines and storm water system is open for the free circulation of fresh air. The seal of rainwater trap thus placed is practically assured whether the building is occupied or vacant, as all water from conductors, seepage tile and floor drains passes through this trap. With this system as many basement floor drains as desired may be installed, for should any one of these lose its seal from evaporation there is not a chance for sewer air from public sewer entering basement through floor drains. The one reason for deep seal traps on floor drains is that it is much easier to remove dirt from floor drain trap than from the sewer.

F. Under certain conditions sanitary science approves of omitting the house trap on sanitary line wherever buildings are of a uniform height and the soil pipe stack is carried above the high point of roof. The omitting of house trap on sanitary lines provides for the general venting of public sewers through soil stacks and greatly lessens the odor of sewer air at curb drains and manholes at street levels.

G. In the better class of residences slop sinks are appreciated in the laundry. This fixture to be of the greatest value is placed at floor level and necessitates the placing of a backwater valve in sink above the water seal in trap, to prevent the basement closet or laundry tubs from discharging into slop sink and overflowing into basement when the control valve on line No. 4 is closed. (Boosey's No. 193 Slop Sink.)

H. Cast iron conductors extended one foot above grade.

J. Cast iron cross connection uniting the inner and outer seepage tile lines at the base of foundation wall.

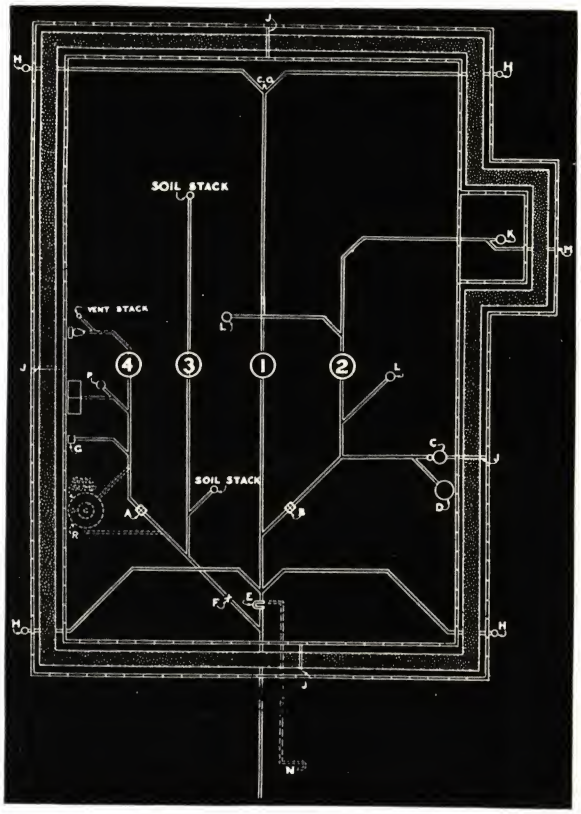
K. Cast iron area drain with flat or beehive strainers connected to storm water line. (Boosey's No. 134 C. I. flat or No. 134 H Beehive strainer.)

L. Cast iron floor drain with deep seal trap. The reason for deep seal traps on floor drains is that it is much easier to remove dirt from trap than from sewer. (Boosey's No. 134 C. I. 106 iron strainer or Boosey's No. 134 G 106 brass hinged strainer.) Brass strainers are recommended for all basement floor drains, because nothing adds more to the general high grade appearance of the building.

M. Cast iron air inlet from above grade to floor drain line.

N. Cast iron relief from rainwater trap on storm water line. This is to prevent water overflowing fixtures on the first floor should the yard or main sewer become clogged.

P. Cast iron floor drain in laundry. This drain installed at floor level, on account of being used as the waste from washing machine is considered as an additional fixture and connects to the sanitary line. A backwater valve placed in drain just below the strainer where it is accessible for inspection and cleaning is recommended to prevent water from laundry tub and closet backflowing through floor drain when the drainage control valve on line No. 4 is closed. (Backwater Floor Drain — Boosey's No. 108.)



R. Where basement fixtures are to be used when control valve is closed, it is necessary to by-pass control valve in sanitary line No. 4 by installing a cast iron, vented sump equipped with pump to discharge sewage back into line No. 4 on sewer side of control valve, as shown by dotted lines.

No. 1 Storm water line; cast iron extends from rainwater trap to 12 ins. above grade for downspouts.

No. 2 Basement drainage line; cast iron branch from line No. 1 to which all floor drains, seepage tile drains, areaway drains, and relief sump are connected.

No. 3 Sanitary drainage line, cast iron extending from 5 ft. outside basement wall and carried up above high point of roof. To this line are connected all soil stacks from sanitary fixtures above basement.

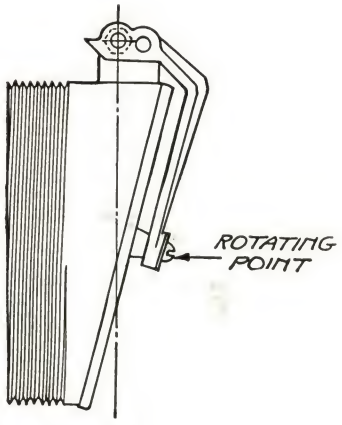
No. 4 Basement sanitary line, cast iron branch from line No. 3 vented through roof and to which are connected basement fixtures only.

Guarantee

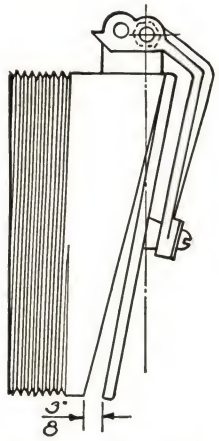
Drainage installed in accordance with the Boosey 1-2-3-4 System of Gravity Drainage, will positively prevent street sewage backflowing through the house sewer and flooding the basement, when valves A and B on lines 2 and 4 are closed. These valves do not interfere with the free flow of water from the rain water conductors or from fixtures above basement that are connected to the soil pipe stacks.

BOOSEY BALANCED CHECK VALVE

The Boosey balanced swing check valve embodies the latest improvements in construction, which under normal conditions assures the opening and closing of the valve with each flush of water. Due to the vanes on the disc, it rotates with each flush, which cleans the seat, keeping the valve in readiness to protect the building's basement and contents from the destructive action of backflowing street sewage. Thousands of these silent, invisible guardians of health and investment are performing their duties daily and doing it so efficiently that building owners have forgotten their very existence.



Swing Valve Adjusted to Open with 1-inch Head of Water



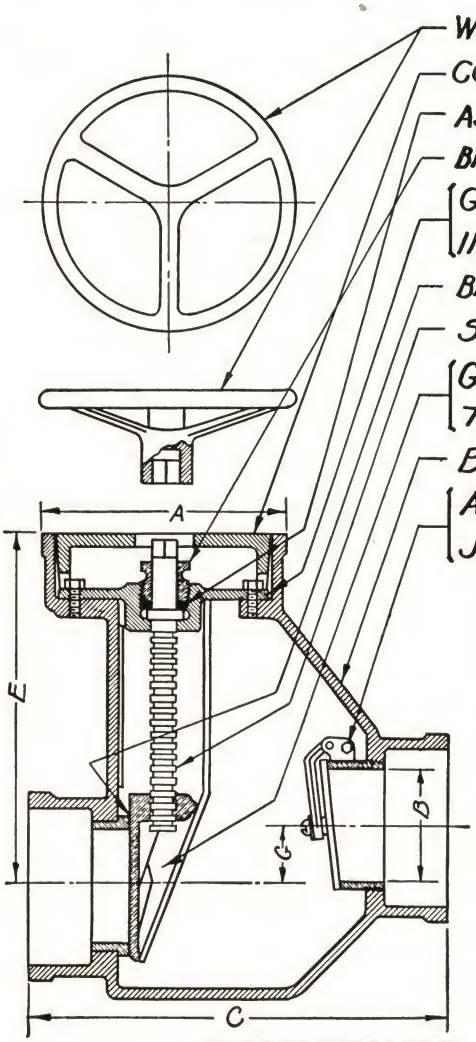
Swing Valve Adjusted to Hang Open 3/8 Inch for Air Circulation

BOOSEY

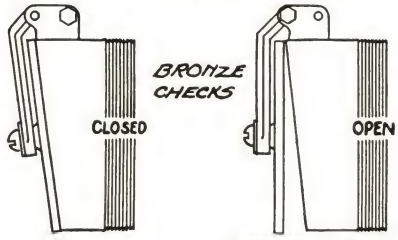
IN MODERNIZING BASEMENTS EVERYTHING DEPENDS UPON THE CONTROL OF THE DRAINAGE INSTALLATION WHICH LIES BELOW BASEMENT FLOOR, OTHERWISE, GORGED STREET SEWERS BACK FLOW THROUGH THE BASEMENT DRAINAGE LINES RUINING BASEMENT CONTENTS AND DECORATIONS.

DRAINAGE CONTROL VALVE

WITH AUTOMATIC SELF CLOSING VALVE AND HAND OPERATED GATE. NON-RISING STEM



- WHEEL HANDLE (REMOVABLE)
- COVER-SET FLUSH WITH FLOOR
- ASBESTOS GRAPHITE GASKET
- BRONZE PACKING NUT
- GLAND PLATE-REMOVABLE FOR INSPECTION.
- BRONZE MACHINED SEAT
- SQUARE THREAD
- GATE-SPADE SHAPED TO CUT THROUGH SEWAGE. (BRONZE METAL)
- BODY-CAST IRON
- AUTOMATIC CHECK-CAN BE ADJUSTED TO HANG OPEN OR CLOSED.



SIZE	A	B	C	E	G
3	8	3	14	12	2
4	8	4	14	12	2
5	10½	5	16	15	2
6	10½	6	16	15	2

Nº109

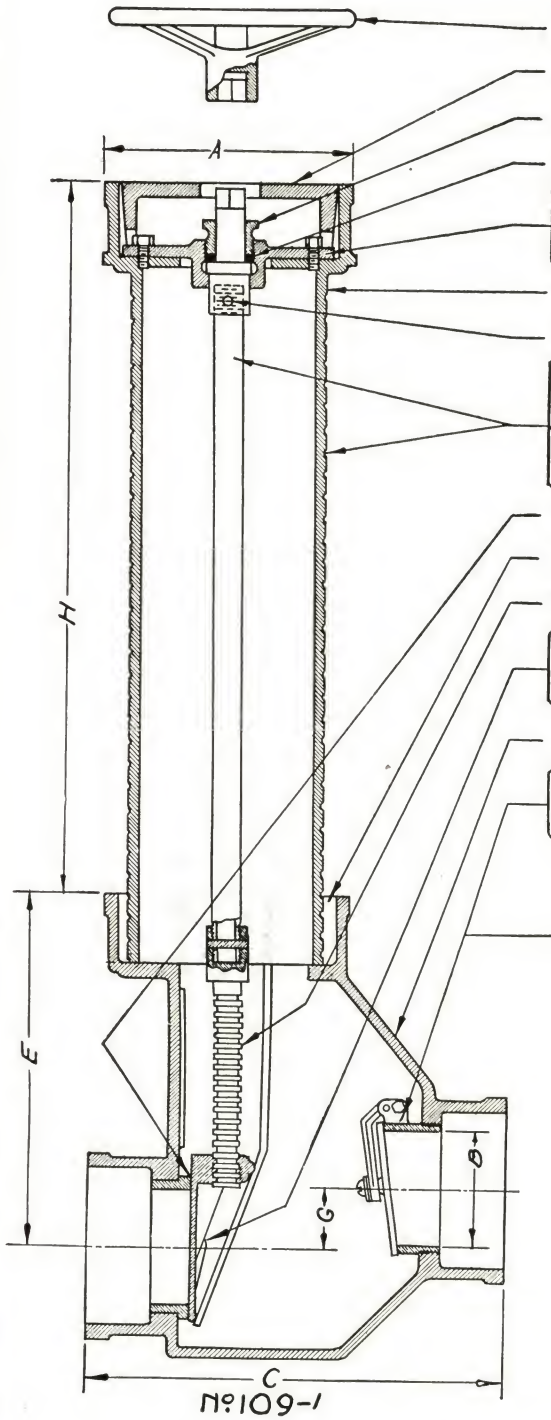
NO PIT REQUIRED
VALVE BODY EXTENDS TO FLOOR LINE

Nº109

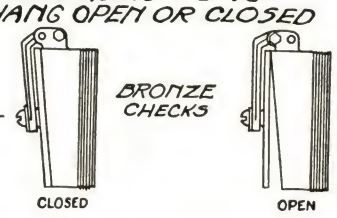
BOOSEY

DRAINAGE CONTROL VALVE

WITH AUTOMATIC SELF CLOSING VALVE AND HAND OPERATED GATE. NON-RISING STEM



WHEEL HANDLE (REMOVABLE)
COVER-SET FLUSH WITH FLOOR
BRONZE PACKING NUT
ASBESTOS GRAPHITE PACKING
GLAND PLATE REMOVABLE FOR INSPECTION.
EXTENSION VALVE HEAD
¼" STEEL PIN
VALVE STEM AND EXTENSION-CAN BE CUT OFF TO MEET FLOOR LINE ADJUSTMENT BETWEEN 18 AND 36 INCHES
BRONZE MACHINED SEAT
CAULKED JOINT
SQUARE THREAD
GATE-SPADE SHAPED TO CUT THROUGH SEWAGE. (BRONZE METAL)
BODY-CAST IRON
AUTOMATIC CHECK-CAN BE ADJUSTED TO HANG OPEN OR CLOSED



SIZE	A	B	C	E	G	H
3	8	3	14	12	2	12
3	8	3	14	12	2	24
4	8	4	14	12	2	12
4	8	4	14	12	2	24
5	10½	5	16	15	2	9
5	10½	5	16	15	2	21
6	10½	6	16	15	2	9
6	10½	6	16	15	2	21

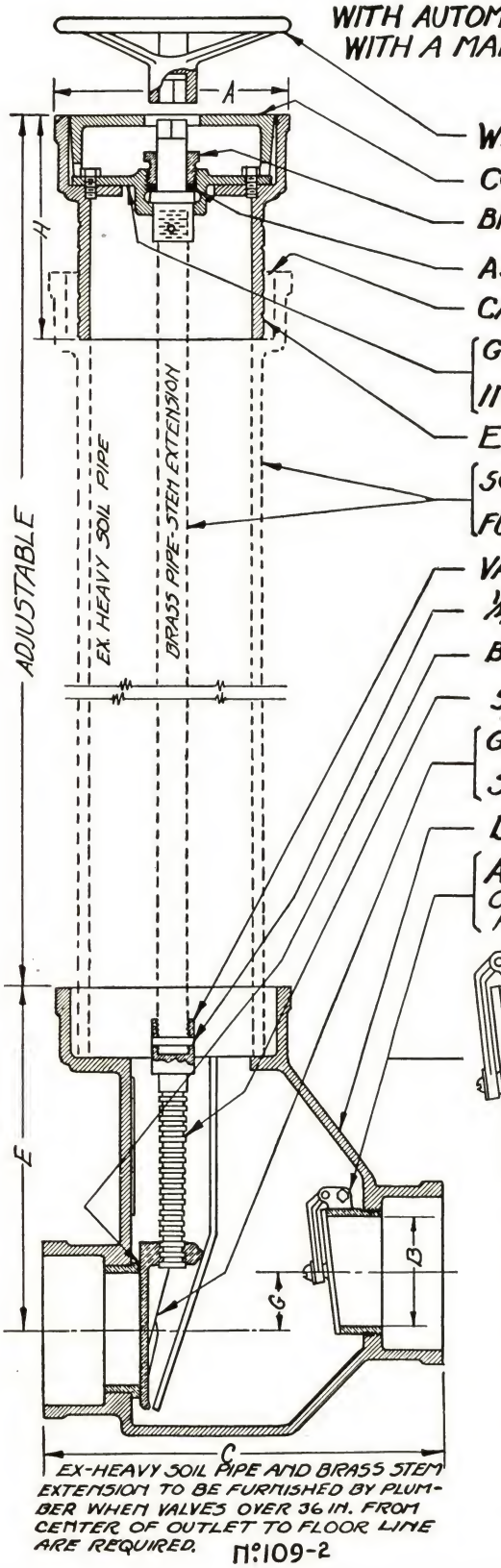
SPECIAL: LENGTHS OTHER THAN INDICATED FURNISHED TO ORDER TO WITHIN 6 INCHES OF "E" DIMENSION.

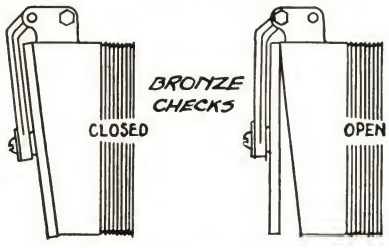
Nº109-1

BOOSEY

DRAINAGE CONTROL VALVE

WITH AUTOMATIC SELF CLOSING VALVE COMBINED WITH A MANUALLY OPERATED GATE. NON-RISING STEM

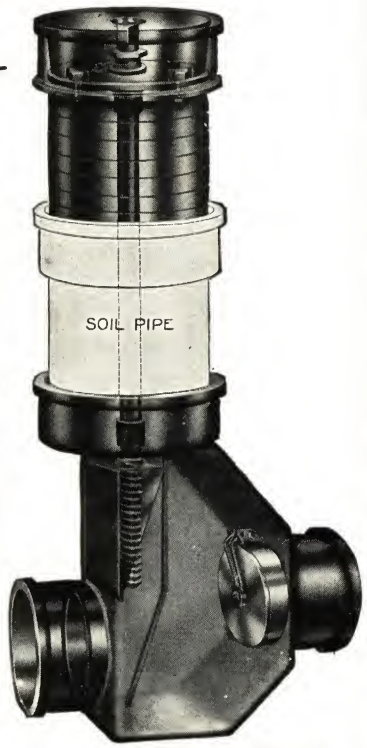




SIZE	A	B	C	E	G	H
3	8	3	14	12	2	12
4	8	4	14	12	2	12
5	10½	5	16	15	2	12
6	10½	6	16	15	2	12

EX-HEAVY SOIL PIPE AND BRASS STEM EXTENSION TO BE FURNISHED BY PLUMBER WHEN VALVES OVER 36 IN. FROM CENTER OF OUTLET TO FLOOR LINE ARE REQUIRED.

Nº109-2



Nº109-2

BOOSEY

DRAINAGE CONTROL VALVE

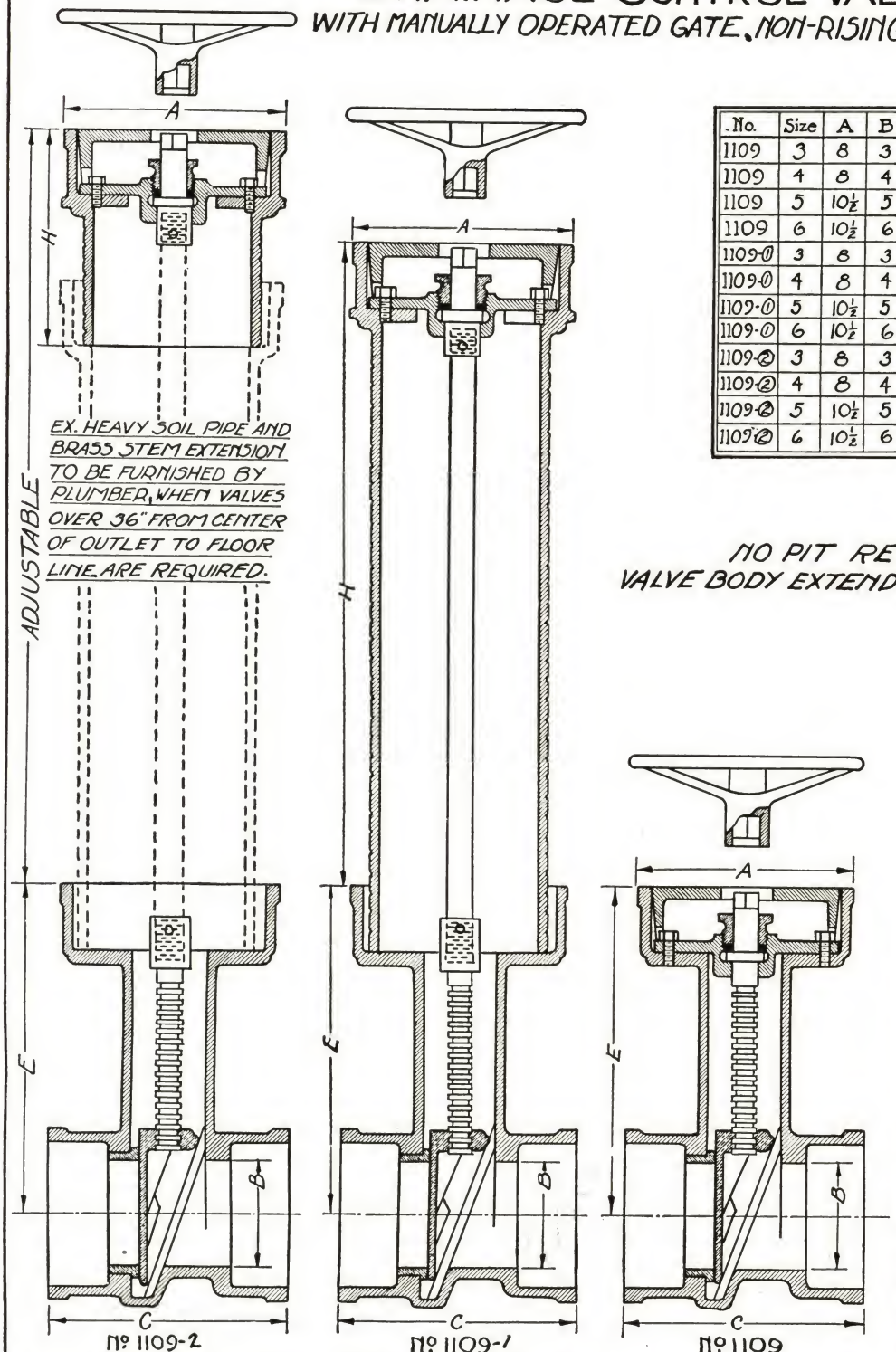
WITH MANUALLY OPERATED GATE, NON-RISING STEM

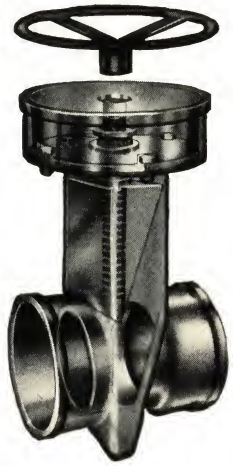
No.	Size	A	B	C	E	H
1109	3	8	3	8½	12	
1109	4	8	4	8½	12	
1109	5	10½	5	9½	15	
1109	6	10½	6	9½	15	
1109-①	3	8	3	8½	12	24
1109-①	4	8	4	8½	12	24
1109-①	5	10½	5	9½	15	21
1109-①	6	10½	6	9½	15	21
1109-②	3	8	3	8½	12	12
1109-②	4	8	4	8½	12	12
1109-②	5	10½	5	9½	15	12
1109-②	6	10½	6	9½	15	12

EX. HEAVY SOIL PIPE AND BRASS STEM EXTENSION TO BE FURNISHED BY PLUMBER, WHEN VALVES OVER 36" FROM CENTER OF OUTLET TO FLOOR LINE ARE REQUIRED.

ADJUSTABLE

NO PIT REQUIRED
VALVE BODY EXTENDS TO FLOOR LINE





№1109

№ 1109-2
VALVE HEAD EXTENDED TO FLOOR LINE WITH SOIL PIPE AND BRASS STEM EXTENSION.

№ 1109-1
SPECIAL-LENGTHS OTHER THAN INDICATED FURNISHED TO ORDER TO WITHIN 6 IN. OF "E" DIMENSIONS

№ 1109
DRAINAGE CONTROL VALVE.

BOOSEY

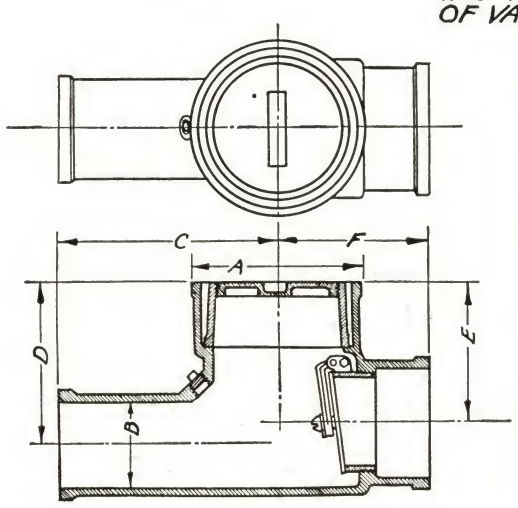
SIZE	A	B	C	D	E	F
3	6	3	10	7½	7½	5
4	7	4	10	7½	7½	6
6	9¾	6	12	10	8	7½

N°116

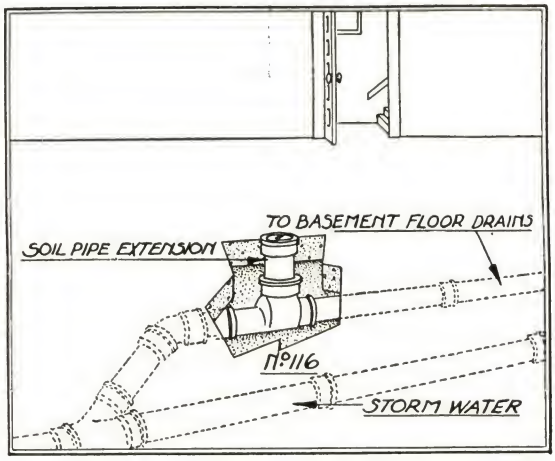
BACK WATER DRAINAGE VALVE

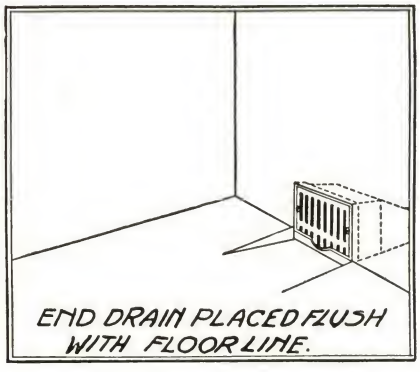
WITH HUB TOP FOR EXTENSION TO FLOOR LINE.

MADE X.H. AND WITH ACCESSIBLE BRONZE METAL BALANCED SWING VALVE WITH ROTATING VANES ON DISC FOR SELF-CLEANING OF VALVE SEAT.



N°116



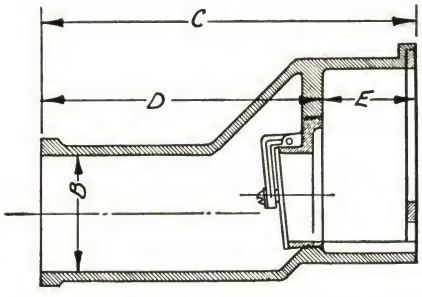


BACKWATER END DRAIN.

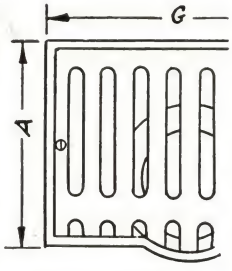
FOR ELEVATOR, CONDUIT OR METER PITS, TUNNELS, AND VALVE MAN HOLES.

SIZE	A	B	C	D	E	G
4	7	4	13	10	3	9
6	8	6	13	10	3	11

N°113

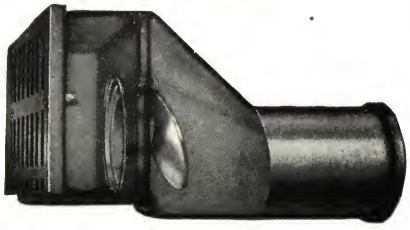


N°113



REMOVABLE CAST IRON STRAINER

N°116



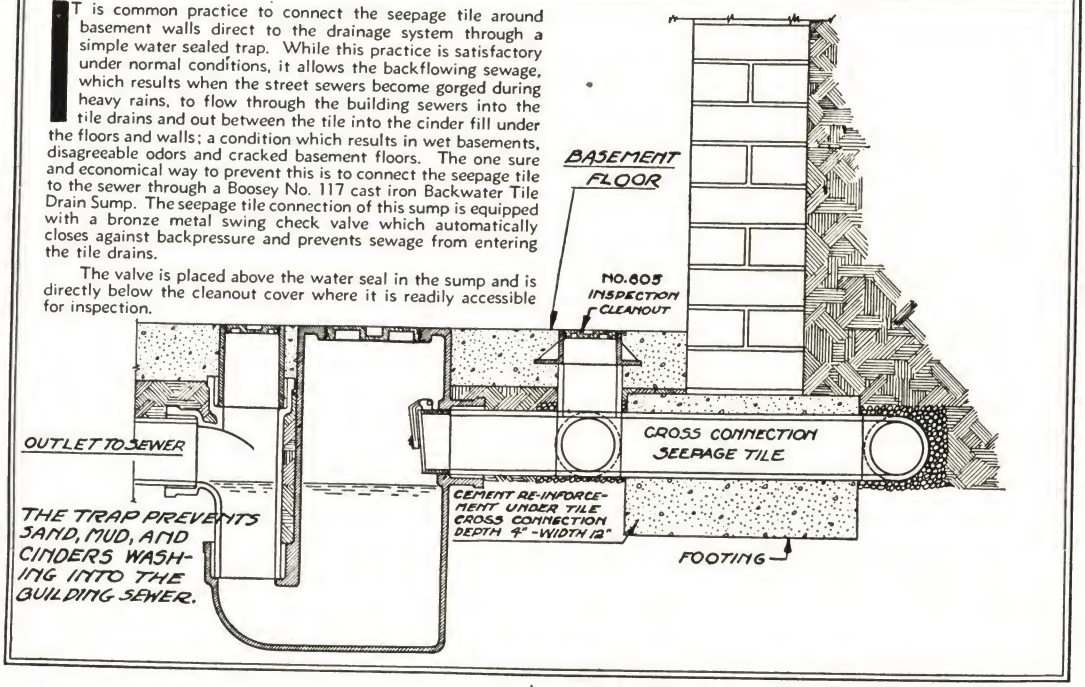
N°113

BOOSEY

SEEPAGE TILE DRAIN SUMP

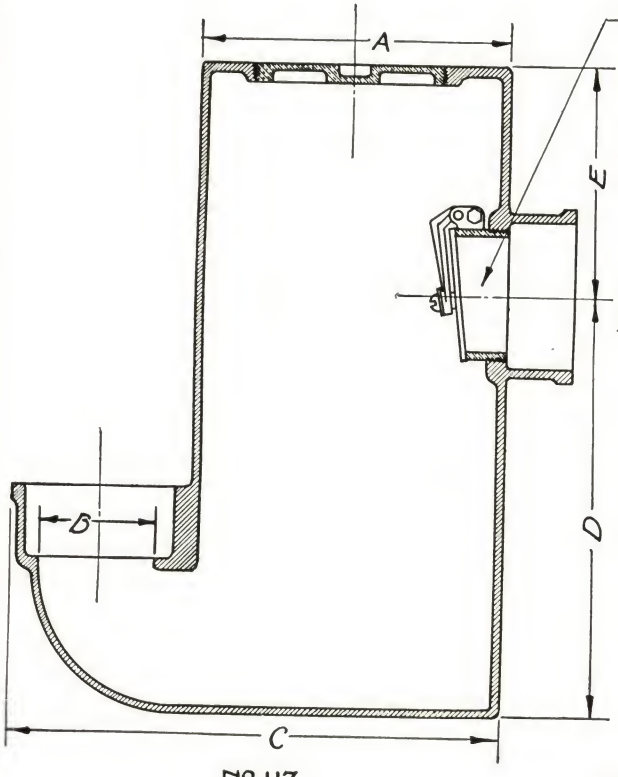
IT is common practice to connect the seepage tile around basement walls direct to the drainage system through a simple water sealed trap. While this practice is satisfactory under normal conditions, it allows the backflowing sewage, which results when the street sewers become gorged during heavy rains, to flow through the building sewers into the tile drains and out between the tile into the cinder fill under the floors and walls; a condition which results in wet basements, disagreeable odors and cracked basement floors. The one sure and economical way to prevent this is to connect the seepage tile to the sewer through a Boosey No. 117 cast iron Backwater Tile Drain Sump. The seepage tile connection of this sump is equipped with a bronze metal swing check valve which automatically closes against backpressure and prevents sewage from entering the tile drains.

The valve is placed above the water seal in the sump and is directly below the cleanout cover where it is readily accessible for inspection.

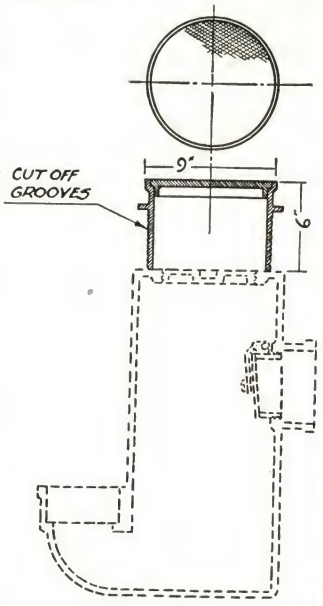


VALVE PREVENTS GORGED STREET SEWERS BACKFLOWING THROUGH SEEPAGE TILE AROUND THE FOUNDATION WALLS - THUS PREVENTING HYDRO-STATIC PRESSURE HEAVING AND CRACKING BASEMENT FLOOR. THE VALVE ALSO PREVENTS THE CLOGGING OF SEEPAGE DRAINS AND CINDER BED UNDER BASEMENT FLOOR WITH SEWAGE.

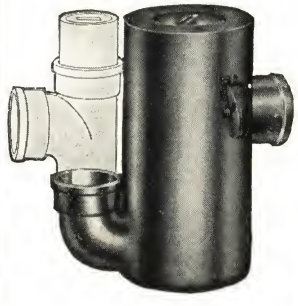
A	B	C	D	E
10½	4	16⅛	14½	7½



№ 117



№ 117 WITH EXTENSION

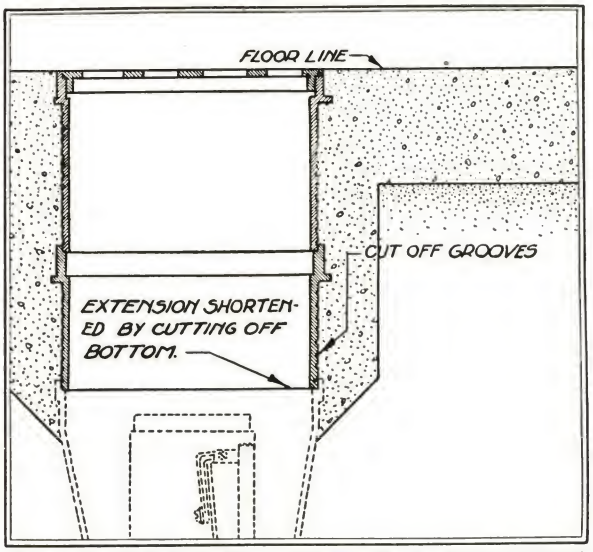


№ 117

BOOSEY

BACK PRESSURE FLOOR DRAINS

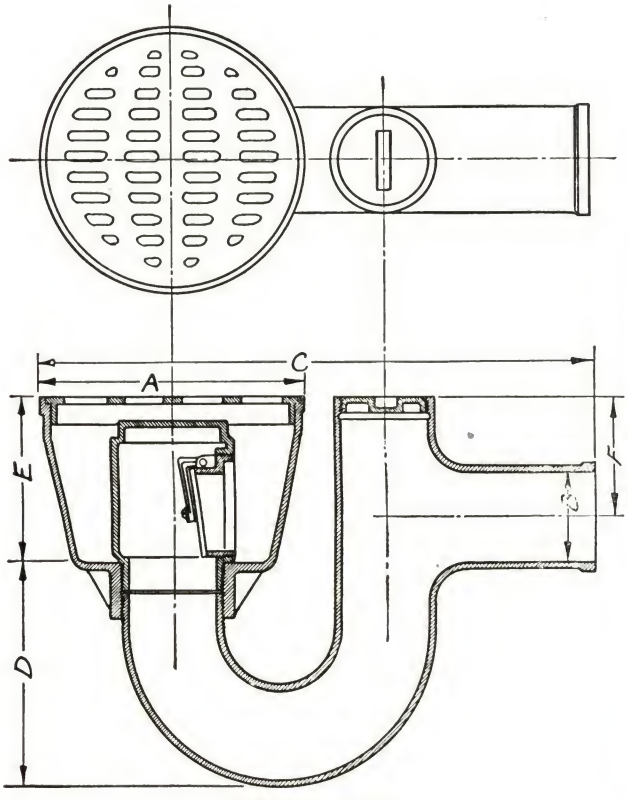
WITH DEEP SEAL TRAP AND CLEANOUT



FLOOR DRAIN EXTENSION FURNISHED IN 6 INCH LENGTHS

No	A	B	C	D	E	F
108	9	2	12	5	5½	4
108	9	3	19	8	5½	4½
108	9	4	20½	9¼	5½	5

BODY-CAST IRON, PAINTED OR GALVANIZED, WITH IRON OR BRONZE STRAINER OR ALL BRONZE TOP. BRONZE METAL BALANCED SWING CHECK VALVE, INCASED IN REMOVABLE IRON CYLINDER.



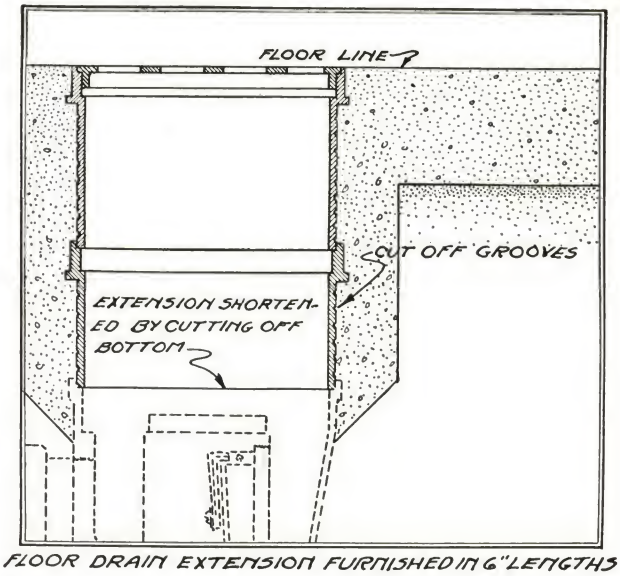
No 108 – W

No 108 – W

BOOSEY

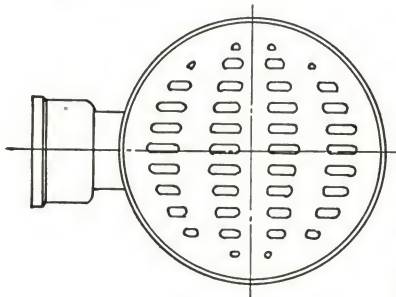
BACK PRESSURE FLOOR DRAINS

WITH SPIGOT OUTLET AND AUXILIARY INLET

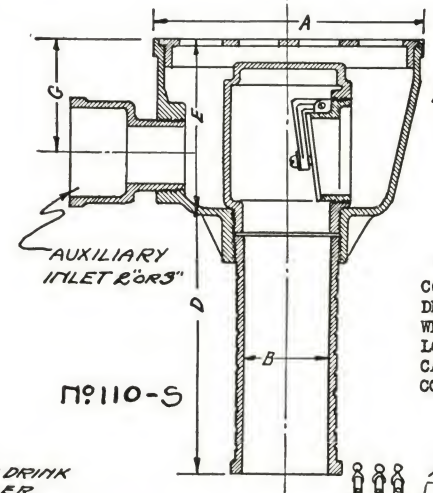


FLOOR DRAIN EXTENSION FURNISHED IN 6" LENGTHS

No.	A	B	D	E	G 2" HUB	G 3" HUB
1105	9	2	8	5½	4	3¾
1105	9	3	8	5½	4	3¾
1105	9	4	8	5½	4	3¾

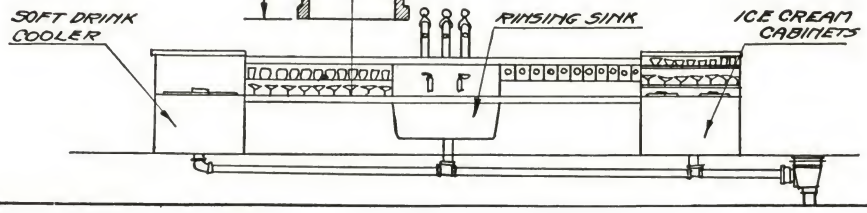


BODY-CAST IRON, PAINTED OR GALVANIZED, WITH IRON OR BRONZE STRAINER OR ALL BRONZE TOP. BRONZE METAL BALANCED SWING CHECK VALVE, INCASED IN REMOVABLE IRON CYLINDER.



No. 110-S

THE INSTALLATION OF WASTES FROM COOLERS, RINSING SINKS AND COUNTER DRAINS IN STORES WITHOUT BASEMENTS, WHEN REMODELLED FOR SOFT DRINK PARLORS, CONFECTIONERY OR DRUG STORES, CAN BE MADE AT MINIMUM EXPENSE BY CONNECTING THEM TO DRAIN NO. 110-S.

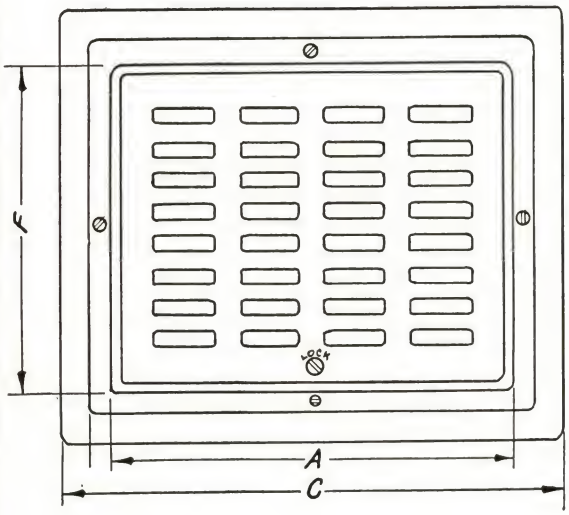


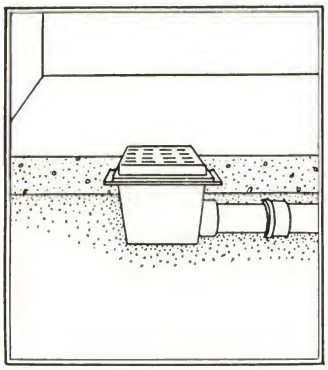
No. 110-S

BOOSEY

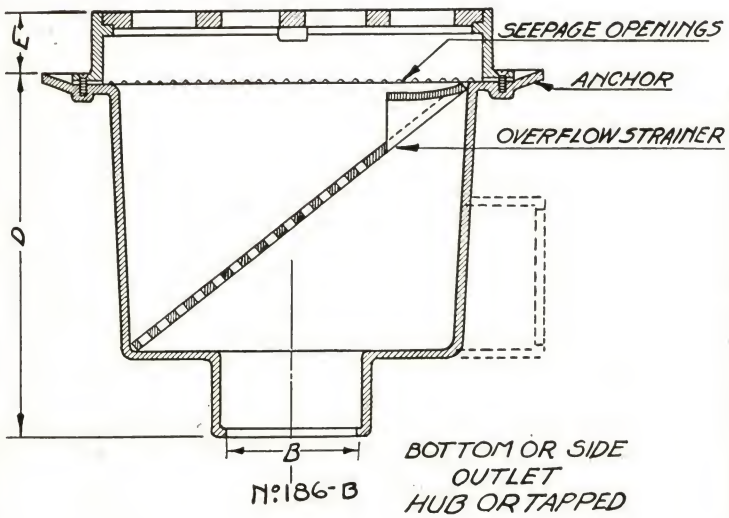
INDUSTRIAL FLOOR DRAIN

NO. 186-B IS OF THE SEEPAGE DRAINAGE TYPE AND PROVIDES POSITIVE WATER TIGHT FLOOR CONSTRUCTION. A SEEPAGE PAN, CAST TO BODY OF DRAIN, ALSO ACTS AS AN ANCHOR SECURING THE DRAIN BODY PERMANENTLY IN THE CEMENT SLAB. DRAIN IS EQUIPPED WITH CAST IRON OR BRONZE REMOVABLE INTERMEDIATE STRAINER, 3/8" MESH, WITH ENLARGED OPENINGS AT TOP FOR OVERFLOW.
BODY OF DRAIN IS CAST IRON, PAINTED OR GALVANIZED. STRAINER AND FRAME; IRON, PAINTED OR GALVANIZED OR ALL BRONZE POLISHED OR PLATED, EITHER HINGED OR LOOSE SET, HELD IN PLACE WITH BRONZE LOCKING DEVICE. CARRYING CAPACITY OF IRON STRAINERS APPROXIMATELY 2 TONS. INLET AREA OF STRAINERS 30 SQUARE INCHES.





A	B	C	D	E	F
13¾	3	17	12¼	2½, 4, OR 6	11¾
13¾	4	17	12¼	2½, 4, OR 6	11¾



Nº186-B

BOTTOM OR SIDE OUTLET HUB OR TAPPED

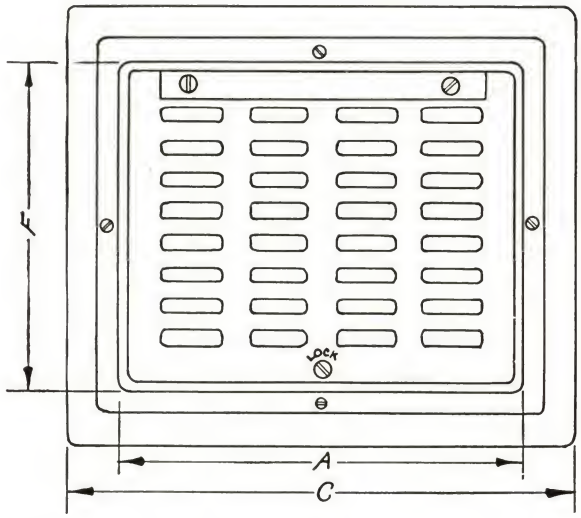
SUITABLE FOR-FACTORIES, AUTO STORAGE YARDS, AND UNHEATED BUILDINGS.

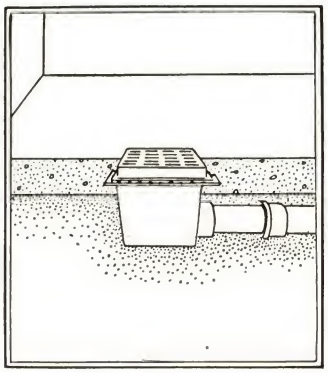
Nº186-B

BOOSEY

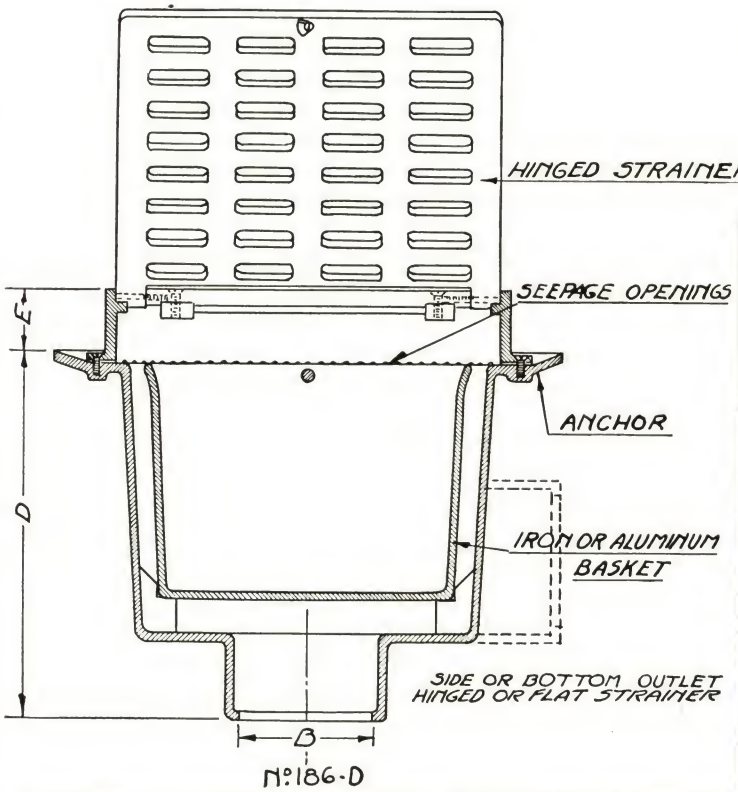
FACTORY SEDIMENT FLOOR DRAIN

NO.186-D IS OF THE SEEPAGE DRAINAGE TYPE AND PROVIDES POSITIVE WATER TIGHT FLOOR CONSTRUCTION. A SEEPAGE PAN, CAST TO BODY OF DRAIN, ALSO ACTS AS AN ANCHOR SECURING THE DRAIN BODY PERMANENTLY IN THE CEMENT SLAB.
DRAIN IS EQUIPPED WITH REMOVABLE IRON OR ALUMINUM BASKET, OVER-FLOW TYPE, FOR KEEPING THE SIDES FLUSHED CLEAN.
BODY OF DRAIN IS CAST IRON, PAINTED OR GALVANIZED. STRAINER AND FRAME; IRON, PAINTED OR GALVANIZED OR ALL BRONZE POLISHED OR PLATED, EITHER HINGED OR LOOSE SET, HELD IN PLACE WITH BRONZE LOCKING DEVICE. CARRYING CAPACITY OF IRON STRAINER APPROXIMATELY 2 TONS. INLET AREA OF STRAINERS 30 SQUARE INCHES.





A	B	C	D	E	F
13¾	3	17	12½	2½, 4, OR 6"	11¾
13¾	4	17	12½	2½, 4, OR 6"	11¾



Nº186-D

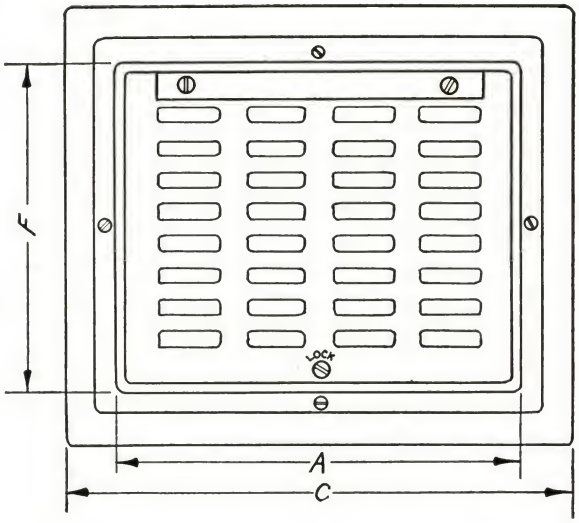
OVERFLOW FROM BASKET KEEPS THE SIDES OF DRAIN CLEAN.

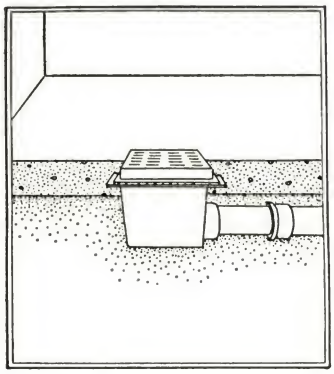
Nº186-D

BOOSEY

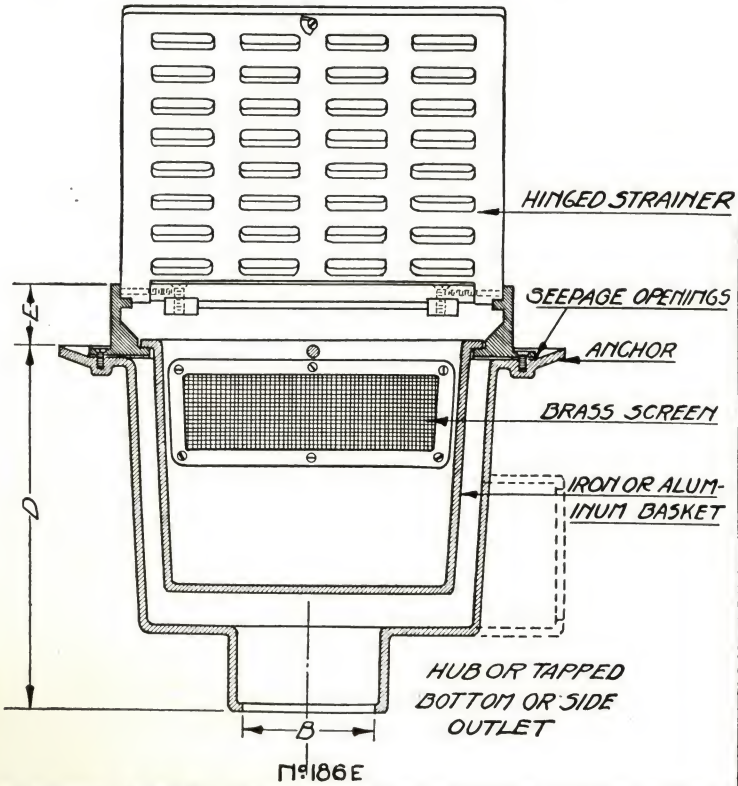
Anti Clog Drain

NO. 186-E IS OF THE SEEPAGE DRAINAGE TYPE AND PROVIDES POSITIVE WATER TIGHT FLOOR CONSTRUCTION. A SEEPAGE PAN, CAST TO BODY OF DRAIN, ALSO ACTS AS AN ANCHOR SECURING THE DRAIN BODY PERMANENTLY IN THE CEMENT SLAB.
DRAIN IS EQUIPPED WITH REMOVABLE IRON OR ALUMINUM BASKET WHICH FORMS A SEDIMENT CHAMBER BELOW STRAINER TO RECEIVE LIQUIDS AND SOLIDS. LIQUIDS DISCHARGE FROM BASKET THROUGH A BRASS SCREEN OF ANY DESIRED MESH, PLACED IN THE UPPER PART OF BASKET WHILE SOLIDS ARE RETAINED IN THE BASKET, THEREBY PREVENTING THE CLOGGING OF THE DRAIN LINE.
BODY OF DRAIN IS CAST IRON, PAINTED OR GALVANIZED. STRAINER AND FRAME; IRON, PAINTED OR GALVANIZED OR ALL BRONZE POLISHED OR PLATED, EITHER HINGED OR LOOSE SET, HELD IN PLACE WITH BRONZE LOCKING DEVICE. CARRYING CAPACITY OF IRON STRAINERS APPROXIMATELY 2 TONS. INLET AREA OF STRAINERS 30 SQUARE INCHES.



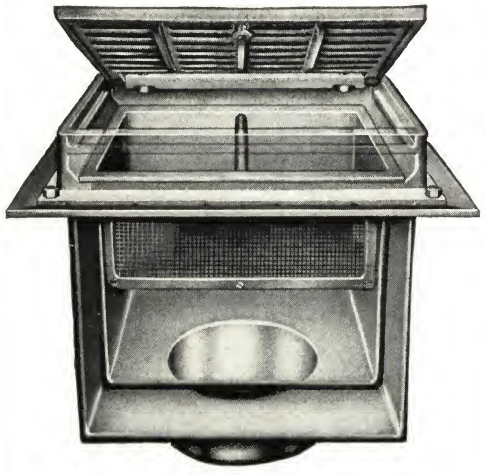


A	B	C	D	E	F
13 3/4	3	17	12 1/2	2 1/2, 4, OR 6	11 3/4
13 3/4	4	17	12 1/2	2 1/2, 4, OR 6	11 3/4



No.186E

SUITABLE FOR-DENTAL LABRATORIES, DUCO PAINT DEPARTMENTS, SCHOOLS, AND TESTING LABRATORIES.

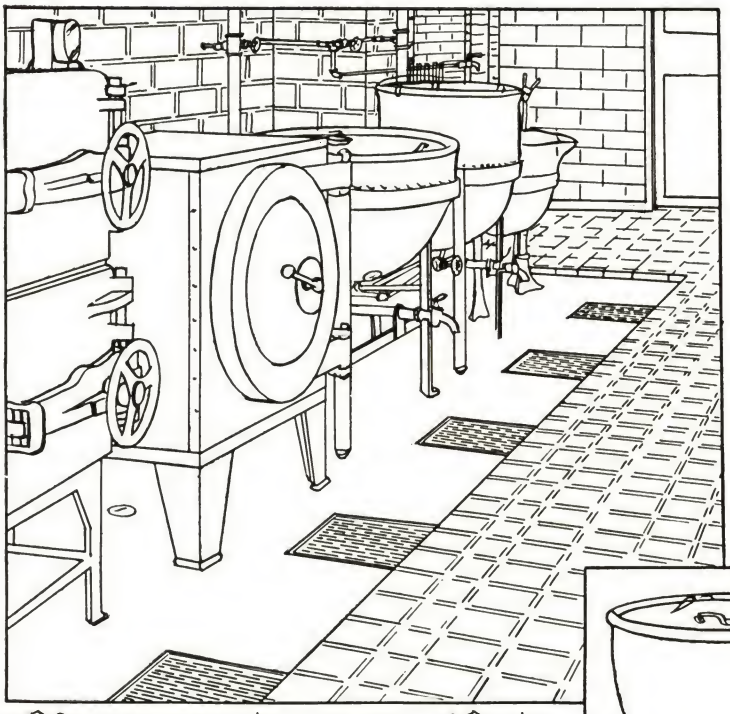


No.186-E

BOOSEY

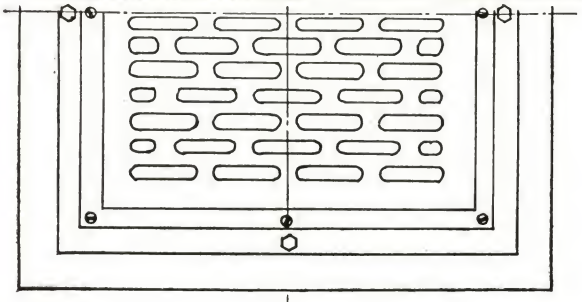
KITCHEN FLOOR DRAIN
WITH ALUMINUM BASKET

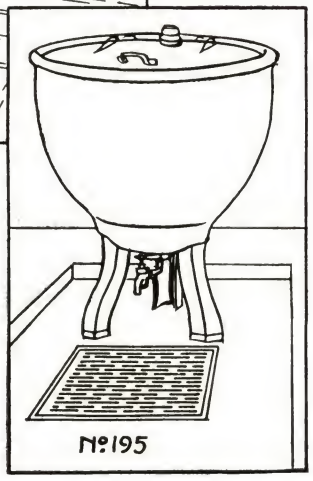
STRAINER, BRONZE METAL, OF THE LIFT OFF TYPE- NO HIDDEN CORNERS - WHEN THE BASKET IS REMOVED, ALL PARTS ARE ACCESSIBLE FOR CLEANING



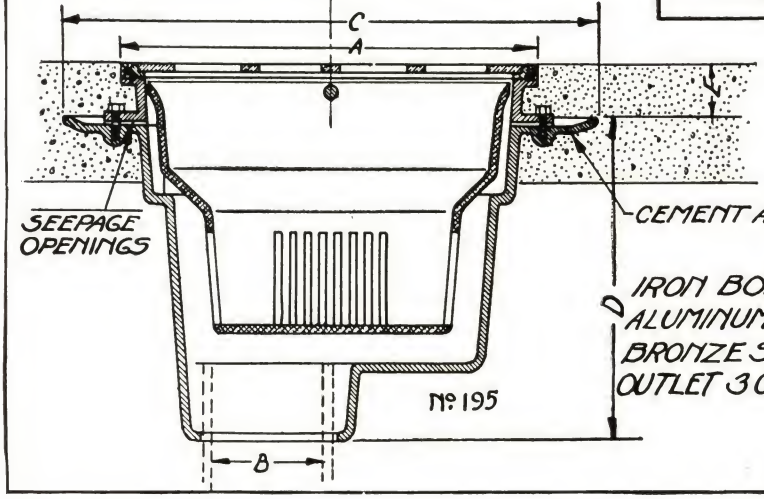
OUTLET	A	B	C	D	E
HUB	14	3	18	11	1 3/4
TAP	14	3	18	11	1 3/4
SPIGOT	14	3	18	11	1 3/4
HUB	14	4	18	11	1 3/4
TAP	14	4	18	11	1 3/4
SPIGOT	14	4	18	11	1 3/4

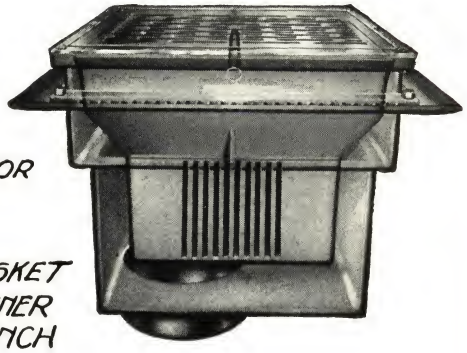
APPROVED KITCHEN DRAIN FOR- RESTAURANTS · HOTELS HOSPITALS





Nº195





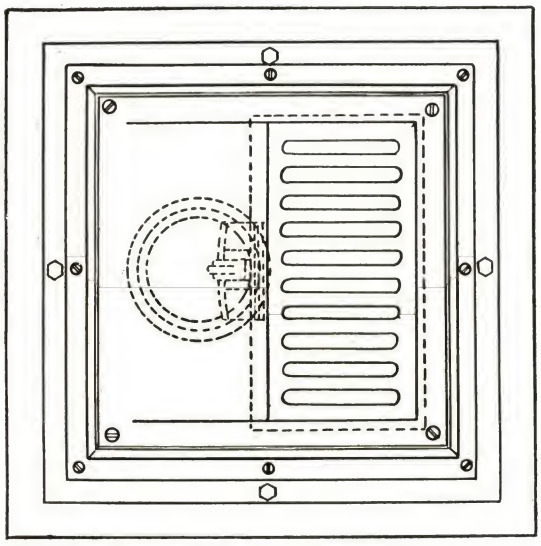
Nº195

BOOSEY

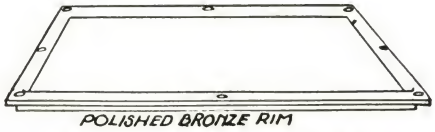
BACK PRESSURE SLOP SINKS

STORES HOTELS HOSPITALS

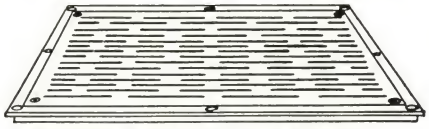
NO. 193 DRAIN, SEEPAGE TYPE, BODY CAST IRON, PAINTED OR GALVANIZED. STRAINER OR RIM, IRON OR BRONZE. INTERMEDIATE STRAINER IRON OR BRONZE. ACCESSIBLE BRONZE METAL BACK PRESSURE VALVE. SEEPAGE PAN CAST TO BODY OF DRAIN ALSO PROVIDES ANCHORAGE FOR SECURING THE DRAIN PERMANENTLY IN THE CEMENT SLAB.



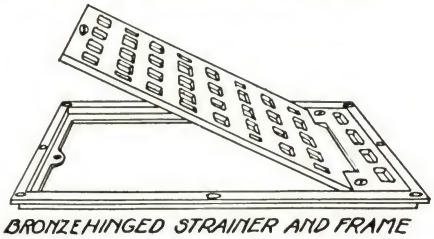
OUTLET	A	B	C	D	E	F	G
HUB	14	3	18	11	1¾	7	13
TAP	14	3	18	11	1¾	7	13
SPIGOT	14	3	18	11	1¾	8	13
HUB	14	4	18	11	1¾	9¼	13
TAP	14	4	18	11	1¾	9¼	13
SPIGOT	14	4	18	11	1¾	8	13



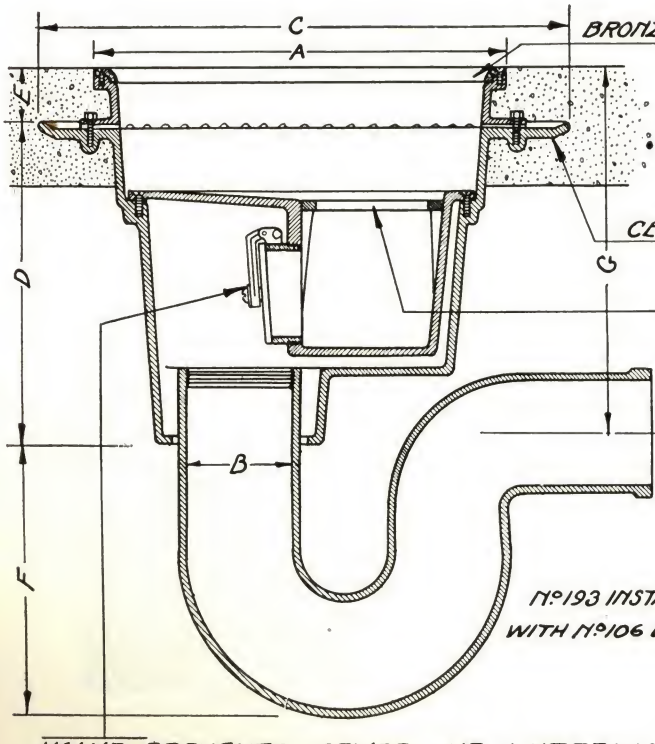
POLISHED BRONZE RIM

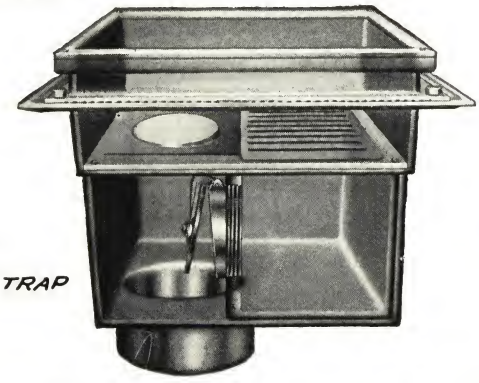


BRONZE STRAINER AND FRAME



BRONZE HINGED STRAINER AND FRAME





Nº193 INSTALLATION WITH Nº106 DEEP SEAL TRAP

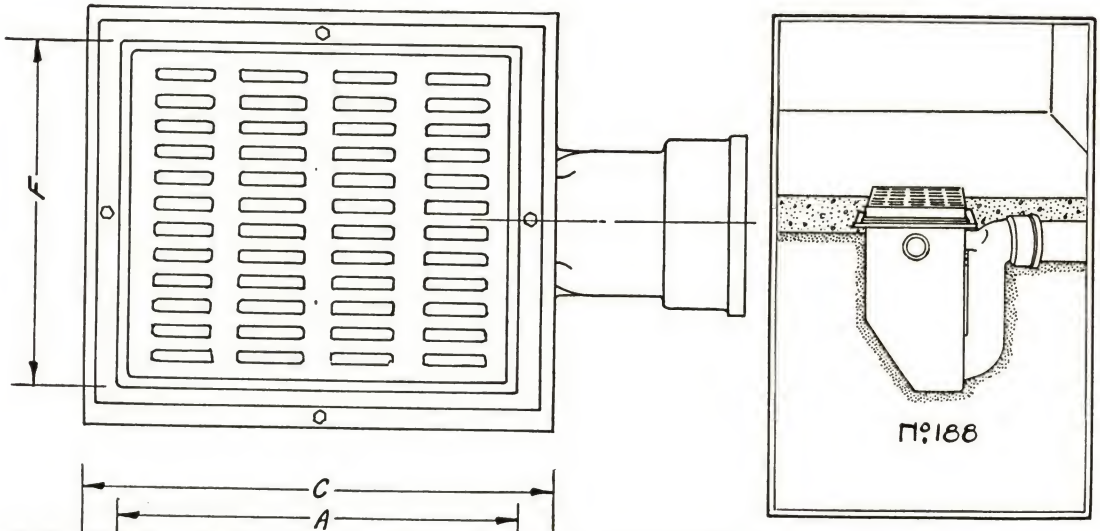
VALVE PREVENTS SEWER AIR ENTERING THE BUILDING SHOULD TRAP LOSE ITS SEAL FROM EVAPORATION

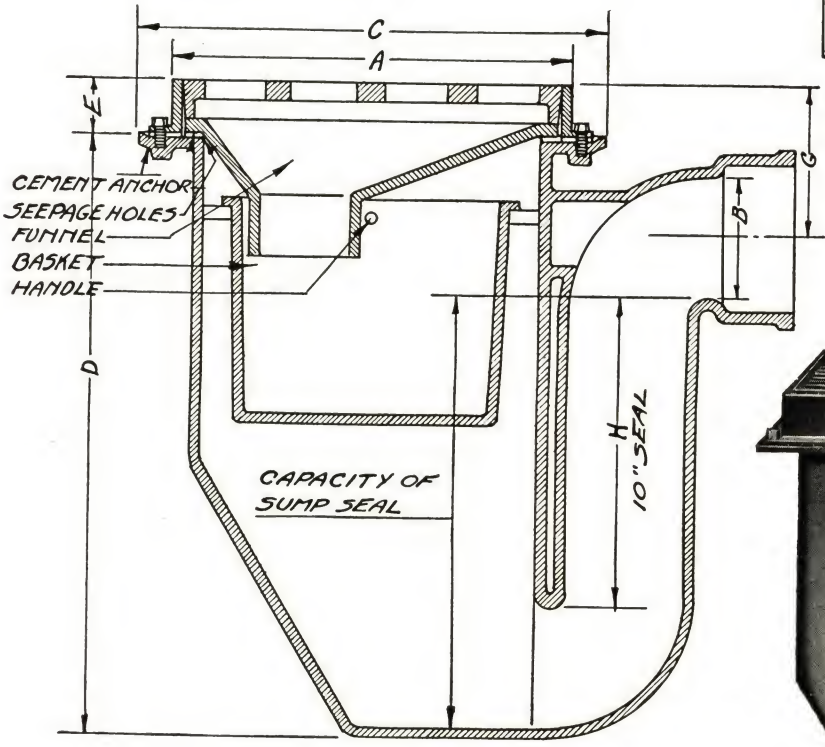
Nº193

BOOSEY

GARAGE DRAIN

NO.188 DRAIN AND TRAP COMBINED IN A SINGLE UNIT. RECOMMENDED FOR RESIDENCE GARAGES. INSIDE DEFLECTOR DIRECTS ALL DIRT INTO REMOVABLE BASKET. VISIBLE TRAP SEAL AND THREE INCH VENT CONNECTION.
BODY OF DRAIN IS CAST IRON, PAINTED OR GALVANIZED, WITH LATERAL FLANGE CAST TO BODY WHICH ANCHORS DRAIN SECURELY IN CEMENT SLAB.
STRAINER AND FRAME IS CAST IRON, PAINTED OR GALVANIZED. TOTAL AREA OF TOP, 155 SQUARE INCHES. STRAINER IS 13½" X 11½" WITH INLET AREA OF 33 SQUARE INCHES. CARRYING CAPACITY OF STRAINER, APPROXIMATELY 5 TONS. DEPTH OF TRAP SEAL, 10". OUTLET 4" HUB

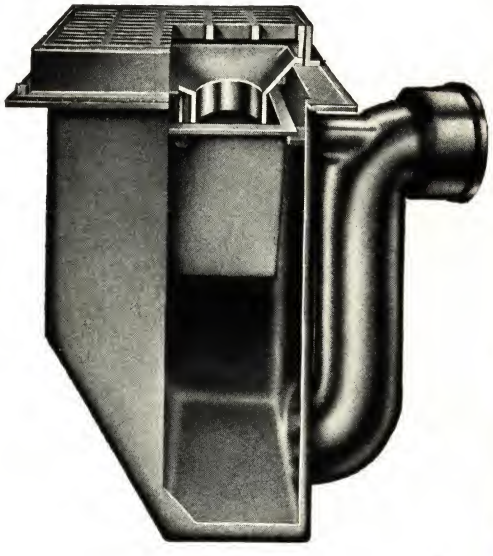




A	B	C	D	E	F	G	H
13½	4	15¾	20	2	11½	5¼	10½

Nº188

CARRYING CAPACITY OF STRAINER APPROXIMATELY 5 TONS. CAST IRON DEFLECTOR. REMOVABLE BASKET-OVERFLOW TYPE.

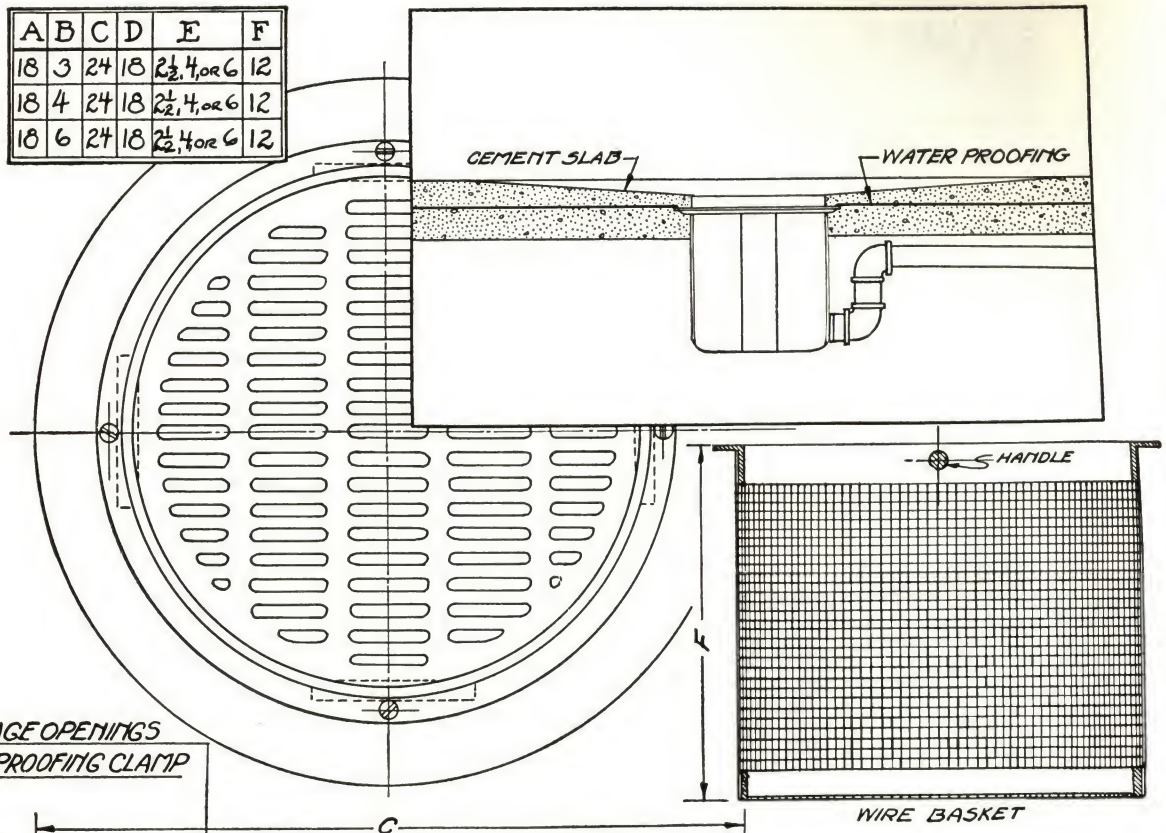


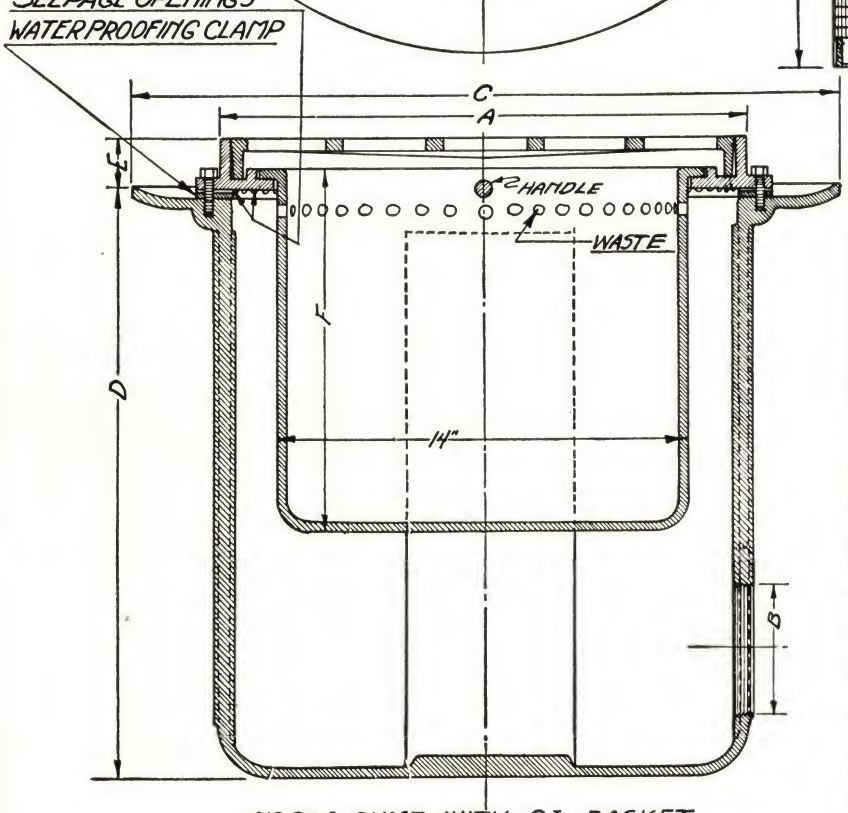
Nº188

BOOSEY

CAST IRON SUMP
SUSPENDED CONSTRUCTION

A	B	C	D	E	F
18	3	24	18	2½, 4, or 6	12
18	4	24	18	2½, 4, or 6	12
18	6	24	18	2½, 4 or 6	12





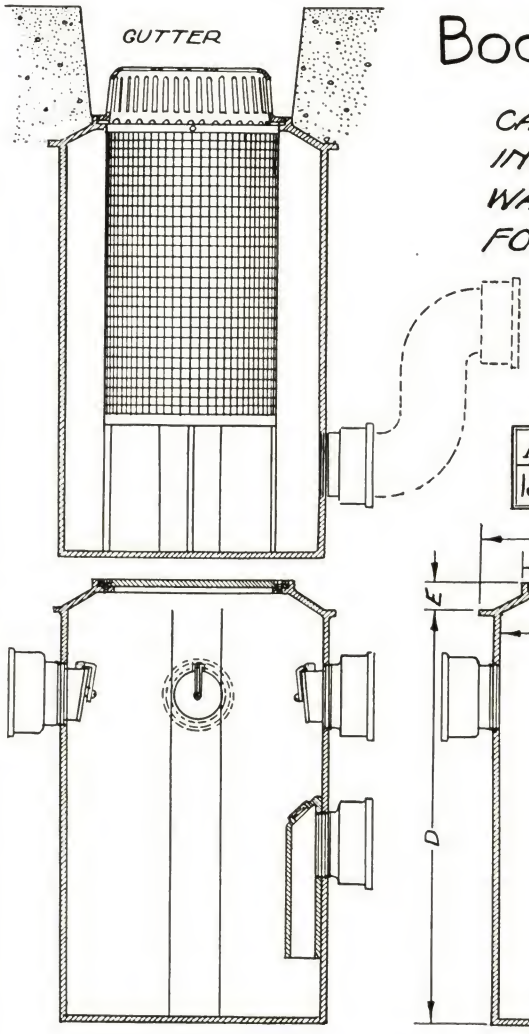
No 636 SUMP WITH C.I. BASKET
SIDE OR BOTTOM OUTLET
HUB OR TAPPED

No 636

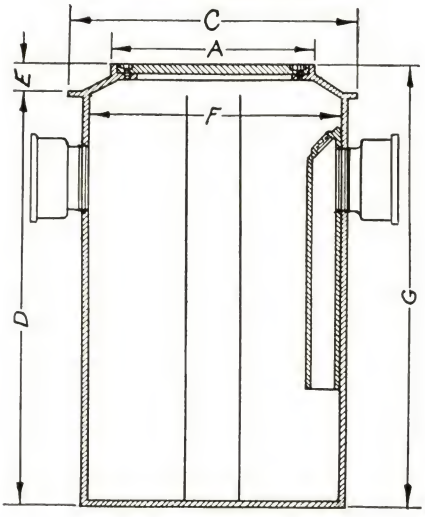
BOOSEY

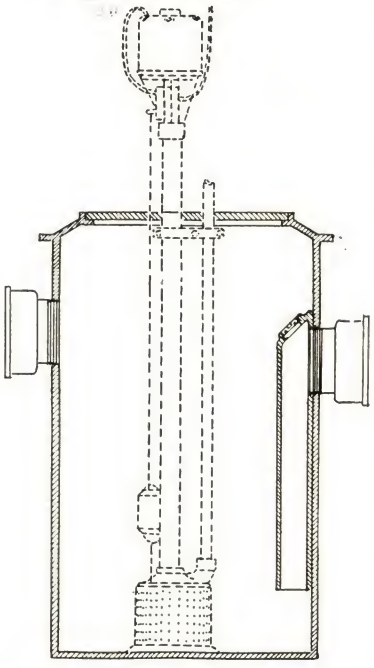
Boosey's Cast Iron Sump

CAST WITH FOUR FLAT SIDES, PROVIDING MACHINE SPACE FOR TAPPING WASTE AND VENT CONNECTIONS IN FOUR DIRECTIONS AT ANY REQUIRED DISTANCE FROM FLOOR LINE.



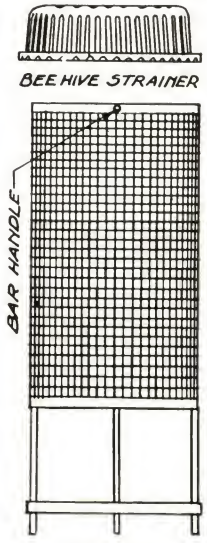
A	C	D	E	F	G
15"	20"	28"	2"	18"	30"





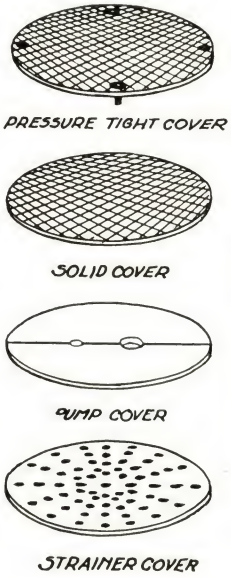
NO. 635

ACCESSORIES TO NO. 635 SUMP



NO. 635 SUMP

LISTED BODY ONLY. ACCESSORIES AND TAPPINGS, TO SUIT REQUIREMENTS, ARE ADDITIONAL TO LIST.



BOOSEY

SEEPAGE SHOWER DRAIN AND TRAP
WITH LEAD PAN CONNECTION

SERIES NO. 126
COMBINES FIVE NEW DRAINAGE FEATURES.

NO. 1 BRONZE SEEPAGE PLATE PROVIDES NON-CORROSIVE SEEPAGE OPENINGS.

NO. 2 A POROUS FIBER GASKET COVERING SEEPAGE OPENINGS PREVENTS THEM BEING CLOGGED WITH CEMENT WHEN FLOOR IS POURED.

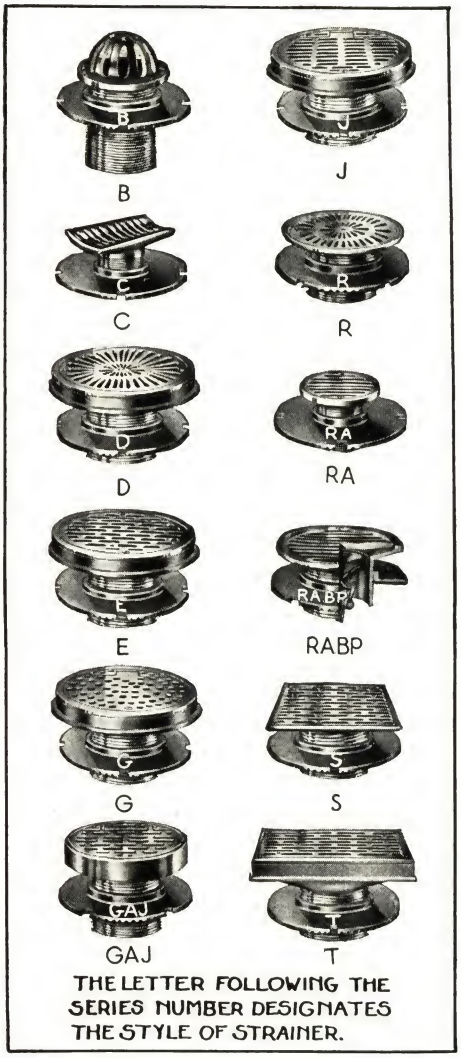
NO. 3 LEAD PAN CONNECTS TO TRAP BODY BY MEANS OF A LEAD, CALKED JOINT, GUARANTEEING AN ECONOMICAL AND WATER TIGHT CONNECTION.

NO. 4 WATER TESTING OF PAN AND CONNECTIONS IS VERY SIMPLE. SCREW A PLUG INTO TRAP INLET, THEN FILL LEAD PAN WITH WATER.

NO. 5 FOR ROUGH TEST AND PLUGGING DURING BUILDING CONSTRUCTION, TRAP IS INTERNALLY THREADED 3" IRON PIPE.

THIS DRAIN REQUIRES LESS VERTICAL SPACE AND COMBINES THE DESIRABLE FEATURES IN SHOWER DRAIN CONSTRUCTION WITH GREATER SEEPAGE AREA AND STRAINER ADJUSTMENT.

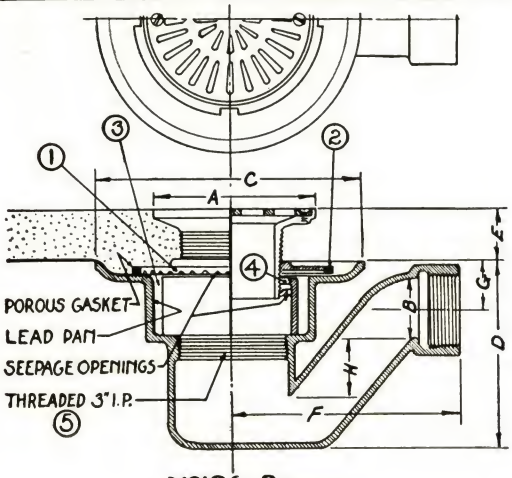
TRAP BODY CAST IRON, PAINTED OR GALVANIZED OR ALL BRONZE AND FURNISHED WITH ANY OF THE ADJUSTABLE STRAINERS SHOWN ON THIS PAGE.



THE LETTER FOLLOWING THE SERIES NUMBER DESIGNATES THE STYLE OF STRAINER.

STRAINER CHART

STRAINER STYLE	DIAMETER	TAIL PIECE TH'D.	STRAINER FAS. TO BODY	FINISH	TAIL PIECE LENGTH	AREA OF GRATE OPEN
B	4½"	3"	SCREWS	STRAINERS FURNISHED IN POLISHED BRONZE, NICKEL, OR CHROME PLATED.	4"	5½ SQ. IN.
C	2¾ x 5"	2"	"		2"	4⅛ " "
D	7"	3"	"		2"	10½ " "
E	7"	3"	"		2"	10⅜ " "
G	7"	3"	HINGED		2"	7 " "
GAJ	6"	3"	"		2½"	8 " "
J	7"	3"	"		2"	7½ " "
R	6"	3"	SCREWS		2¼"	5¾ " "
RA	4"	2"	"		2"	4½ " "
RA	5"	3"	"		2"	5 1/32 " "
RA	6"	3"	"		2¼"	6¾ " "
RA	7"	3"	"		2¼"	12 " "
RA-BP	6"	3"	"		2¼"	6¾ " "
S	6"	3"	"		2"	14 " "
T	8 x 4½"	3"	"		2¼"	10½ " "



No. 126 SERIES

No. 126 SERIES TRAP ROUGHING-IN DIMENSIONS								
SIZE	A	B	C	D	E	F	G	H
2" OUTLET	STRAINER SIZE	2"	9"	6"	ADJUSTABLE	8"	1 5/8"	2"
3" OUTLET		3"	9"	8"		8 1/4"	2 1/8	3"
4" OUTLET		4"	12"	11 3/8		10 3/4"	2 5/8	2½"

No. 126-R

BOOSEY

SEEPAGE SHOWER AND FLOOR DRAIN
WITH LEAD PAN CONNECTION

SERIES NO. 130
COMBINING FIVE NEW DRAINAGE FEATURES

NO. 1 BRONZE SEEPAGE PLATE PROVIDES NON-CORROSIVE SEEPAGE OPENINGS.

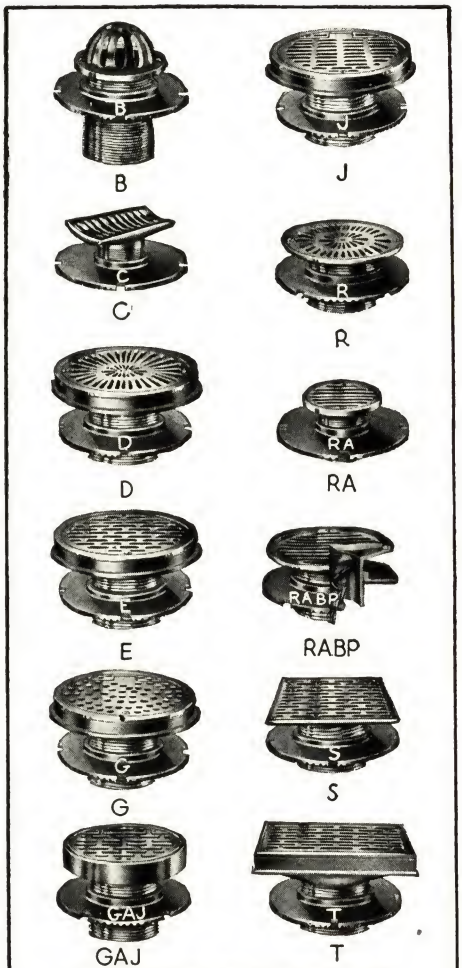
NO. 2 A POROUS FIBER GASKET COVERING SEEPAGE OPENINGS PREVENTS THEM BEING CLOGGED WITH CEMENT WHEN THE FLOOR IS POURED.

NO. 3 LEAD PAN CONNECTS TO TRAP BODY BY MEANS OF A LEAD CALKED JOINT GUARANTEEING A WATER TIGHT AND ECONOMICAL CONNECTION.

NO. 4 WATER TESTING OF PAN AND CONNECTIONS IS VERY SIMPLE, SCREW A PLUG INTO WASTE INLET THEN FILL LEAD PAN WITH WATER.

NO. 5 FOR ROUGH TEST AND PLUGGING DURING BUILDING CONSTRUCTION SCREW PLUG INTO WASTE OUTLET.

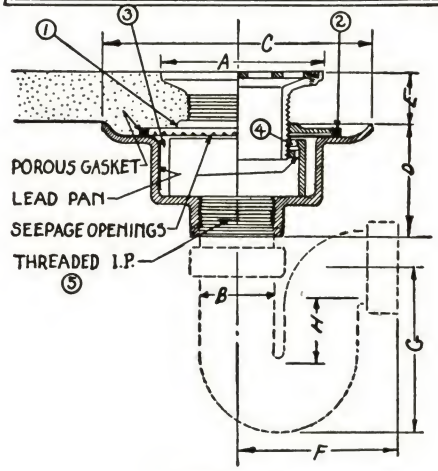
DRAIN BODY CAST IRON, PAINTED OR GALVANIZED, OR ALL BRONZE AND FURNISHED WITH ANY OF THE ADJUSTABLE STRAINERS SHOWN ON THIS PAGE.



THE LETTER FOLLOWING THE SERIES NUMBER DESIGNATES THE STYLE OF STRAINER.

STRAINER CHART

STRAINER STYLE	DIAMETER	TAIL PIECE TH'D	STRAINER FAS. TO BODY	FINISH	TAIL PIECE LENGTH	AREA OF GRATE OPEN.
B	4½"	3"	SCREWS	STRAINERS FURNISHED IN POLISHED BRONZE, NICKEL, OR CHROME PLATED	4"	5¼ SQ. IN.
C	2¾ X 5"	2"	"		2"	4⅛ " "
D	7"	3"	"		2"	10½ " "
E	7"	3"	"		2"	10⅞ " "
G	7"	3"	HINGED		2"	7 " "
GAJ	6"	3"	"		2½"	8 " "
J	7"	3"	"		2"	7½ " "
R	6"	3"	SCREWS		2¼"	5¾ " "
RA	4"	2"	"		2"	4½ " "
RA	5"	3"	"		2"	5½ " "
RA	6"	3"	"		2¼"	6¾ " "
RA	7"	3"	"		2¼"	12 " "
RA-BP	6"	3"	"		2¼"	6¾ " "
S	6"	3"	"		2"	14 " "
T	8 X 4½"	3"	"		2¼"	10½ " "



N°130 SERIES

N°130 SERIES DRAIN ROUGHING IN DIMENSIONS

SIZE	A	B	C	D	E	F	G	H
2" OUTLET	STRAINER SIZE	2"	9	4	ADJUSTABLE	5¾	5¾	2
3" OUTLET		3"	9	4		6½	8	3
4" OUTLET		4"	11	4¼		10	10	4

N°130-R

BOOSEY

SEEPAGE FLOOR DRAIN

TAPPED OUTLET

DIMENSION CHART

PLATE NO.	OUTLET	STRAIN. DIA	AREA GRATE	A	B	C	D	E
133 - C.I.	2	7	9	7	2	9	2 1/4	2
133 - C.I.	3	7	9	7	3	9	3	2
133 - C.I.	3	9	12	9	3	11	3	2
133 - C.I.	4	9	12	9	4	11	3 1/4	2
133 - C.I..	4	12	20	12	4	15	3 1/4	2
133 - C.I.	6	12	20	12	6	15	3 1/2	2
133 - C.I.	6	15	52	15	6	18	3 1/2	2
133 - C.I.	8	15	52	15	8	18	3 1/2	2
133 - E	2	7	10 7/8	7	2	9	2 1/4	2 1/8
133 - E	3	7	10 7/8	7	3	9	3	2 1/8
133 - E	3	9	15 13/16	9	3	11	3	2 1/8
133 - E	4	9	15 13/16	9	4	11	3 1/4	2 1/8
133 - G	2	7	7	7	2	9	2 1/4	2 1/8
133 - G	3	7	7	7	3	9	3	2 1/8
133 - G	3	9	11	9	3	11	3	2 1/8
133 - G	4	9	11	9	4	11	3 1/4	2 1/8
133 - GS	2	7	13	7	2	9	2 1/4	2
133 - GS	3	7	13	7	3	9	3	2
133 - GS	4	7	13	7	4	11	3 1/4	2
133 - H	2	7	18	7	2	9	2 1/4	2
133 - H	3	7	18	7	3	9	3	2
133 - H	3	9	30	9	3	11	3	2
133 - H	4	9	30	9	4	11	3 1/4	2
133 - J	2	7	8	7	2	9	2 1/4	2 1/8
133 - J	3	7	8	7	3	9	3	2 1/8
133 - J	3	9	14	9	3	11	3	2 1/8
133 - J	4	9	14	9	4	11	3 1/4	2 1/8
133 - J	4	12	27 1/2	12	4	15	3 1/4	2 1/8
133 - R	2	6	5 3/4	7	2	9	2 1/4	ADJ.
133 - R	3	6	5 3/4	7	3	9	3	ADJ.
133 - RA	2	4	4 1/2	4	2	9	2 1/4	ADJ.
133 - RA	3	5	5 1/32	5	3	9	3	ADJ.
133 - RA	3	6	6 3/4	6	3	11	3	ADJ.
133 - RA	4	7	12	7	4	11	3 1/4	ADJ.
133 - RA	4	7	12	7	4	16	3 1/4	ADJ.

CI

H

E

J

G

R

GS

RA

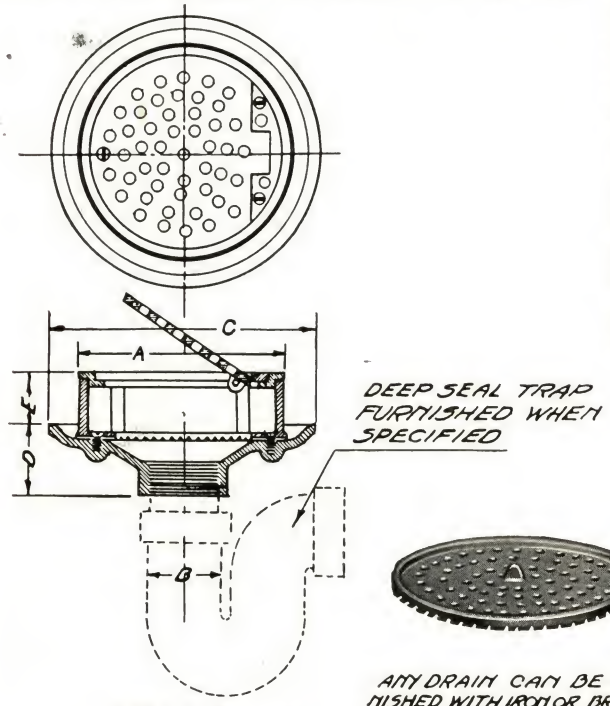
THE LETTER FOLLOWING THE SERIES NUMBER DESIGNATES THE STYLE OF STRAINER.

SERIES NO. 133

SHALLOW DRAINS SIMPLE IN CONSTRUCTION WITH CAST IRON BODIES QUICKLY ASSEMBLED TO MEET ANY SPECIAL CONDITION AND MAY BE SAFELY USED IN ORDINARY CEMENT FLOOR CONSTRUCTION WITHOUT ADDITIONAL FLASHING, DEPENDING ENTIRELY ON THE SEEPAGE PAN CAST TO THE BODY OF DRAIN HEAD. THIS PAN ALSO ACTS AS AN ANCHOR SECURING THE DRAIN HEAD PERMANENTLY IN THE CEMENT SLAB, PREVENTING EXPANSION, CONTRACTION, OR TRAFFIC WORKING IT LOOSE.

DRAIN FURNISHED WITH ROUND OR SQUARE STRAINERS IN IRON OR BRONZE. ADAPTABLE FOR USE IN STORES, HOTELS, OFFICE BUILDINGS OR ANY PLACE WHERE A WELL DESIGNED, NOT TOO CONSPICUOUS, DRAIN IS REQUIRED.

BODY OF DRAIN IRON PAINTED OR GALVANIZED OR ALL BRONZE. MADE IN FIVE OUTLET SIZES; 2,3,4, 6 AND 8".



No. 133-SERIES

ANY DRAIN CAN BE FURNISHED WITH IRON OR BRASS INTERMEDIATE STRAINERS AT ADDITIONAL COST.

No. 133-G

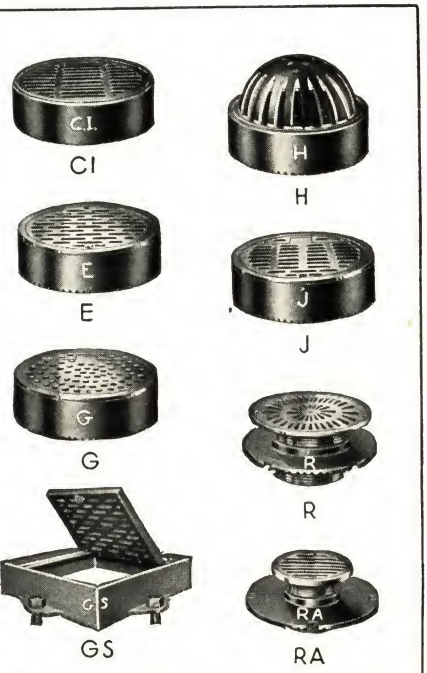
BOOSEY

SEEPAGE FLOOR DRAIN

HUB OUTLET

DIMENSION CHART

PLATE NO.	HUB OUTLET	STRAIN. DIA	AREA GRATE	A	B	C	D	E
134-C.I.	2	7	9	7	2	9	2¼	2
134-C.I.	3	7	9	7	3	9	3	2
134-C.I.	3	9	12	9	3	11	3	2
134-C.I.	4	9	12	9	4	11	3¼	2
134-C.I.	4	12	20	12	4	15	3¼	2
134-C.I.	6	12	20	12	6	15	3½	2
134-C.I.	6	15	52	15	6	18	3½	2
134-C.I.	8	15	52	15	8	18	3½	2
134-E	2	7	10 7/8	7	2	9	2¼	2⅛
134-E	3	7	10 7/8	7	3	9	3	2⅛
134-E	3	9	15 13/16	9	3	11	3	2⅛
134-E	4	9	15 13/16	9	4	11	3¼	2⅛
134-G	2	7	7	7	2	9	2¼	2⅛
134-G	3	7	7	7	3	9	3	2⅛
134-G	3	9	11	9	3	11	3	2⅛
134-G	4	9	11	9	4	11	3¼	2⅛
134-GS	2	7	13	7	2	9	2¼	2
134-GS	3	7	13	7	3	9	3	2
134-GS	4	7	13	7	4	11	3¼	2
134-H	2	7	18	7	2	9	2¼	2
134-H	3	7	18	7	3	9	3	2
134-H	3	9	30	9	3	11	3	2
134-H	4	9	30	9	4	11	3¼	2
134-J	2	7	8	7	2	9	2¼	2⅛
134-J	3	7	8	7	3	9	3	2⅛
134-J	3	9	14	9	3	11	3	2⅛
134-J	4	9	14	9	4	11	3¼	2⅛
134-J	4	12	27½	12	4	15	3¼	2⅛
134-R	2	6	5 3/4	7	2	9	2¼	ADJ.
134-R	3	6	5 3/4	7	3	9	3	ADJ.
134-RA	2	4	4½	4	2	9	2¼	ADJ.
134-RA	3	5	5 3/32	5	3	9	3	ADJ.
134-RA	3	6	6¾	6	3	11	3	ADJ.
134-RA	4	7	12	7	4	11	3¼	ADJ.
134-RA	4	7	12	7	4	15	3¼	ADJ.



THE LETTER FOLLOWING THE SERIES NUMBER DESIGNATES THE STYLE OF STRAINER.

SERIES NO. 134

SHALLOW DRAIN HEAD, WITH HUB OUTLET CAST TO BODY OF DRAIN. PAINTED OR GALVANIZED.

EASILY ADJUSTED TO FLOOR LINE AND QUICKLY ASSEMBLED TO MEET SPECIAL CONDITIONS.

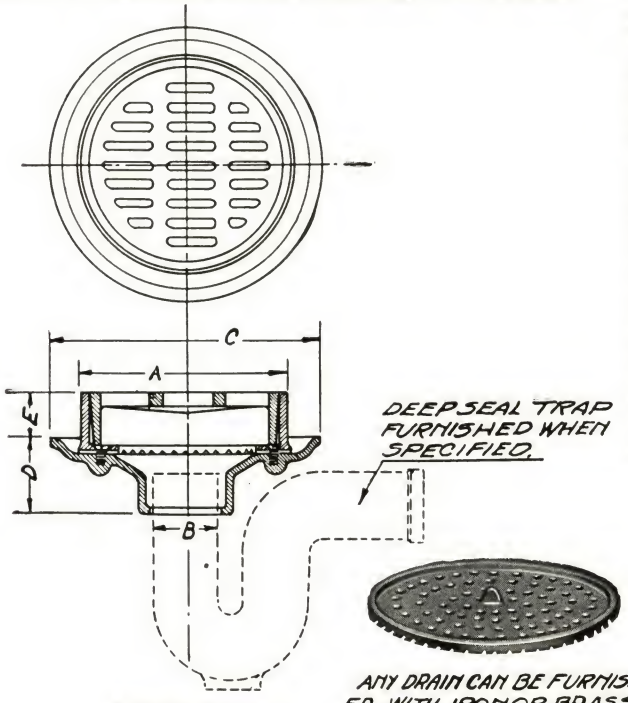
CAN BE SAFELY INSTALLED IN ORDINARY CEMENT FLOOR, WITHOUT ADDITIONAL FLASHING, DEPENDING ENTIRELY UPON THE SEEPAGE PAN, CAST TO BODY OF DRAIN HEAD, TO PREVENT SEEPAGE DRIPPING TO FLOOR BELOW.

THE CAST SEEPAGE PAN ALSO ACTS AS AN ANCHOR, SECURING THE DRAIN PERMANENTLY IN THE CEMENT SLAB, PREVENTING EXPANSION, CONTRACTION OR HEAVY TRAFFIC WORKING IT LOOSE.

DRAIN FURNISHED WITH ROUND OR SQUARE STRAINERS, IN IRON OR BRONZE AND ARE ADAPTABLE FOR INSTALLATION WHERE EVER SOIL PIPE IS USED FOR DRAINAGE.

THE DRAIN STRAINERS ARE OF A WEIGHT TO WITHSTAND ABUSE AND ARE REMOVABLE, PROVIDING EASY ACCESS TO TRAP FOR CLEANING.

MADE IN SIX OUTLET SIZES; 2,3,4,5,6 & 8".



No. 134 SERIES

ANY DRAIN CAN BE FURNISHED WITH IRON OR BRASS INTERMEDIATE STRAINERS AT ADDITIONAL COST.

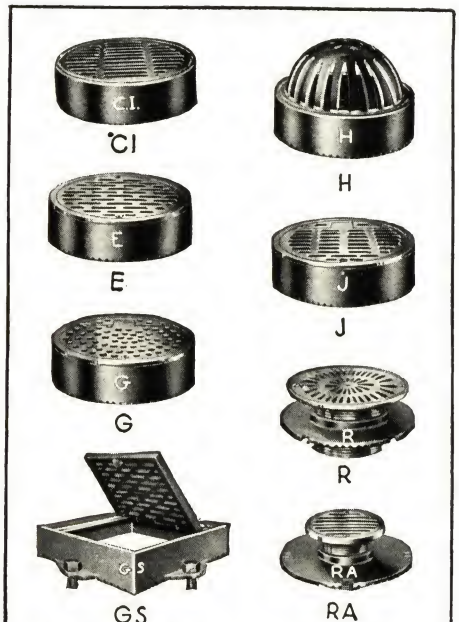
No. 134-C.I.

BOOSEY

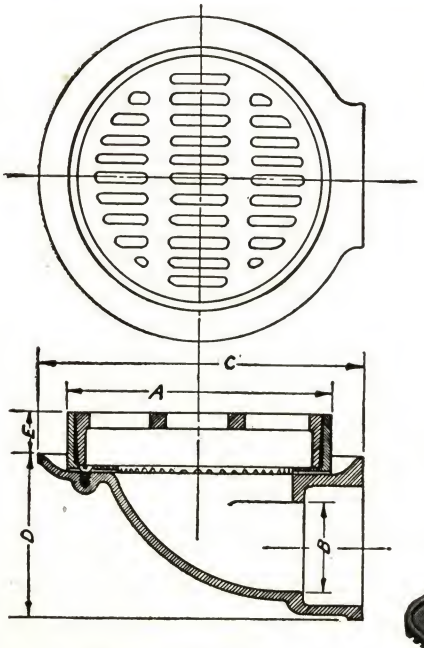
SEEPAGE FLOOR DRAIN
SIDE HUB OUTLET

DIMENSION CHART

PLATE Nº	HUB OUTLET	STRAIN. DIA	AREA GRATE	A	B	C	D	E
136 C.I.	3"	7	9	7	3	11	5½	2
136 C.I.	3"	9	12	9	3	11	5½	2
136 C.I	4"	7	9	7	4	11	6½	2
136 C I.	4"	9	12	9	4	11	6½	2
136 E	3"	7	10 7/8	7	3	11	5½	2⅛
136 E	3"	9	15 1/16	9	3	11	5½	2⅛
136 E	4"	7	10 7/8	7	4	11	6½	2⅛
136 E	4"	9	15 13/16	9	4	11	6½	2⅛
136 G	3"	7	7	7	3	11	5½	2⅛
136 G	3"	9	11	9	3	11	5½	2⅛
136 G	4"	7	7	7	4	11	6½	2⅛
136 G	4"	9	11	9	4	11	6½	2⅛
136 GS	3"	7	13	7	3	11	5½	2
136 GS	4"	7	13	7	4	11	6½	2
136 H	3"	7	18	7	3	11	5½	2
136 H	3"	9	30	9	3	11	5½	2
136 H	4"	7	18	7	4	11	6½	2
136 H	4"	9	30	9	4	11	6½	2
136 J	3"	7	8	7	3	11	5½	2⅛
136 J	3"	9	14	9	3	11	5½	2⅛
136 J	4"	7	8	7	4	11	6½	2⅛
136 J	4"	9	14	9	4	11	6½	2⅛
136 R	3"	6	5 3/4	6	3	11	5½	ADJ.
136 R	4"	6	5 3/4	6	4	11	6½	ADJ.
136 RA	3"	4	4½	4	3	11	5½	ADJ.
136 RA	3"	5	5 3/32	5	3	11	5½	ADJ.
136 RA	4"	6	6 3/4	6	4	11	6½	ADJ.
136 RA	4"	7	12	7	4	11	6½	ADJ.



THE LETTER FOLLOWING THE SERIES NUMBER DESIGNATES THE STYLE OF STRAINER.



Nº 136 SERIES

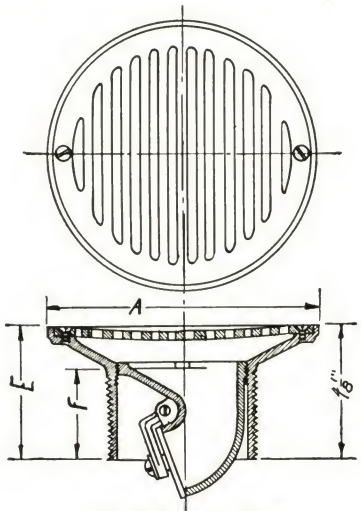
NO. 136 HORIZONTAL DISCHARGE SEEPAGE DRAIN WITH HUB OUTLET. BODY OF DRAIN CAST IRON, PAINTED OR GALVANIZED. STRAINERS, VARIOUS STYLES AS ILLUSTRATED CAST IRON, PAINTED OR GALVANIZED OR BRONZE METAL POLISHED, NICKEL OR CHROMIUM PLATED. HUB OUTLETS 3" OR 4".

ANY DRAIN CAN BE FURNISHED WITH IRON OR BRASS INTERMEDIATE STRAINERS AT ADDITIONAL COST.

Nº 136-C.I.

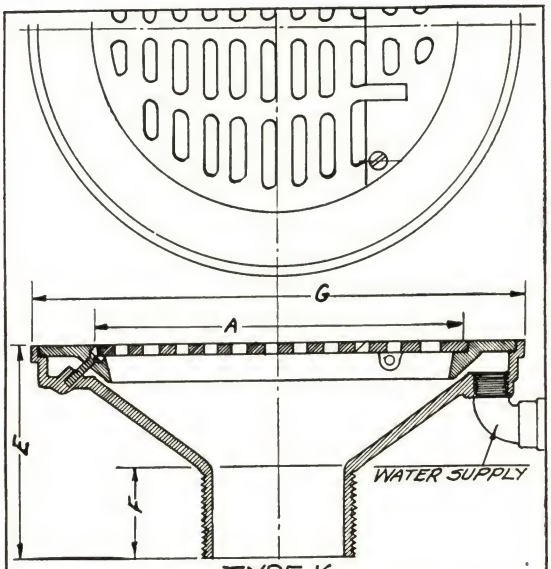
BOOSEY

SPECIAL DRAIN HEADS



TYPE-RA-BP

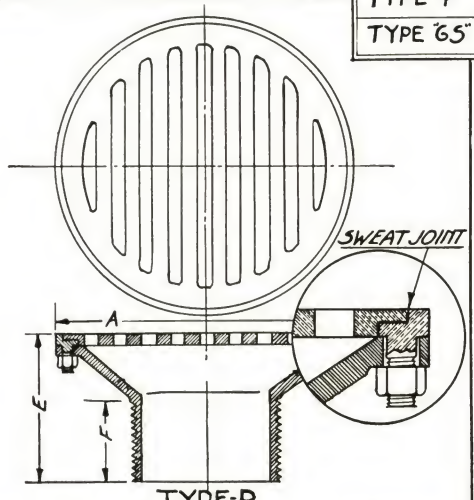
BACK PRESSURE DRAIN HEAD. ALL BRONZE, NICKEL OR CHROMIUM PLATED. RECOMMENDED FOR INSTALLATIONS WHERE INTERMITTENT USE OF DRAIN MAY CAUSE TRAP TO LOOSE ITS SEAL FROM EVAPORATION. THE SWING CHECK, BEING ALWAYS SET IN A CLOSED POSITION, PREVENTS FREE FLOW OF SEWER AIR INTO BUILDING. ENTIRE CHECK VALVE ASSEMBLY CAN BE REMOVED THROUGH STRAINER OPENING.



TYPE-K

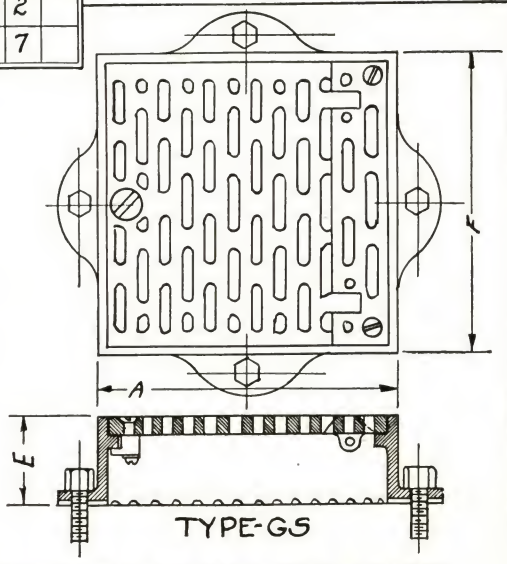
FLUSHING RIM DRAIN HEAD. ALL BRONZE. RECOMMENDED FOR HOSPITALS, SANITARIUMS, MORGUES AND LABORATORIES. CAN BE USED WITH OR WITHOUT LEAD PAN CONNECTION, DEPENDING ON INSTALLATION REQUIREMENTS. TOP, WITH HINGED STRAINER AND FLUSHED SURFACE, ALL BRONZE, POLISHED OR PLATED. EASILY ACCESSIBLE FOR CLEANING.

TYPE	A	E	F	G
TYPE "RA-BP"	6	3	$2\frac{1}{4}$	
TYPE "K"	8	$4\frac{3}{4}$	$2\frac{1}{2}$	$10\frac{3}{4}$
TYPE "P"	7	$3\frac{1}{4}$	2	
TYPE "GS"	7	2	7	



TYPE-P

PRISON DRAIN HEAD. A LOOSE DRAIN STRAINER IS A DANGEROUS WEAPON IN THE HANDS OF A PRISONER. THEREFORE, WE RECOMMEND THAT STRAINERS BE FASTENED TO DRAIN HEADS, IN CELLS AND CORRIDORS, WITH A SWEAT SOLDERED JOINT. THIS PERMITS REMOVAL OF STRAINER ONLY BY USE OF A TORCH. MADE IN FIVE SIZES 4",5",6",7" & 9".



TYPE-GS

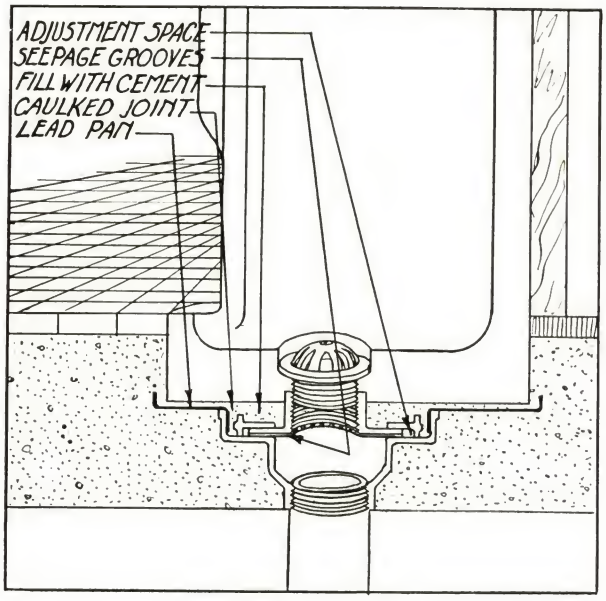
SQUARE DRAIN HEAD WITH HINGED STRAINER HAVING LOCKING DEVICE. FURNISHED IN CAST IRON, PAINTED OR GALVANIZED OR ALL BRONZE, POLISHED OR PLATED.

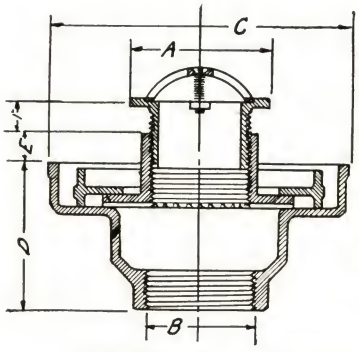
ALL OF THE ABOVE DRAIN HEADS CAN BE FURNISHED WITH DRAIN BODIES, SERIES NO'S. 126-130-133-134 & 136.

BOOSEY

ADJUSTABLE SEEPAGE URINAL DRAIN

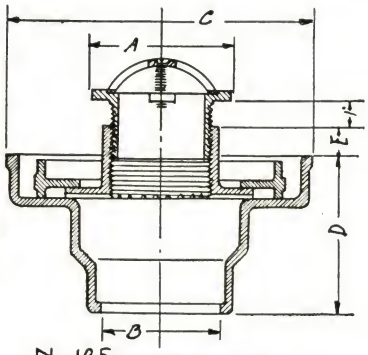
NO. 135 URINAL SEEPAGE DRAIN PROVIDES ONE AND ONE HALF INCH HORIZONTAL ADJUSTMENT IN ANY DIRECTION BY MERELY SLIDING INLET THE REQUIRED DISTANCE. THE HORIZONTAL ADJUSTMENT COMBINED WITH THE VERTICAL TAIL PIECE ADJUSTMENT LESSENS THE INSTALLATION COST AND INSURES PERMANENT WATER TIGHT CONSTRUCTION. THIS DRAIN IS ALSO PROVIDED WITH SEEPAGE OPENINGS AND LEAD PAN CONNECTION, THE LATTER BEING CAULKED INTO RAGLET FORMED AROUND THE OUTER RIM OF DRIP PAN. BODY OF DRAIN IS CAST IRON, PAINTED OR GALVANIZED. OUTLET 3" HUB OR TAPPED. TAIL PIECE AND SEEPAGE PLATE ARE BRONZE METAL. STRAINERS ARE BRONZE, EITHER FLAT OR BEEHIVE, POLISHED OR PLATED, ALSO FURNISHED IN PORCELAIN, EITHER DISC OR STRAINER TYPE. SHRINKAGE IN THE CEMENT FLOOR SLAB OFTEN DEVELOPES A CRACK AT THE JUNCTION OF FLOOR TO URINAL. IT IS GOOD ENGINEERING PRACTICE TO EXTEND THE LEAD PAN UNDER FLOOR TYPE URINALS ONE INCH BEYOND THE URINAL BASE.



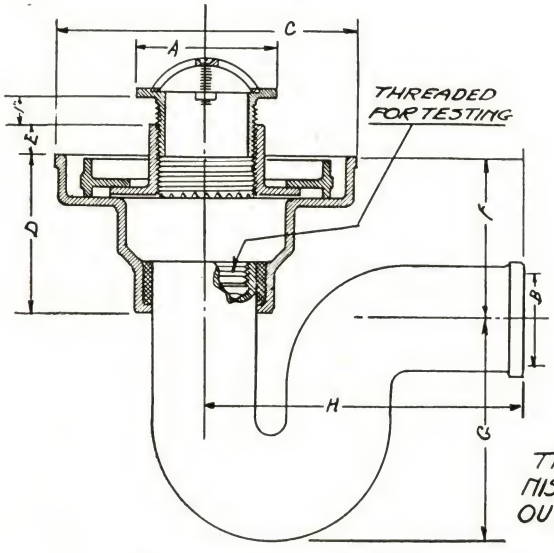


Nº135-TAPPED OUTLET

Nº	A	B	C	D	E	F	G	H
135	4 3/8	2" TAP	10	5	1 1/4			
135	4 3/8	3" "	10	5	1 1/4			
135	4 3/8	3" HUB	10	5 3/4	1 1/4			
135-106	4 3/8	3" SPIG.	10	5 3/4	1 1/4	5 3/4	8	11 1/2
135-70	4 1/8	2" TAP	10	5	1 1/4	6	5 1/2	5 3/4
135-70	4 3/8	3" TAP	10	5	1 1/4	6 1/2	8	8 1/2

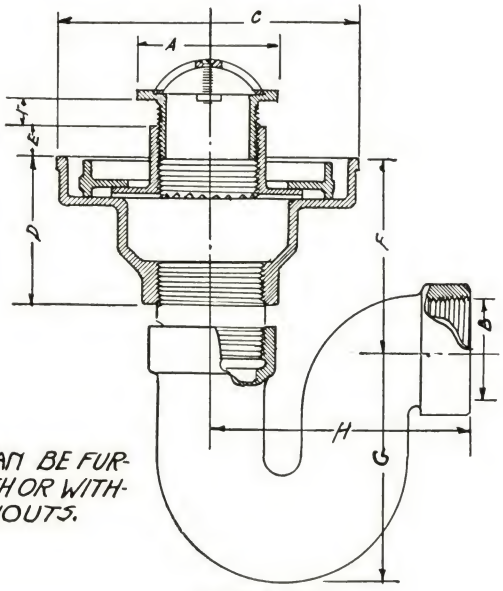


No.135- HUB OUTLET



Nº135-106

TRAPS CAN BE FURNISHED WITH OR WITHOUT CLEANOUTS.



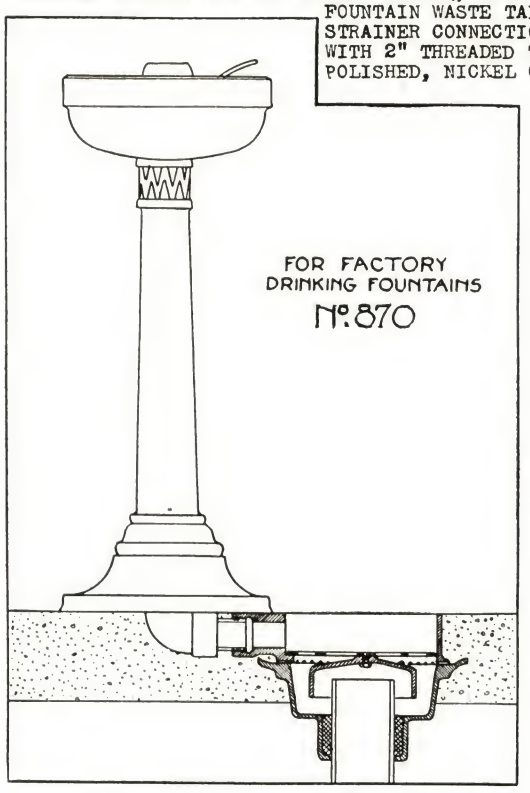
Nº135-70

BOOSEY

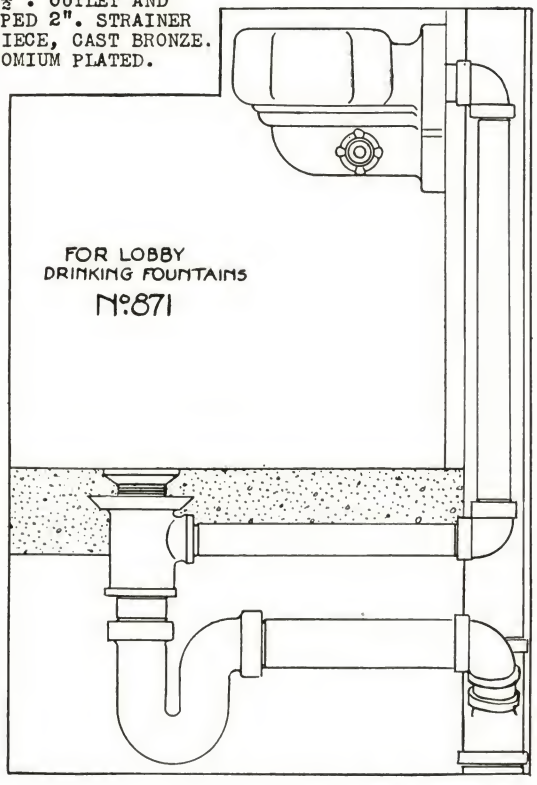
DRINKING FOUNTAIN DRAINS

NO. 870 FACTORY DRINKING FOUNTAIN AND SEEPAGE FLOOR DRAIN WITH TRAP COMBINED IN A SINGLE UNIT. WASTE FROM FOUNTAIN PASSES OVER AND THROUGH FLOOR DRAIN STRAINER KEEPING IT FLUSHED CLEAN AND ASSURING A PERMANENT SEAL IN TRAP. BODY OF DRAIN WITH INTEGRAL SEEPAGE PAN AND CEMENT ANCHOR, CAST IRON, PAINTED OR GALVANIZED. SIDE CONNECTION FOR FOUNTAIN WASTE TAPPED 1½". DRAIN OUTLET 3" HUB.

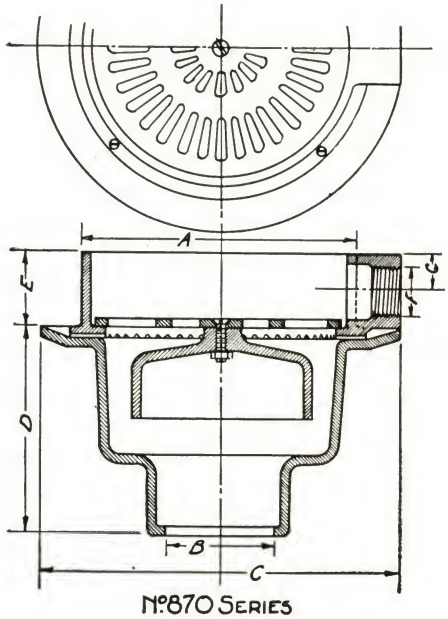
NO. 871 WALL DRINKING FOUNTAIN AND SEEPAGE FLOOR DRAIN COMBINED IN A SINGLE UNIT. A NEAT, SERVICEABLE AND INCONSPICUOUS DOUBLE INLET DRAIN DESIGNED TO SERVE AS WASTE CONNECTION FROM FOUNTAIN AND SEEPAGE FLOOR DRAIN FOR LOBBIES AND CORRIDORS. BODY OF DRAIN, WITH INTEGRAL SEEPAGE PAN AND CEMENT ANCHOR, CAST IRON, PAINTED OR GALVANIZED. SIDE INLET FOR FOUNTAIN WASTE TAPPED 1½". OUTLET AND STRAINER CONNECTION TAPPED 2". STRAINER WITH 2" THREADED TAIL PIECE, CAST BRONZE. POLISHED, NICKEL OR CHROMIUM PLATED.



FOR FACTORY DRINKING FOUNTAINS
Nº.870

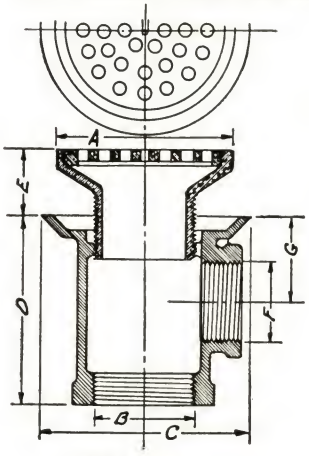


FOR LOBBY DRINKING FOUNTAINS
Nº.871

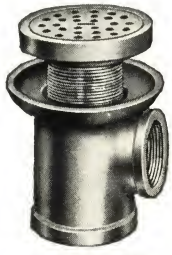


Nº870 SERIES

Nº	A	B	C	D	E	F	G
870	9	3	12	7	2½	1½	1¼
871	4	2	4¾	4⅜	ADJ.	1½	2



Nº871 SERIES



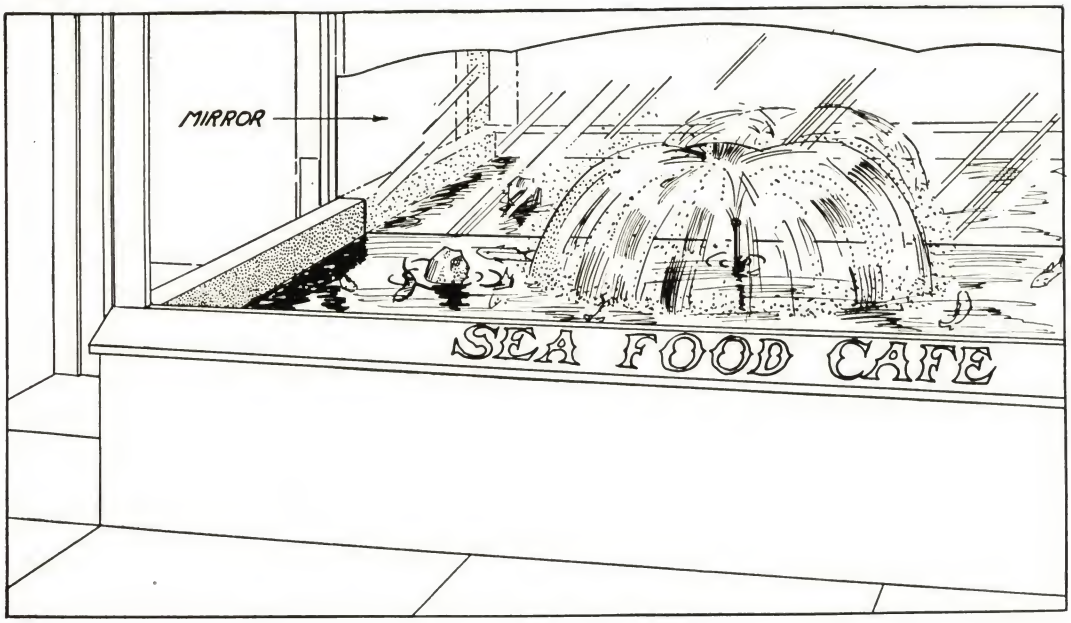
Nº871

Nº870

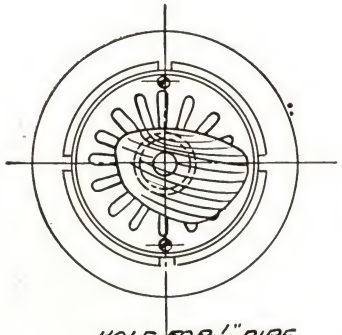
BOOSEY

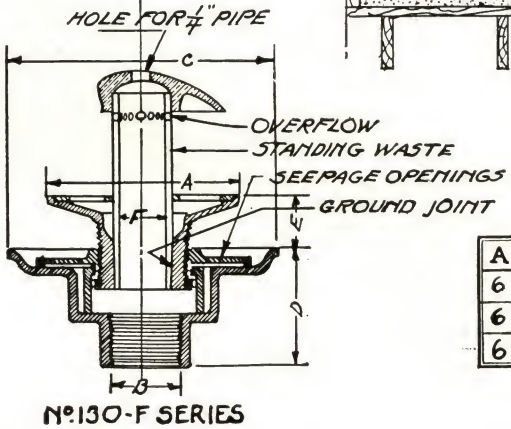
DRAIN FOR WINDOW AQUARIUM

NO. 130-F AQUARIUM DRAIN. ADAPTABLE FOR INSIDE FOUNTAIN AQUARIUMS. RELIABLE CONSTRUCTION AT MINIMUM INSTALLATION COST. THIS UNIT SERVES FIVE PURPOSES. (1) LEAD PAN CAULKS TO DRAIN BODY WHICH IS PROVIDED WITH SEEPAGE OPENINGS TO PREVENT LEAKS THROUGH BOTTOM OF AQUARIUM. (2) STRAINER, THROUGH WHICH STANDING WASTE RISES, ACTS AS BOTTOM DRAIN FOR EMPTYING AQUARIUM. (3) STANDING WASTE, PROVIDED WITH OVERFLOW OPENINGS, REGULATES WATER LINE IN AQUARIUM AND IS CONNECTED TO DRAIN WITH GROUND JOINT, EASILY REMOVABLE WHEN AQUARIUM IS TO BE DRAINED. (4) WATER SUPPLY CONNECTION, MADE THROUGH STANDING WASTE, EXTENDS THROUGH OPENING IN ORNAMENTAL TOP. (5) STRAINER, ADJUSTABLE FOR VARYING THICKNESSES OF CEMENT IN AQUARIUM BOTTOM. BODY OF DRAIN CAST IRON, PAINTED OR GALVANIZED. STANDING WASTE, 1½" BRASS PIPE. ALL OTHER PARTS CAST BRONZE. ALL EXPOSED SURFACES POLISHED, NICKEL OR CHROMIUM PLATED. OUTLET SIZES 2", 3" AND 4".

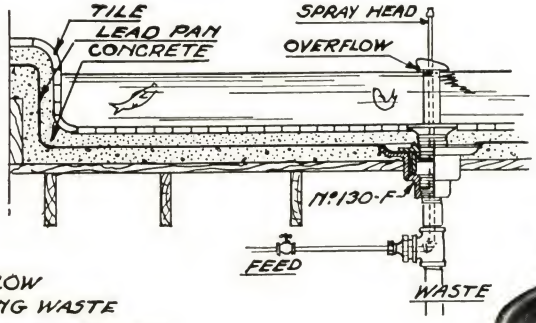


SEEPAGE DRAIN WITH LEAD PAN, OVERFLOW AND FOUNTAIN CONNECTION FOR WINDOW AQUARIUM.





Nº130-F SERIES



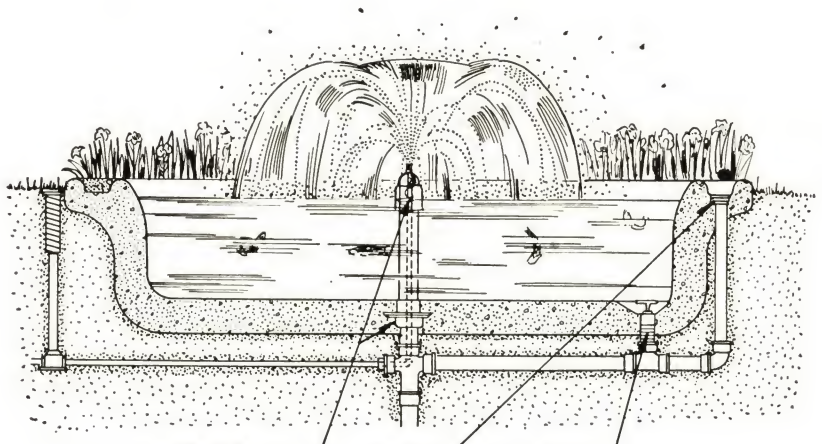
A	B	C	D	E	F
6	2	9	4½	1-2	1½
6	3	9	4½	1-2	1½
6	4	11	4½	1-2	1½

Nº 130-F

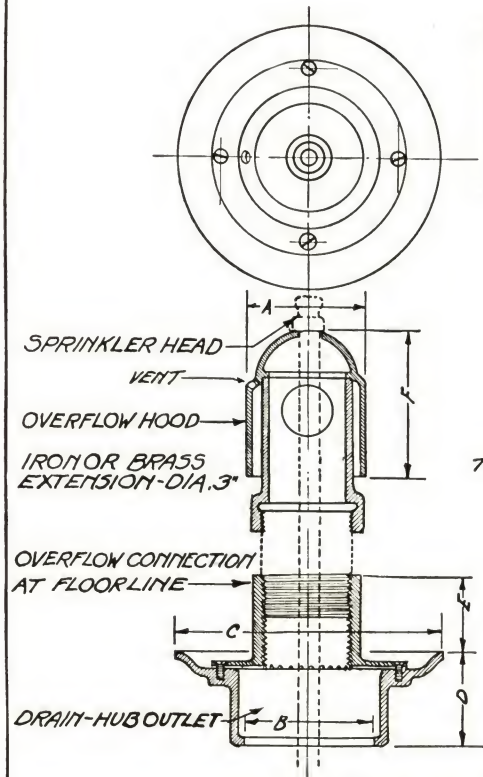
BOOSEY

YARD FOUNTAIN DRAIN

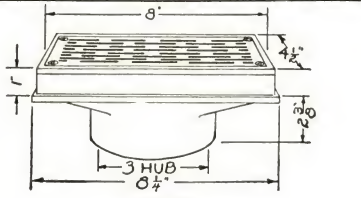
NO. 134 F.O. YARD FOUNTAIN DRAIN. BODY OF DRAIN CAST IRON, PAINTED OR GALVANIZED, WITH FLANGE ANCHOR AND HUB OUTLET WITH 3" THREADED EXTENSION TO FLOOR LINE. THE EXTENSION FROM FLOOR LINE TO OVERFLOW HEAD MAY BE EITHER GALVANIZED OR BRASS PIPE. FITTED WITH CAST IRON OR POLISHED BRONZE OVERFLOW HEAD WITH OPENING IN TOP FOR WATER SUPPLY PIPE TO WHICH THE BRASS SPRAY HEAD IS CONNECTED. IN CONNECTION WITH THE WASTE PIPING WE RECOMMEND THE NO. 804-4X8" CLEANOUT WITH "T" HANDLE PLUG FOR DRAINING FOUNTAIN AND WHEN LILY GUTTERS ARE CONSTRUCTED IN FOUNTAIN RIM, THE NO. 965 GUTTER DRAIN HEAD, HUB OUTLET.

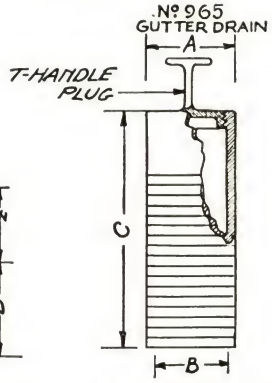


№	A	B	C	D	E	F
134-FO	4¾	2	9	3½	2¼	6
134-FO	4¾	3	9	3½	2¼	6
134-FO	4¾	4	11	3½	2¼	6

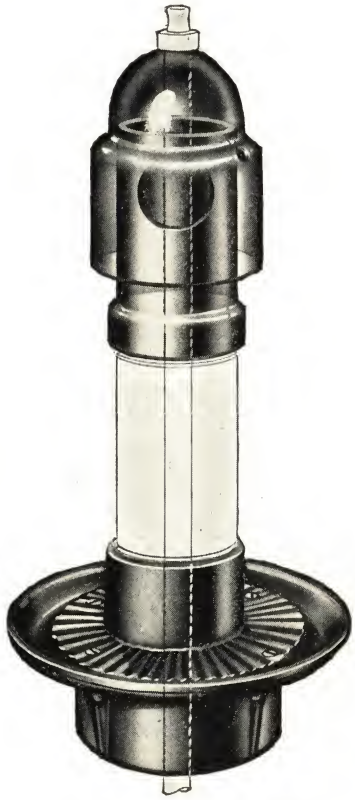


№134-FO FOUNTAIN SUPPLY AND OVERFLOW DRAIN





№804 4"x8" CLEANOUT WITH T-HANDLE PLUG



№134-FO

BOOSEY

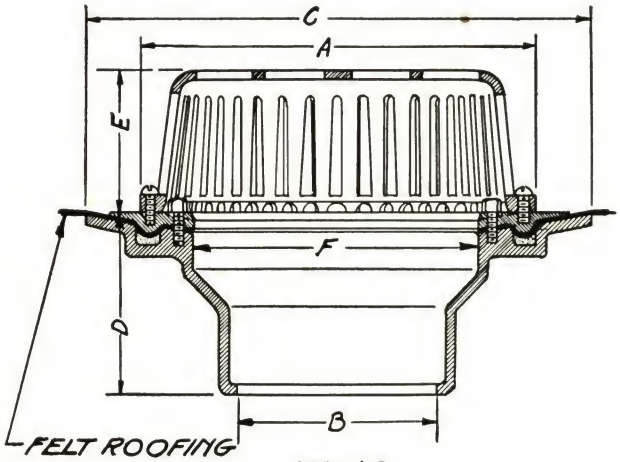
CAST IRON ROOF DRAINS
FOR FELT OR METAL FLASHING

ROOF SUMP NO. 1148. CAST IRON OR BRASS. MAY BE USED WITH EITHER FELT OR METAL ROOFING. ALL CONNECTIONS ARE VISIBLE AND CONVENIENT TO INSPECT. THE SHALLOW, SELF CLEANING BOWL WILL NOT COLLECT AND HOLD DIRT. STRAINER EASILY REMOVABLE WITHOUT DISTURBING OTHER CONNECTIONS. THE SUMP IS AN EFFICIENT, NON-FREEZING AND PERMANENT RAIN CONDUCTOR ROOF CONNECTION.

METAL ROOF CONNECTION TO SUMP IS MADE BY TURNING THE METAL DOWN INTO RAGLET CAST AROUND SUMP INLET AND CAULKING WITH LEAD OR BY FILLING RAGLET WITH ROOFING CEMENT THEN COVERING THE CONNECTION WITH THE UPPER CAST IRON FLANGE, DRAWN SECURELY TO PLACE WITH BOLTS.

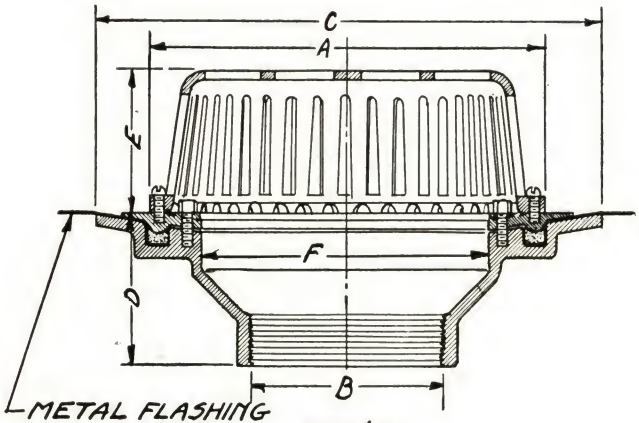
FELT ROOF CONNECTION TO SUMP IS MADE BY MOPPING THE LOWER FLANGE AND FILLING RAGLET WITH ROOFING PITCH AND THEN PLACING THE FELTS OVER FLANGE. AN EXTENSION RING, CAST TO UNDER SIDE OF UPPER FLANGE, FORCES ROOFING FELTS DOWN INTO THE RAGLET WHEN FLANGE IS BOLTED IN PLACE. AN EASILY CONSTRUCTED, FLANGED AND SEALED WATER TIGHT CONNECTION.

THE SUMP IS PROVIDED WITH DOME GUARD, FIVE INCHES IN HEIGHT, OF GREATER DIAMETER THAN SUMP INLET. THUS IS PROVIDED MORE INLET AREA THROUGH STRAINER AND AN OUTER GUARD TO PREVENT FOREIGN SUBSTANCES ENTERING THE DOWN SPOUT LINE.

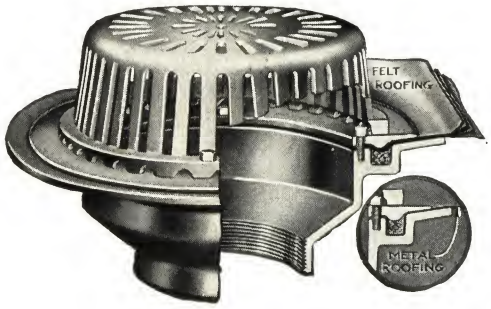


No. 1148

No.	OUTLET	GRATE AREA	A	B	C	D	E	F
1148	3" TAP	45 SQ. IN.	9	3	13	5	5	6 1/8
1148	3" HUB	45 " "	9	3	13	6	5	6 1/8
1148	4" TAP	45 " "	9	4	13	5	5	6 1/8
1148	4" HUB	45 " "	9	4	13	6	5	6 1/8
1148	4" TAP	77 " "	13 1/2	4	17 1/4	5	4 3/4	10 1/4
1148	4" HUB	77 " "	13 1/2	4	17 1/4	6	4 3/4	10 1/4
1148	5" TAP	77 " "	13 1/2	5	17 1/4	5 1/4	4 3/4	10 1/4
1148	5" HUB	77 " "	13 1/2	5	17 1/4	6 1/4	4 3/4	10 1/4
1148	6" TAP	77 " "	13 1/2	6	17 1/4	5 1/4	4 3/4	10 1/4
1148	6" HUB	77 " "	13 1/2	6	17 1/4	6 1/4	4 3/4	10 1/4



No. 1148



MADE IN FOUR SIZES - 3", 4", 5" & 6"
HUB OR TAPPED

No. 1148

BOOSEY

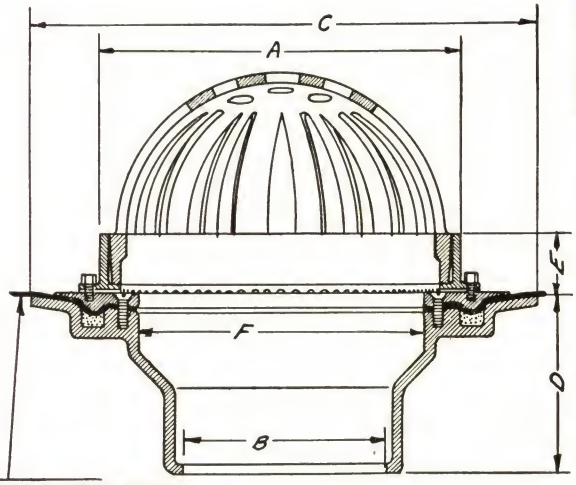
CAST IRON DECK DRAINS

NO.1149 DECK DRAIN. DESIGNED FOR TILE, SLATE OR ASPHALT ROOFING AND FURNISHED WITH EITHER ROUND, BEEHIVE OR SQUARE STRAINERS. CAST IRON, PAINTED OR GALVANIZED, OR ALL BRONZE. SEEPAGE PAN CAST TO DRAIN BODY ALSO ACTS AS AN ANCHOR, SECURING DRAIN PERMANENTLY IN CONCRETE SLAB.

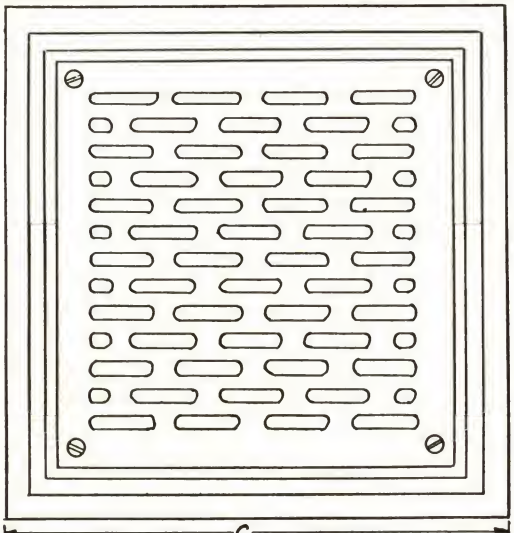
ADDITIONAL WATER-PROOFING AROUND DRAIN OF EITHER METAL OR FELT CAN BE USED BY FLANGING OR CAULKING INTERMEDIATE WATER-PROOFING TO DRAIN BODY.

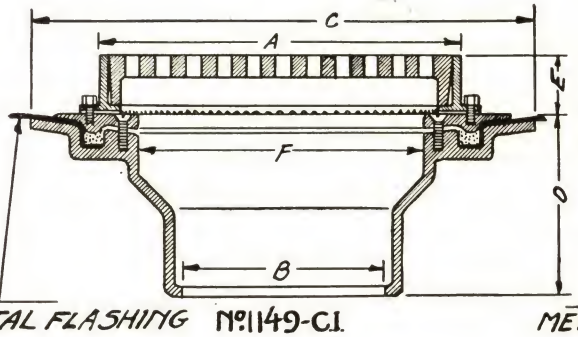
DIAMETER OF ROUND OR BEEHIVE STRAINERS 7", 9" AND 12". SQUARE STRAINERS 9", 12" AND 15".

Nº	GRATE AREA	A	B	C	D-HUB	D-TAP	E	F
1149-CI	9 SQ. IN.	7	3	13	6	5	2	6⅛
1149-CI	9 " "	7	4	13	6	5	2	6⅛
1149-CI	12 " "	9	3	13	6	5	2	6⅛
1149-CI	12 " "	9	4	13	6	5	2	6⅛
1149-CI	20 " "	12	4	17¼	6¼	5¼	2	10¼
1149-CI	20 " "	12	5	17¼	6¼	5¼	2	10¼
1149-CI	20 " "	12	6	17¼	6¼	5¼	2	10¼
1149-H	18 " "	7	3	13	6	5	2	6⅛
1149-H	18 " "	7	4	13	6	5	2	6⅛
1149-H	30 " "	9	3	13	6	5	2	6⅛
1149-H	30 " "	9	4	13	6	5	2	6⅛
1149-H	70 " "	12	4	17¼	6¼	5¼	2	10¼
1149-H	70 " "	12	5	17¼	6¼	5¼	2	10¼
1149-H	70 " "	12	6	17¼	6¼	5¼	2	10¼
1149-S	15 9/16 " "	9	3	13	6	5	2	6⅛
1149-S	15 13/16 " "	9	4	13	6	5	2	6⅛
1149-S	60 " "	12	3	13	6	5	2	6⅛
1149-S	60 " "	12	4	13	6	5	2	6⅛
1149-S	78½ " "	15	4	17¼	6¼	5¼	2	10¼
1149-S	78½ " "	15	5	17¼	6¼	5¼	2	10¼
1149-S	78½ " "	15	6	17¼	6¼	5¼	2	10¼

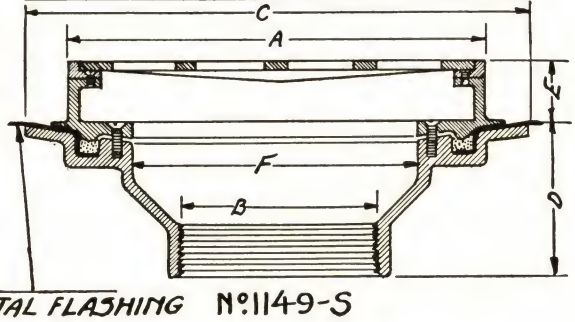


WATER PROOFING Nº1149-H





METAL FLASHING Nº1149-CI.



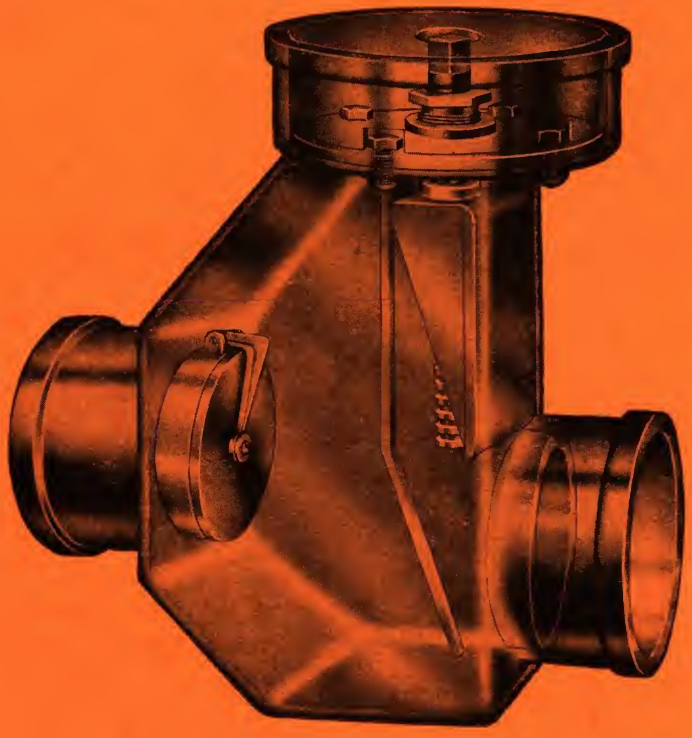
METAL FLASHING Nº1149-S

3, 4, 5, OR 6 INCH OUTLET — HUB OR TAPPED

ARCHITECTS AND ENGINEERS CATALOG

No. 32

DRAINAGE SPECIALTIES



NORMAN BOOSEY MANUFACTURING CO.
5140 HAMILTON AVENUE DETROIT, MICHIGAN

THE H. W. COVERT COMPANY

Manufacturers of Drains

229 East 37th Street
NEW YORK, N. Y.

Product

ANTI-CLOG FLOOR DRAINS for use in factories, garages, dairies, stables, areas, etc.

For our pages on Fireplace Dampers and Smoke Chambers, see Manufacturers' Index.

Advantages of Removable Dirt Box

The dirt box set inside the drain body catches all dirt, sand and debris, which, if allowed to reach the soil pipe, would cause a stoppage in the drain pipe. The dirt box is equipped with a handle to facilitate removal when it is to be emptied and also has seepage holes to allow no water to remain in the box to stagnate or freeze.

Construction

Anti-clog Drains are made of heavy cast iron, with either bottom or side outlet. The body is of one piece, there being no joints to loosen and allow seepage into the floor.

These drains may be provided with lead flashings which are worked into the waterproofing section and render the floor around the drain watertight.

Anti-clog Drains are caulked from the inside which makes it simple for the plumber to accomplish a satisfactory, watertight connection.

When it is required to have the trap within the drain, we can furnish a bell trap and replace the dirt box with a strainer plate.

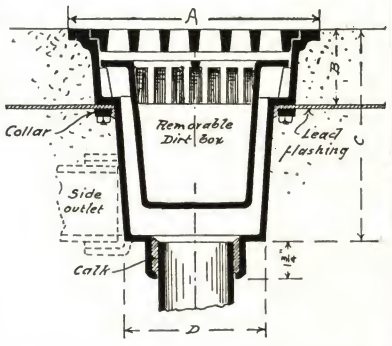
No. 16 Drain Construction—The No. 16 drain has a very deep body providing a deep and capacious sediment box.

Especially designed for garage washstands where much sand and dirt is washed off the cars.

A large number of these drains are used in the Wawa Dairy Farms, Wawa, Pennsylvania.

CROSS SECTION AND DIMENSIONS OF ANTI-CLOG DRAIN WITH REMOVABLE DIRT BOX

No.	A	B	C	D	Size outlet, in.
9	9	1¼	6	5	3
10	10	3½	8¼	6	3
12	12	3¾	10	6	3 or 4
15½	15½	3¾	9¼	8¾	4, 5 or 6
16	15½	3¾	13	8	4, 5 or 6
24	24	3¾	12½	15¼	4, 5 or 6



Specification

Furnish and install as shown on plans Covert Anti-clog Drains with removable dirt boxes [with] [without] lead flashings with [side] [bottom] outlet, made by THE H. W. COVERT COMPANY, 229 East 37th Street, New York, N. Y.

All Dirt Is Retained in the Dirt Box

Dirt Easily Removed from Dirt Box

Anti-clog Floor Drain with Removable Dirt Box

COMPOUND INJECTOR & SPECIALTY CO.

GEORGE J. DEHN, S.E., President

Originators, Designers and Sole Manufacturers

THE PIONEERS (ESTABLISHED 1897)

LONG DISTANCE TELEPHONE
Austin 1861, 1862, 4470

419-421 North Laramie Avenue
CHICAGO, ILL.

CABLE ADDRESS
"Compound Chicago"

DEHN'S SANITARY SAFEGUARDS

Architects, sanitary engineers and contractors will safeguard the health and property of their clients by specifying this company's sanitary devices. As the trade-names "ACME", "CENTRIFUGAL" and "PEERLESS" imply, they are unexcelled in design and operation. They are durable in make and in every way reliable; it is taking chances to permit substitution under the "or equal" clause where this company's product is specified. The essential parts of these devices are patented. More than 35 years' experience originating and designing modern sanitary appliances is your assurance of satisfaction.

DEHNSANIGARD
THE QUALITY GOODS

Their installation protects health, life and property, and are most practical, economical and satisfactory to install.

How to Specify—Architects and engineers shall refer to figure number, size, size openings and the letter designation for the finish desired, when specifying the articles of our manufacture.

Catalogue—Write for Dehn's Sanitary Safeguards New No. 33 Catalogue, illustrating and describing many of our improved modern plumbing and drainage appliances.

DEHN'S "CENTRIFUGAL" DOUBLE TRAPPED WATER COOLING GREASE CATCHBASIN

A New Departure in Water Cooling Grease Separators and Catchbasin Construction

Architects and Engineers (Sanitary and Construction) in cities and in localities where sewage disposal and septic tank systems are in operation, will welcome this great improvement *—elimination of grease in the sewage systems.* Industrial plants, hotels, large institutions, city, county and state, will find these safeguards indispensable in the *elimination of grease in waste pipes and sewage systems.*

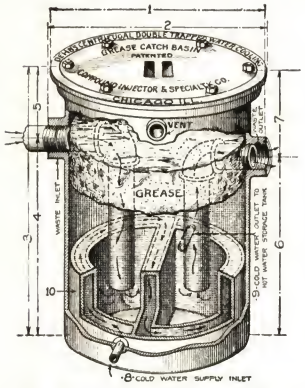
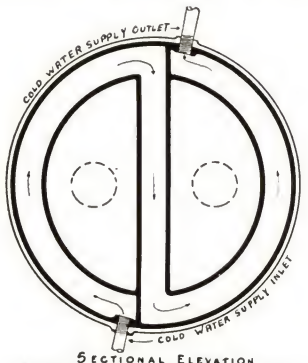


Fig. No. 150 and Larger Sizes
(Patented and patents pending)
Dehn's "CENTRIFUGAL" Double Trapped Water Cooling Grease Separator and Catchbasin.
Tested 250 lbs. cold water pressure

Our new and improved "CENTRIFUGAL" Double Trapped Water Cooling Grease Separator and Catchbasin will positively congeal and retain the grease in the basin. The water cooler, tested to 250 lbs. cold water pressure, permits the main cold supply inlet to connect direct with the water cooler and the outlet with all the faucets and fixtures, including the hot water storage tank, on the premises. The cold water supply must circulate through the entire compartments of the water cooling chamber, allowing a continuous circulation of cold water, and permitting the water in the catchbasin to remain at the same temperature as that of the water in the cold water supply pipe.

The cold water supply pipe connecting with the water cooler is constructed with a separate compartment; this will not allow the cold water supply to come in contact with the waste water in the grease separator and catchbasin. This feature is most important and can only be accomplished in this construction. It has been experienced when large volumes of hot, greasy, oily water are discharged into a receptacle which is not provided with water cooling features, the grease will remain in a fluid condition and discharge into the waste pipes and sewage systems, where it will congeal and



SECTIONAL ELEVATION
DEHN'S "CENTRIFUGAL" DOUBLE TRAPPED WATER COOLING GREASE CATCH BASIN

Fig. No. 150 and Larger Sizes
Water Chamber Detail of Dehn's Catchbasin.
Cold water supply circulates through entire water chamber, resulting in 100% cooling service

DEHN'S GREASE CATCHBASIN SPECIFICATIONS

Fig. No.	Meals supplied per day or less	1 Diam. of top, in.	2 Measurement over all including openings, in.	3 Depth over all, in.	4 Waste inlet: Floor to center of inlet opening, in.	5 Waste inlet: Top to center of inlet opening, in.	6 Waste outlet: Floor to center of outlet opening, in.	7 Waste outlet: Top to center of outlet opening, in.	8 Cold water supply: Inlet to water cooler, in.	9 Cold water supply: Outlet from cooler, in.	10 "CENTRIFUGAL" water cooler	11 Waste opening: Inlet, in.	12 Waste opening: Outlet, in.	13 Depth baffle plate, in.	14 Local vent opening, in.	Gal. water per hr.	Capacity grease lb.	Wt. Approx. lb.	Price, each
150-A 20-1	150	20	22	20	15	5	14	6	1	1		2	2	10	2	222	35	450	$ 95.00
151-A 30-1	300	20	22	30	24	6	23	7	1	1	100%	3	3	10	2	720	80	550	125.00
152-A 36-1	1450	32	36	36	29	7	28	8	1½	1½	cooling	4	4	16	4	880	325	1750	350.00
153-A 42-1	2000	32	36	42	35	7	34	8	1½	1½	service	4	4	16	4	880	450	1900	400.00
154-A 48-1	2700	38	42	48	41	7	40	8	2	2		6	6	16	4	2880	860	2600	750.00
155-A 54-1	3350	38	42	54	47	7	46	8	2	2		6	6	16	4	2880	1000	2800	850.00
156-A 60-1	4000	38	42	60	53	7	52	8	2	2		6	6	16	4	2880	1150	3000	1000.00

Note: This schedule applies to capacities of grease separators and catchbasins when the main cold water supply pipe is connected direct with the water cooler inlet and outlet with all the faucets, fixtures and hot water storage tank on the premises. The accumulated grease should be removed at least once each week.

clog the pipes and sewage systems. Water cooling grease separators and catchbasins make a most practical, economical and satisfactory installation.

Round grease separators and catchbasins are artistic in design and most practical to install. An allowance of 50% additional capacity for increased requirements should be specified when original installation is made.

One type or size will not fill every requirement; every installation is a problem in itself.

Consult us for full information with your problems. Advice free.

We manufacture a complete line of grease separators and catchbasins to meet every condition. Consult our complete catalog for full information.

DEHN'S GARAGE DRAINAGE SYSTEMS AND FLOOR DRAINS

Dehn's Modern Garage Drainage Installation Systems

A system of modern garage drainage installation, consisting of our Fig. No. 62 20x38-in. "PEERLESS" Garage and Floor Drain and 3 Fig. No. 116-A 18x24-in. Special "ACME" Mud, Gas and Oil Basins. This installation will fill the requirements where fifty or less automobiles are housed.

This installation is guaranteed to prevent the mud, gas and oil from discharging into the sewage systems. The air chambers in the "PEERLESS" Garage and Floor Drain, and "ACME" Mud, Gas and Oil Basins are provided with vented openings at the highest point of the basins. These openings insure perfect ventilating system that will permit the continuous circulation of air from the outside of the premises through the air chambers of the basins, eliminating the gas and fumes from the oils and carbon monoxides from the garage.

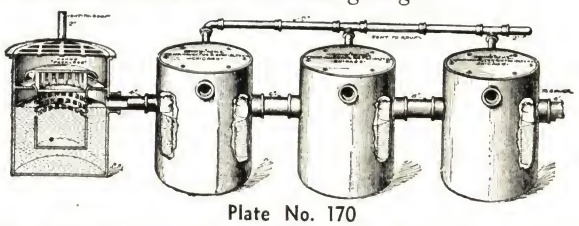


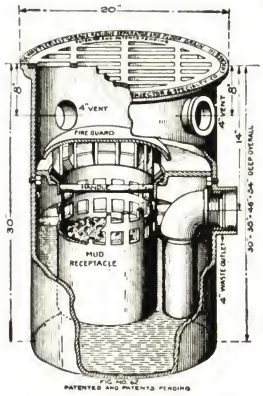
Plate No. 170

This combination consists of 1 Fig. No. 62 20x38-in. "PEERLESS" Garage and Floor Drain, 3 Fig. No. 116-A 18x24-in. Special "ACME" Mud, Gas and Oil Garage Drainage Basins.....per set $200.00

Regulations Governing Dehn's "PeerlesS" Floor and Garage Drains—The following regulations governing drainage from garages and other establishments, where gasoline, oils or other inflammable materials are used or stored, have been adopted by a great many cities.

Garage and floor drains (cast iron) shall be installed to avoid explosions, choked sewers—prevent accidents from formation of gases, and other complaints and nuisances common in automobile garages and other establishments.

It shall be unlawful to use or attach any garage, dye, cleaning or other establishment with the public sewers where gasoline, oils or other inflammable materials are used or stored, unless a system of mud, gas and oil basin (cast iron) is installed. Garages shall be classified according to their construction and capacity of automobiles to be housed as follows: Class "A," Class "B," Class "C," Class "D," Class "E," and Class "F." Other establishments shall be classified according to the construction, size of the building and number of persons employed on the premises.



Dehn's "PeerlesS" Garage and Floor Drain

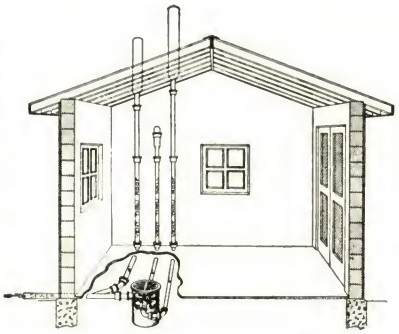


Fig. No. 62 (Patented)

Showing installation of Dehn's "PEERLESS" Garage Drainage System

Schedule of Capacity—The following schedule of capacities of "PEERLESS" Garage and Floor Drains must be according to the specifications described below and referred to as authority:

Air chamber compartment must be provided with two 4-in. vent hub connections. Top of basin to be provided with extra heavy bar grate (cast iron).

Two 4-in. vent stacks must be connected with the air chamber. One 4-in. vent stack must be extended outside of the building at least 8 ft. from the lot level, and one 4-in. vent stack must be extended through roof.

Class "A"—Where more than one and less than five automobiles are housed, one 15-in. diameter of top and 22-in. deep "PEERLESS" Garage and Floor Drain shall be installed. This to be connected with air chamber with two 2-in. vent stacks.

Class "B"—Where from five to ten automobiles are housed, one 20-in. diameter of top and 30-in. deep "PEERLESS" Garage and Floor Drain shall be installed.

Class "C"—Where from ten to twenty-five automobiles are housed, one 20-in. diameter of top and not less than 38-in. deep "PEERLESS" Garage and Floor Drain shall be installed.

Class "D"—Where from twenty-five to fifty automobiles are housed, two 20-in. diameter of top and not less than 38-in. deep "PEERLESS" Garage and Floor Drain shall be installed.

Class "E"—Where more than fifty automobiles are housed two 20-in. diameter of top and not less than 46 or 54-in. deep "PEERLESS" Garage and Floor Drain shall be installed.

Class "F"—Other establishments shall be classified by the Fire Prevention Board according to the construction and size of the building and number of persons employed on the premises, and such drainage shall be installed as may be approved by one in authority.

DEHN'S "PEERLESS" FLOOR AND GARAGE DRAINS

FIG. NO. 61-A WITH VENTED HOOD, FIG. NO. 62-A WITH VENTED AIR CHAMBER

DIMENSIONS AND PRICES, GARAGE AND FLOOR DRAINS

	Fig. No. 61-A	Fig. No. 62-A			
Diameter of top.....ins.	15	20	20	20	20
Waste outlet.....ins.	4	4	4	4	4
Depth over all.....ins.	22	30	38	46	54
Two-vent hub connections...ins.	2	4	4	4	4
Approximate weight.....lbs.	175	400	500	600	700
Price, iron top and strainer.each	$40.00	75.00	95.00	110.00	125.00

Dehn's "AcmE" Deep Seal Floor Drains

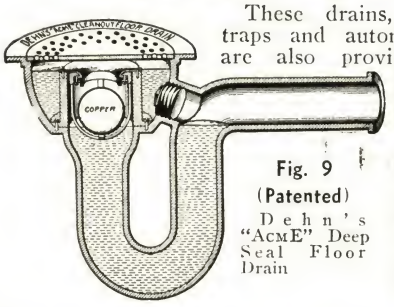


Fig. 9 (Patented) Dehn's "ACME" Deep Seal Floor Drain

These drains, with continuous pipe traps and automatic backwater valves, are also provided with large brass taper-threaded clean-out plugs and seamless metal ball floats.

These floats prevent flooding of cellars; can not get down into trap outlets and become air-bound, and can be easily removed with cage by unscrewing the four brass screws.

DIMENSIONS AND PRICES, DEEP SEAL FLOOR DRAINS WITH AUTOMATIC BACKWATER VALVE AND CLEANOUT, FIG. 9

Outlet, in.	Depth of water seal, in.	Diameter of top, in.	Depth over all, in.	Length over all, in.	Receiver above outlet of trap, in.	Average weight, lb.	Price, each Finishes A Iron top and strainer	B Brass top and strainer	C N. P. brass top and strainer
2	4	9	11	18	2	30	$ 7.50	$13.50	$15.50
3	4	9	13	20	2	40	10.00	17.00	19.00
4	4	12	15	22	2	65	14.00	22.00	25.00

ESTABLISHED 1891

CRAMPTON-FARLEY BRASS CO.

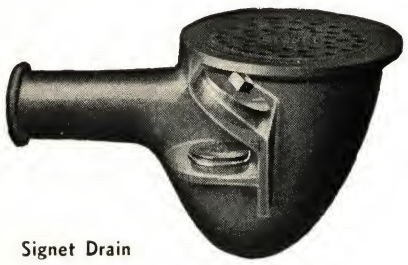
Manufacturers of Plumbers' Specialties
Specialists in Backwater Trap Floor Drains for 25 Years

KANSAS CITY, MO.

FLOOR, SHOWER, URINAL AND AREAWAY DRAINS

Signet, Gateway and San-Seal-O are the trade names of three backwater trap floor drains, designed to prevent flooded basements. They also prevent sewer gas from entering basement, after water in drain has evaporated. The water seal in an ordinary 2-in. floor drain evaporates in about 45 days. For these two reasons, discriminating architects have been specifying our drains for the past 25 years.

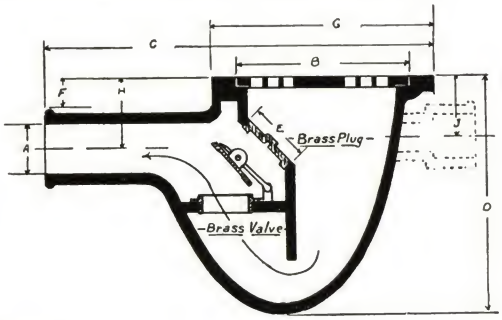
Outstanding Features—The brass valve is submerged. It is placed in a horizontal position to avoid concentrated wear on any one segment of the seat. The cap and the circular rim or seat are carefully hand ground. This seat is made as narrow as possible. The water pressure required to raise the cap keeps this thin rim clean. The valve is on the "far side" of the water seal to protect it from matches, broom straws, etc.



Signet Drain

Signet Drains

The bowl-like construction of this drain makes it very accessible for removing sediment. When installed it is very neat in appearance as no exposed cleanout plug is necessary.



LIST PRICES AND DIMENSIONS, SIGNET DRAINS

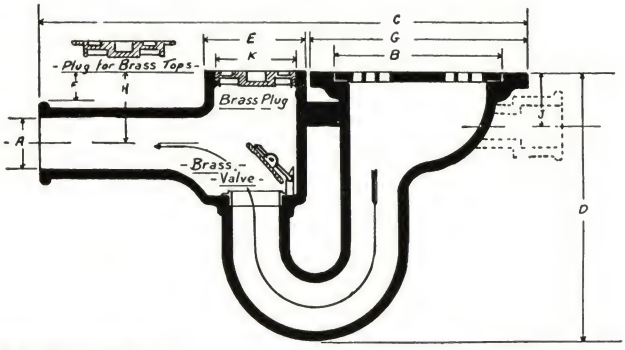
No.	Weight, lb.	Style outlet	Back inlet, in.	A in.	B in.	C in.	D in.	E in. I. P.	F in.	G in.	H in.	J in.	Iron top	Polished brass top
2	20	S. P.	.....	2	6 5/8	13 3/8	7 3/4	2 1/2	1 5/16	7 3/4	2 11/16	.....	$ 6.00	$ 8.50
3	50	S. P.	.....	3	11 3/8	21 1/2	12	3 1/4	2	13	4	.....	13.00	19.00
4	65	S. P.	.....	4	13	24 1/4	14	4	2	14 3/4	4 3/8	.....	18.00	28.00
D-2	19	I. P.	.....	2	6 5/8	11 7/8	7 3/4	2 1/2	1	7 3/4	2 1/2	.....	6.50	9.00
D-2-R	22	I. P.	1 1/2 I. P.	2	6 5/8	11 7/8	7 3/4	2 1/2	1	7 3/4	2 1/2	1 3/4	7.50	10.00
2-R	22	S. P.	1 1/2 I. P.	2	6 5/8	13 3/8	7 3/4	2 1/2	1 5/16	7 3/4	2 11/16	1 7/8	7.00	9.50
3-H	55	S. P.	2 S. P.	3	11 3/8	21 1/2	12	3 1/4	2	13	4	2 3/4	14.00	20.00
4-H	70	S. P.	2 S. P.	4	13	24 1/4	14	4	2	14 3/4	4 3/8	2 3/4	19.00	29.00

For extra heavy iron strainers, add to list as follows: 2 in., $1.00; 3 in., $2.00; 4 in., $2.50.
For nickelplated brass tops, add to list as follows: 2 in., $0.50; 3 in., $0.70; 4 in., $0.80.
For chromiumplated brass tops, add to list as follows: 2 in., $1.00; 3 in., $1.50; 4 in., $2.00.

Gateway Drains

This is a comparatively new drain but its success has been assured by adhering to the same principle as the Signet Drain. It complies with city ordinances where an "open type" drain is required. All numbers have a full 4-in. water seal.

Gateway Drain

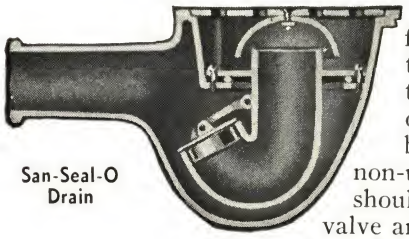


LIST PRICES AND DIMENSIONS, GATEWAY DRAINS

No.	Weight, lb.	Style outlet	Back inlet, in.	A in.	B in.	C in.	D in.	E in.	F in.	G in.	H in.	J in.	K in.	Iron top	Polished brass top
2	22	S. P.	.....	2	6 5/8	17 1/2	10 3/16	4 1/2	1 1/2	7 7/8	2 7/8	.....	3 1/4	$ 7.50	$10.00
3	55	S. P.	.....	3	9 3/8	24 5/8	13	5 1/2	2 1/16	10 5/8	3 15/16	.....	3 1/4	14.20	21.00
4	65	S. P.	.....	4	11 1/2	28	14 1/2	6 3/8	2	13	4 5/16	.....	4	19.30	31.00
D-2	22	I. P.	.....	2	6 5/8	15 5/8	10 3/16	4 1/2	1 3/8	7 7/8	2 7/8	.....	3 1/4	8.00	10.50
2-R	24	S. P.	1 1/2 I. P.	2	6 5/8	17 1/2	10 3/16	4 1/2	1 1/2	7 7/8	2 7/8	1 15/16	3 1/4	8.50	11.00
3-H	60	S. P.	2 S. P.	3	9 3/8	24 5/8	13	5 1/2	2 1/16	10 5/8	3 15/16	2 7/8	3 1/4	15.20	22.00
4-H	70	S. P.	2 S. P.	4	11 1/2	28	14 1/2	6 3/8	2	13	4 5/16	2 7/8	4	20.30	32.00

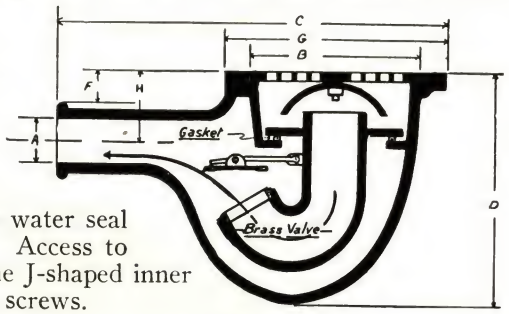
For extra heavy iron strainers, add to list as follows: 2 in., $1.00; 3 in., $2.00; 4 in., $2.50.
For nickelplated brass tops, add to list as follows: 2 in., $0.60; 3 in., $0.70; 4 in., $0.80.
For chromiumplated brass tops, add to list as follows: 2 in., $1.25; 3 in., $1.75; 4 in., $2.25.
Flanged c.o. plugs are furnished when ordering drains with brass tops.

San-Seal-O Drains



San-Seal-O Drain

The San-Seal-O Drain was the first successful "flapper type" drain to be really adopted by many architects and the plumbing trade. This drain is very popular for school buildings where the long periods of non-use make it very necessary that the water seal should be preserved from evaporation. Access to valve and sewer is obtained by removing the J-shaped inner unit which is held in place with four brass screws.

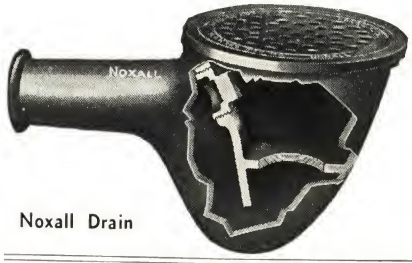


LIST PRICES AND DIMENSIONS, SAN-SEAL-O FLOOR DRAINS

No.	Weight, lb.	Style outlet	A in.	B in.	C in.	D in.	F in.	G in.	H in.	Back water trap drains		Plain drains	
										Iron top	Polished brass top	Iron top	Polished brass top
0	22	I. P.	1½	6⅝	11¾	8½	1½	7¾	2½	$ 6.25	$ 8.75	$ 4.00	$ 6.50
00	24	I. P.	2	6⅝	11⅞	8½	1	7¾	2½	6.50	9.00	4.25	6.75
1	24	S. P.	2	6⅝	13½	8½	1¼	7¾	2⅝	6.00	8.50	3.75	6.25
2	35	S. P.	2	9⅜	18⅜	8½	1¼	10⅞	2½	8.00	13.00	5.00	10.00
3	60	S. P.	3	11⅜	21½	12	2	13	4	13.00	19.00	9.00	15.00
4	85	S. P.	4	13	24	14½	1⅛	14½	3½	18.00	28.00	13.00	23.50

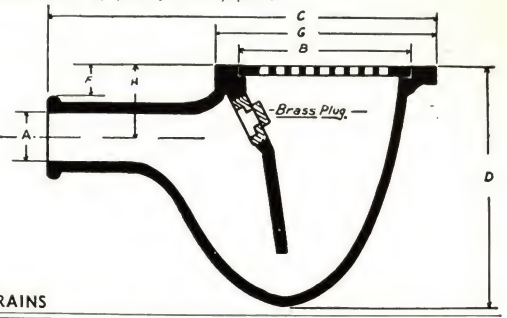
For extra heavy iron strainers, add to list as follows: Nos. 0, 00 and 1, $1.00; No. 2, $1.50; No. 3, $2.00; No. 4, $2.50.
For nickelplated brass tops, add to list as follows: Nos. 0, 00 and 1, $0.50; No. 2, $0.60; No. 3, $0.70; No. 4, $0.80.
For chromiumplated brass tops, add to list as follows: Nos. 0, 00 and 1, $1.00; No. 2, $1.25; No. 3, $1.50; No. 4, $2.00.

Noxall Drains



Noxall Drain

Noxall floor drains are made of heavy cast iron with 2-in. brass cleanout plug, very compact, and have large water seal and high outlet.



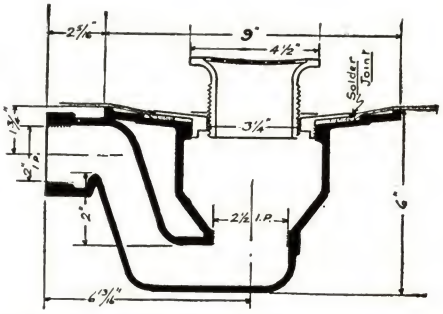
LIST PRICES AND DIMENSIONS, NOXALL DRAINS

No.	Weight, lb.	Style outlet	Back inlet, in.	A in.	B in.	C in.	D in.	F in.	G in.	H in.	Iron top	Polished brass top
2	16	S. P.	.....	2	6⅝	13⅜	7¾	1⅛	7¾	2½	$2.25	$ 5.00
3	35	S. P.	.....	3	10⅛	20	11½	2	11⅝	4	6.00	12.00
4	45	S. P.	.....	4	11⅜	21½	13¼	2	13	4⅜	8.00	16.00
*2-A	16	S. P.	.....	2	6⅝	13⅜	7¾	1⅛	7¾	2½	2.25	5.00
D-2	16	I. P.	.....	2	6⅝	11⅞	7¾	1	7¾	2½	2.75	5.50
2-R	16	S. P.	1½ I. P.	2	6⅝	13⅜	7¾	1⅛	7¾	2½	2.75	5.50

*For No. 2 tapped for 2-in. test plug, specify No. 2-A.
For extra heavy iron strainers add to list as follows: 2 in., $1.00; 3 in., $1.50; 4 in., $2.00.
For nickelplated brass tops, add to list as follows: 2 in., $0.50; 3 in., $0.70; 4 in., $0.80.
For chromiumplated brass tops, add to list as follows: 2 in., $1.20; 3 in., $1.70; 4 in., $2.00.

Minoka Shower or Urinal Drain

This drain is made of heavy cast iron with strainer, collar and flashing ring of cast red brass. The flashing ring screws down on lead apron, making a tight joint. Although shallow, this drain has a full 2-in. water seal. Ample seepage holes are next to the threads of the collar. The collar adjustment is 1¼ to 2¾ in. The drain is tapped for testing. When desired it is furnished with 1½-in. I. P. back inlet for an overflow connection.

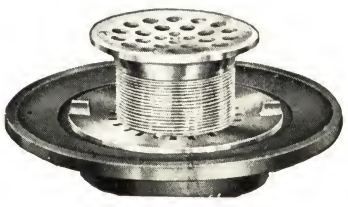


No.	With nickelplated brass tops (double seepage)	List price
90	With flashing ring	$10.30
91	Without flashing ring (plain)	8.80
90–8	With flashing ring and back inlet	11.30
91–8	Without flashing ring but with back inlet	9.80

For chromiumplated tops, add to list $0.60. For 2-in. spigot or 2-in. soil pipe hub attachment, add to list $0.60.
Made in 2-in. size. Can furnish 1½-in. iron pipe bushing at no extra cost.

Shower Head or Urinal Drain

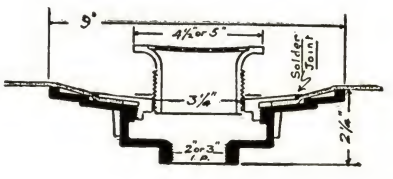
(Without trap)



Heavy iron body with brass flashing ring which screws down on lead apron, making a tight joint.

No.	Outlet	NP top	List price
96	2-in. I.P.	With flashing ring	$7.00
96-A	2-in. I.P.	With plain ring	5.50
97	3-in. I.P.	With flashing ring	9.00
97-A	3-in. I.P.	With plain ring	7.50

For chromiumplated tops, add to list $0.60.
Top diam. of brass strainer for Nos. 97 and 97-A (3-in. outlet) 5 in.



JOSAM MANUFACTURING CO.

Floor and Roof Drains, Interceptors and Other Josam Products

MAIN SALES OFFICE
4900 Euclid Building
CLEVELAND, OHIO

FACTORY AND FOUNDRY
Corymbo Road
MICHIGAN CITY, IND.

DISTRICT BRANCH OFFICES
NEW YORK, N. Y., 215 East 37th Street
CLEVELAND, OHIO, 4900 Euclid Building
CHICAGO, ILL., 307 North Michigan Boulevard
ATLANTA, GA., 189 Trinity Avenue, S. W.

REPRESENTATIVES IN ALL PRINCIPAL CITIES IN UNITED STATES

MANUFACTURED IN CANADA BY EMPIRE BRASS MFG. CO., LTD., LONDON, ONTARIO—BRANCHES THROUGHOUT THE DOMINION

Products

JOSAM FLOOR and ROOF DRAINS with and without the Josam Double Drainage feature; Floor Drains with and without traps, for showers, urinal stalls, garages, hospitals, roadways and wherever drains are required; OIL RETENTION DRAINS; NEW FEATURE AREAWAY AND FLOOR DRAINS; NON-CLOG AND TRIPLE DRAINAGE.

ROOF, SAWTOOTH, PROMENADE and GUTTER DRAINS with and without the Josam Double Drainage feature, all having the Josam Exclusive Removable Combined Dome Strainer and Sediment Cup, easily removed for cleaning without aid of tools.

VENT STACK FLASHING SLEEVES.

OPEN SEAT BACKWATER SEWER VALVES; OPEN SEAT SWING CHECK VALVES.

JOSAM-MARSH GREASE INTERCEPTORS.

JOSAM-MARSH MULTIPLE SPRING SHOCK ABSORBERS.

For Josam Swimming Pool Equipment, see Manufacturers' Index.

Also Scuppers for roof overflow; Pylon, Cornice and Sill Drains; Expansion Joints for roof and floor drains; Combination Drain and Backwater Deep Seal Traps; Adjustable Double Eccentric Flange Unions; Adjustable Heavy Duty Concrete Inserts in sizes to take standard bolt sizes; Eccentric Refrigerator Drains; Flap Valves, Instant Copper Tube Steam Water Heaters; Adjustable Closet Outlet Connections and Bends, watertight and gastight; Josam-Marsh Hair and Sediment, Dental and Surgical Sink Interceptors.

Service

When requesting information or recommendations, consult our Engineering Department at Cleveland, sending sketch of conditions to be met.

Materials

Drains generally furnished in cast iron or brass bodies, with either cast iron grates or brass strainers, but can be furnished in Duriron, Everdur, brass, nickel, white metal, or galvanized iron, at extra cost. Adjustable brass strainers regularly furnished nickelplated, brass grates regularly furnished polished, unless otherwise specified. Brass strainers and grates chromium plated at extra cost.

Josam Catalogue "G"

Catalogue "G," showing complete line of products or a Folder descriptive of any specific Josam product will be sent upon request.

Josam Double Drainage Feature

Description—The double drainage feature is exclusive in Josam drains and positively prevents water seepage around drain through floor to ceiling beneath, thus providing *leakproof protection.* Specified by leading engineers and architects.

Josam Positive Clamping Device

Insures an absolute watertight connection between roof and drain body, or between the floor and drain, by securely holding the roofing or waterproofing membrane to the inner surface of roof drain or flanged cup of floor drain.

Any Josam Drain having flanged cup can be furnished with clamping device at $1.00 extra.

JOSAM NEW FEATURE AREAWAY AND NON-CLOG FLOOR DRAINS

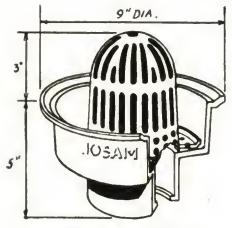
A recently designed and moderately priced series of areaway and floor drains for general use, combining features not found in any other line of drains for similar use.

Inasmuch as the same body is used for series 5200, 5300, 5320, and 5400, the production cost is lessened and thereby reflected in the sales price, owing to the minimum use of patterns.

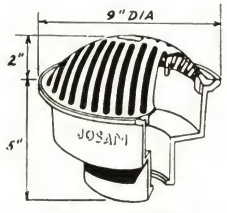
In the various series of drains shown here, there is a drain available for any purpose, condition or need.

All the series indicated can be provided with either brass domes or grates, and complete brass tops or the entire drain of all brass, at added cost.

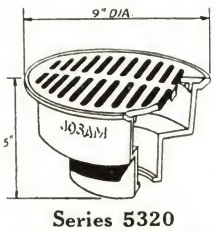
Extra depth heavy duty drain with extra depth sediment bucket (Series 5600) will be available shortly.



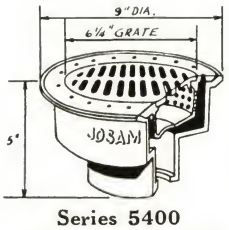
Series 5200
Has exclusive removable dome strainer and sediment cup



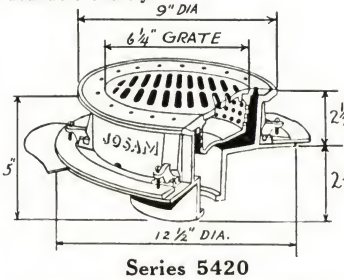
Series 5300
Furnished with convex grate



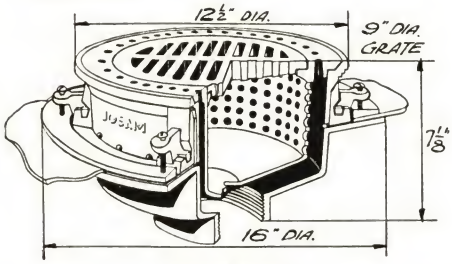
Series 5320
Furnished with flat grate



Series 5400
Has exclusive non-clog features as well as removable sediment bucket



Series 5420
Heavy duty type. Has non-clog and triple drainage feature in addition to removable sediment bucket



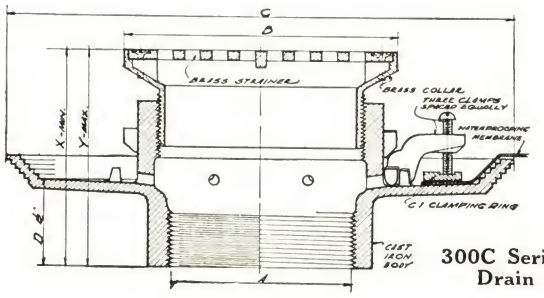
Series 5440
Large heavy type triple drainage non-clog drain, having deep type removable sediment retainer

Series	Type	Outlet	List price	Series	Type	Outlet	List price
5200	5202	2 in.	$3.75	5400	5402	2 in.	$5.00
	5203	3 in.	3.75		5403	3 in.	5.00
	5204	4 in.	3.75		5404	4 in.	5.00
5300	5302	2 in.	3.75	5420	5422	2 in.	12.50
	5303	3 in.	3.75		5423	3 in.	12.50
	5304	4 in.	3.75		5424	4 in.	12.50
5320	5322	2 in.	3.75	5440	5443	3 in.	18.00
	5323	3 in.	3.75		5444	4 in.	18.00
	5324	4 in.	3.75		5445	5 in.	18.00
					5446	6 in.	18.00

JOSAM FLOOR, SHOWER AND URINAL DRAINS

Josam Double Drainage Drain without Trap for Shower Receptors and Urinals

300C Series—For shower stalls. Body, cast iron; strainer, nickelplated or polished brass. Can be installed in connection with independent trap. Various types of strainers furnished, all adjustable to meet varying floor thicknesses. Equipped with flashing ring and clamping device which firmly holds waterproofing membrane in place. Also furnished without clamping device. This 300C Series can also be furnished with side outlet in the 1½, 2, and 3-in. size outlet where for any reason a drain with side outlet is preferable or necessary. (See table below for 300R Series.) With or without clamping device.



300C Series Drain

Dimensions in Inches

No.*	No.†	A	B	C	D	X	Y	Wt., lb.	Price*	Price†
341½C	341½	1½	4	7¾	1½	3¼	3⅞	7	$ 6.70	$ 5.70
342C	342	2	4	7¾	1½	3¼	3⅞	7	7.20	6.20
353C	353	3	5	9¼	1½	3¼	4	9	9.35	8.35
364C	364	4	6	10¼	1½	3¾	4½	11½	11.00	10.00

*With clamping device. †Without clamping device.

300R SERIES (SIDE OUTLET)
Dimensions in Inches

No.		Outlet	Strainer	Wt., lb.	Price	
Without clamping device	With clamping device				Without clamping device	With clamping device
341½R	341½RC	1½	4	8	$6.70	$7.70
342R	342RC	2	4	8	6.70	7.70
353R	353RC	3	5	10	9.35	10.35

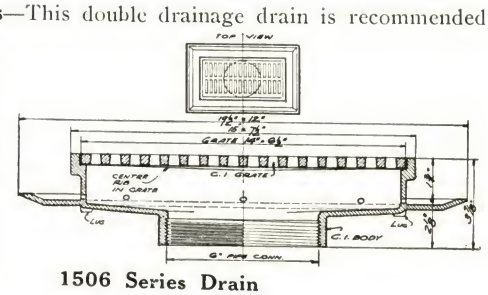
3000 Series—A drain similar to the 300 Series, but designed primarily for use with urinals and shower receptors, particularly when two or more receptors or urinals are placed in batteries, as top of drain is equipped with double eccentric brass bushings which compensate for inaccuracies in roughing-in up to a maximum dimension of 1⅜ in. This provides easy means of centering receptor and strainer in position. Only one-half turn of each bushing is required to obtain maximum adjustment.

Dimensions in Inches

No.	A	B	C	Wt., lb.	Price
3042	2	4½	10¾	15	$ 9.35
3043	3	4½	10¾	16	10.35

Either drain with 2-in. local vent (add suffix "A") $1.00 additional.

1506 Series—This double drainage drain is recommended for narrow gutters in terrace or balcony floors or in warehouses and laundries where a drain with large waterway is required. Heavy cast iron construction throughout.



1506 Series Drain

Dimensions in Inches

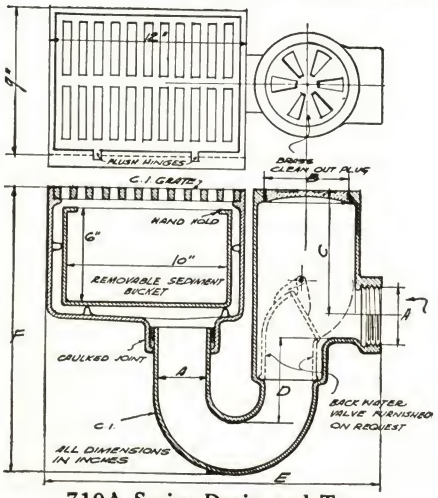
No.	Outlet	Wt., lb.	Price
1506	6	35	$12.00

Josam Combined Drain and Trap with Removable Sand Bucket —Open Deep Seal Type

710A Series—A new type, of which the body, trap, rectangular hinged grate and removable sediment bucket are cast iron.

Has a threaded brass cleanout plug, flush with floor, 2 in. larger in diameter than the trap outlet. Furnished with or without all-brass gravity action backwater valve. Trap is open seal type.

This type is of moderate size and price, is recommended for small garages, boiler rooms or in places where a drain with removable sediment bucket is required. Furnished with threaded, hub or spigot outlet.



710A Series Drain and Trap

Dimensions in Inches

No.	712A	713A	714A
A	2	3	4
B	4	5	6
C	7¼	7	6¾
D	4	5	5
E	19	20	21
F	14½	17	18
Weight lb.	88	97	108
Price	$20.00	$22.00	$25.00

760B Series—This drain is the box, hinged grate and sediment bucket of Series 710A described above, but without trap and cleanout.

This drain is made with bottom outlet for inside calking or with side hub outlet.

Dimensions in Inches

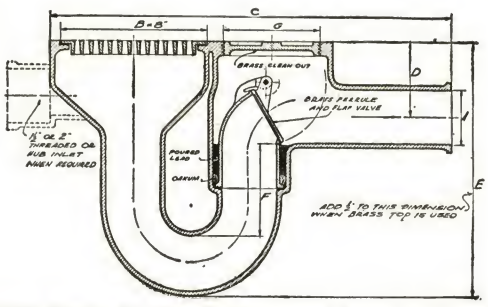
No.	Outlet	Wt., lb.	Price
762B	2	60	$14.00
763B	3	60	14.00
764B	4	60	14.00

Note: When this Series is desired with side outlet, add "R" after "B" and mention on what side the outlet is required.

Josam Combined Drain and Deep Seal Trap with Backwater Valve and Threaded Brass Cleanout

750A Series—Where it is desired to install a combined drain and deep seal trap with cleanout this series drain will meet all necessary requirements. The brass cleanout plug on outlet end to trap is flush with the floor and of handhole size, and the trap itself is self-cleansing. The backwater valve flap is the same size as the sewer outlet, maintaining full waterway from the drain to the line.

Trap has spigot end outlet, but can be furnished threaded when so ordered.



750A Series Combined Drain and Deep Seal Trap

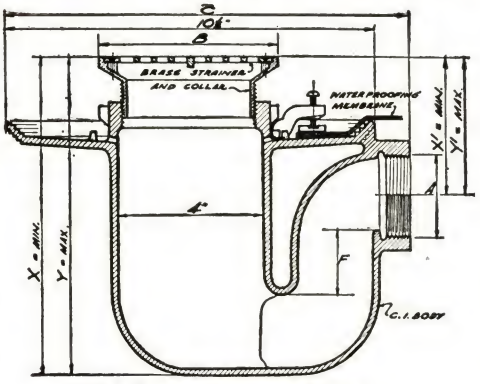
Dimensions in Inches

No.	A	C	D	E	F	G	Wt., lb.	Price
752A	2	20¾	4¼	11	4	4	40	$13.00
753A	3	21¾	4	14	5	5	52	15.00
754A	4	23¾	4½	16	5	6	70	20.00

JOSAM FLOOR, SHOWER AND URINAL DRAINS (Continued)

Josam Double Drainage Combined Trap and Drain

200A Series—Heavy cast iron body with adjustable brass strainer to suit floor thickness variations. Strainers for porcelain shower receptors also furnished.



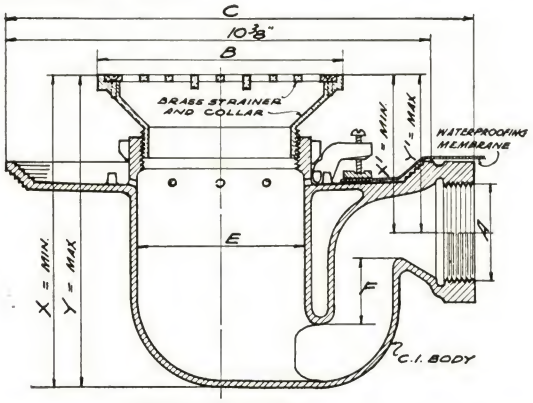
200A Series Drain and Trap

Dimensions in Inches

No.*	No.†	A	B	C	F	X	Y	X¹	Y¹	Wt., lb.	Price*	Price†
241½AC	241½A	1½	4	12	2⅛	8⅛	9⅜	3⅛	4⅜	20	$11.85	$10.85
251½AC	251½A	1½	5	12	2⅛	8⅜	9⅛	3⅜	4⅛	20	12.35	11.35
242AC	242A	2	4	11½	2¾	8⅞	10⅛	3¼	4½	20	12.85	11.85
252AC	252A	2	5	11½	2¾	9⅛	9⅞	3½	4¼	20	13.35	12.35
261½AC	261½A	1½	6	12	2⅛	8⅞	9⅝	3⅞	4⅝	20½	13.50	12.50
262AC	262A	2	6	11½	2¾	9⅞	10⅜	4¼	4¾	20½	14.50	13.50
253AC	253A	3	5	12½	2¼	9⅞	10⅝	3¾	4½	23½	16.35	15.35
263AC	263A	3	6	12½	2¼	10⅝	11⅛	4½	5	24	17.50	16.50
264AC	264A	4	6	15½	2⅛	11⅞	12⅜	4¾	5¼	36	20.50	19.50
274AC	274A	4	7	15½	2⅛	11½	12⅜	4⅜	5¼	37	21.65	20.65
284AC	284A	4	8	15½	2⅛	11⅝	12⅜	4½	5¼	38	22.80	21.80

*With clamping device. †Without clamping device.

2000A Series Special Shallow Type—Same construction as 200A, but designed for shallow installation. Furnished with flashing ring and clamping device to hold flashing permanently in flanged cup. Nickelplated brass strainer and adjustable collar. Hub or screw outlet.



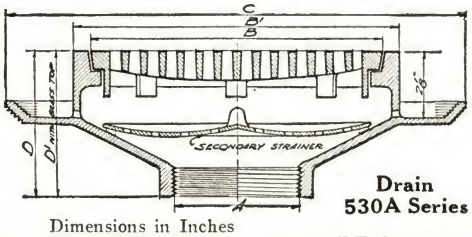
2000A Series Special Shallow Type Drain and Trap

Dimensions in Inches

No.	A	B	C	E	F	X	Y	X¹	Y¹	Wt.,lb.	Price
2042A	2	4½	12	4	1½	6¾	9	3	5¼	20½	$14.35
2052A	2	5	12	4	1½	6¾	7½	3	3¾	19	14.35
2062A	2	6	12	4	1½	7¼	8	3½	4¼	20	15.50
2043A	3	4½	14½	5	2	8¼	10½	4	6¼	29½	17.35
2053A	3	5	14½	5	2	8¼	9	4	4¾	28	17.35
2063A	3	6	14½	5	2	8¾	9½	4½	5¼	29	18.50

Josam Double Drainage Drain or Cesspool

530A Series—Extra heavy type, similar to Series 510. Supplementary grate prevents sewer stoppage. Furnished with extra heavy cast iron grate 1 in. thick.



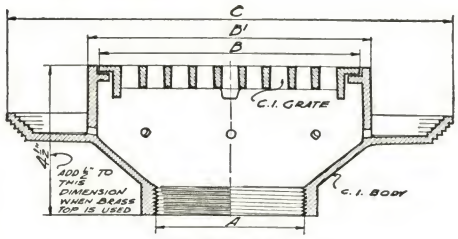
Drain 530A Series

Dimensions in Inches

No.	A	B	B¹	C	D	D¹	Wt., lb.	Price
532A	2	10	11	15¾	5	5½	40	$10.00
533A	3	10	11	15¾	5	5½	40	10.00
534A	4	10	11	15¾	5	5½	40	10.50
544A	4	14	15¼	19¼	5	5⅝	68	14.00
545A	5	14	15¼	19¼	5	5⅝	70	15.00
546A	6	14	15¼	19¼	5	5⅝	70	16.00
548A	8	14	15¼	19¼	5¼	5⅞	75	18.00

Josam Double Drainage Drain or Cesspool

510 Series—For warehouse, factory, dairy or laundry floors. Made of cast iron with anti-tilting cast iron grate. Brass top and grate extra.



510 Series Drain

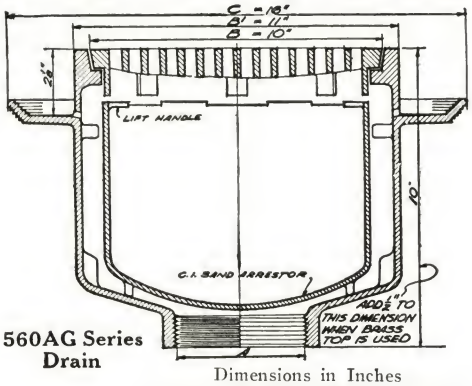
Furnished also with side outlet 2, 3, 4, 5 and 6-in. With or without clamping device

Dimensions in Inches

510 SERIES (BOTTOM OUTLET) No.	A	B	B¹	C	Wt., lb.	Price	550R SERIES (SIDE OUTLET) No.	Outlet	Grate	Wt., lb.	Price
512	2	8	8¾	13½	18	$6.00	552R	2	8	30	$ 7.00
513	3	8	8¾	13½	18	6.00	553R	3	8	30	7.00
514	4	8	8¾	13½	18	6.00	554R	4	8	33	8.00
524	4	11	12⅜	17	40	9.00	555R	5	11	55	11.00
525	5	11	12⅜	17	40	9.00	556R	6	11	55	11.00
526	6	11	12⅜	17	40	9.00					

Josam Double Drainage Extra Heavy Floor Drain with Removable Sediment Bucket

560AG Series—Recommended where large drainage facilities are required and where waste waters contain quantities of sediment, in floors, such as of boiler rooms, coal rooms, ash pits, garages, etc. Has large area anti-tilting extra heavy grate with easily removed sediment bucket.



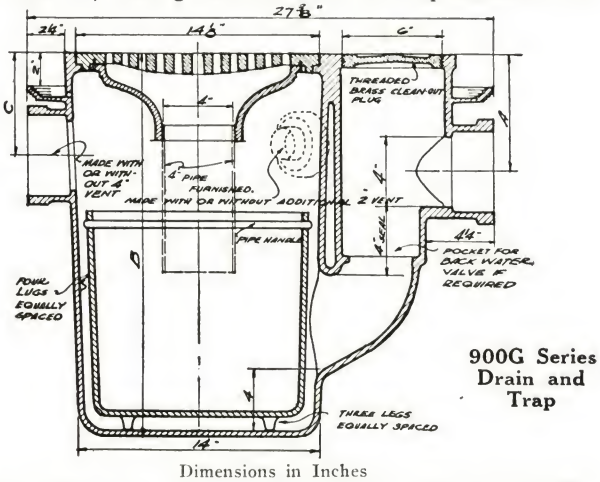
560AG Series Drain

Dimensions in Inches

No.	A outlet	Wt., lb.	Price
562AG	2	59	$15.00
563AG	3	59	15.00
564AG	4	59	15.00

Josam Garage and Industrial Plant Floor Drain

900G Series—For floors subjected to large water flow and heavy dirt and grease deposits. Heavy special anti-tilting grate lifts out, making sediment basin of trap accessible for



900G Series Drain and Trap

Dimensions in Inches

No.	Slab, in.	A	B	C	Wt., lb.	Price
910G	4	6¾	22¼	6	255	$58.00
920G	6	8¾	24¼	8	280	66.00
930G	8	10¾	26¼	10	305	71.00
940G	10	12¾	28¼	12	330	76.00
950G	12	14¾	30¼	14	355	81.00
When ordered without:	Sand bucket.....deduct				27	10.00
	Gas seal cone.....deduct				13	6.00
When ordered with:	Brass backwater valve.....add				5	23.70
	Polished brass rim and grate..add				.....	5.00

JOSAM FLOOR, SHOWER AND URINAL DRAINS (Continued)

cleaning out. Trap without pocket prevents sediment deposit.

Special threaded brass cleanout plug flush with floor provides positive means for removal for cleaning.

Furnished with cast iron sand bucket; also cast iron cone for deflecting gasoline fumes to vent pipe. With or without vent, with or without brass backwater valve. All galvanized at added cost.

Josam Acid-proof Double Drainage Drains

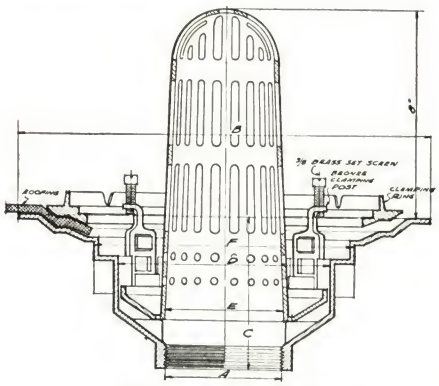
Josam-Duriron Drains—Various Josam Floor Drains can be furnished in Duriron, an acid-proof metal, for use in laboratories, pickling rooms, battery stations, chemical plants, engraving rooms, or any place where drainage includes corrosive liquids. Josam-Duriron Drains meet the conditions and requirements for which Josam Drains are designed, but of necessity, are furnished only with spigot or hub connections.

JOSAM ROOF DRAINS AND VENT STACK SLEEVES

Josam Improved Roof Drain with Removable Combined Sediment Cup and Dome Strainer for Wood, Concrete or Tile Roofs

410S Series—This drain affords an *absolutely watertight connection between roofing and drain body without use of flashing.* This is accomplished by an improved type clamping ring that has the same surface contour as flange of drain. This clamping ring is held securely in place by four adjustable manganese bronze clamping posts, each receiving a ⅜-in. setscrew, the tightening of which permits any desired pressure on clamping ring, under which roofing felts are clasped. Made of heavy cast iron, eliminating possibility of condensation when buried in roof slab.

This series can also be furnished with square top flange at no additional cost, and is designated as Series 410SL. Also furnished with side outlet at $2.00 additional list, and designated as Series 410SR. Also furnished with side outlet and square top flange at $2.00 additional list, and designated as Series 410SRL. *Josam Expansion Joint can be furnished with this or other types of Josam Roof Drains with bottom outlet, where necessary, at added cost.*



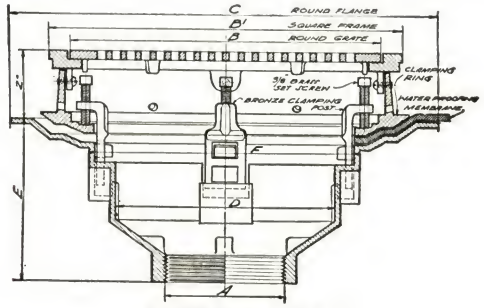
410S Series Roof Drain

Dimensions in Inches

No.	A	B	C	D	E	F	Wt., lb.	Price
412S	2	16	6	8⅜	5	10¼	38	$14.00
413S	3	16	6	8⅜	5	10¼	38	14.00
414S	4	16	6	8⅜	5	10¼	38	14.00
415S	5	17¼	6	9⅜	5½	11⅜	48	16.00
416S	6	18¼	6	10⅜	6½	12¼	56	18.00
418S	8	20⅛	7	12¼	8½	14½	70	26.00

Josam Improved Roof Drain with Flat Grate

420SP Series—Recommended for the same types of roof as 410S, but where roof is used for promenade or deck and where a flat grate in place of dome strainer is necessary.



420SP Series Drain

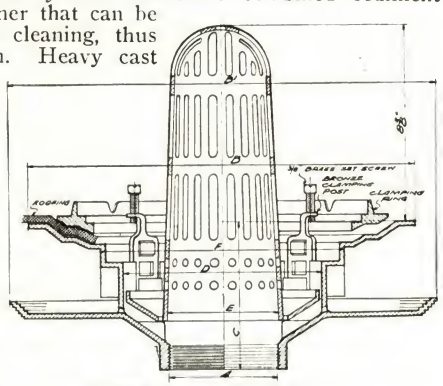
Dimensions in Inches

No.	A	B	B¹	C	D	E	F	Wt., lb.	Price
422SP	2	11¾	13¼	16	8⅜	6	10¼	43	$15.00
423SP	3	11¾	13¼	16	8⅜	6	10¼	43	15.00
424SP	4	11¾	13¼	16	8⅜	6	10¼	43	15.00
425SP	5	12¾	14¼	17¼	9⅜	6	11⅜	56	17.00
426SP	6	13¾	15¼	18¼	10⅜	6	12¼	63	19.00
428SP	8	13¾	15¼	20⅛	12¼	7	14½	67	27.00

Josam Improved Double Drainage Roof Drain, with Removable Combined Sediment Cup and Dome Strainer for Concrete Roofs

430BS Series—In addition to having Josam double drainage feature, this drain affords a positive means whereby roofing felts are joined to the drain body with an improved clamping ring, that has the same surface contour as flange of drain and is held securely in place by four adjustable manganese bronze clamping posts, each receiving a ⅜-in. brass setscrew, the tightening of which permits any desired pressure on clamping ring, under which roofing felts are clasped. *This insures an absolutely watertight connection between roofing felts and body of drain, and eliminates use of flashing.*

Series 430BS has Josam removable combined sediment cup and dome strainer that can be removed easily for cleaning, thus keeping drain clean. Heavy cast iron construction eliminates possibility of condensation when buried in roof slab. Tapped for standard iron pipe thread. Galvanized at added cost. *Soil pipe connectors for all sizes and all series of Josam Roof Drains can be furnished at added cost.*



430BS Series Roof Drain

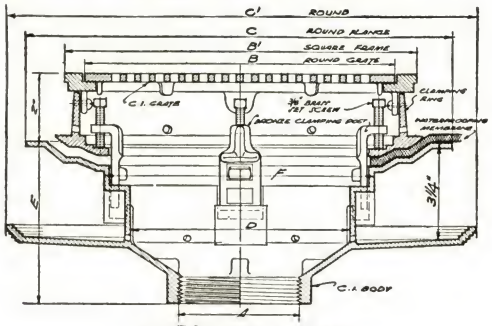
Dimensions in Inches

No.	A	B	B¹	C	D	E	F	Wt., lb.	Price
432BS	2	16	17½	5⅜	8½	4⅝	10¼	45	$15.00
433BS	3	16	17½	5⅜	8½	4⅝	10¼	45	15.00
434BS	4	16	17½	5⅜	8½	4⅝	10¼	45	15.00
435BS	5	17⅜	18½	5½	9½	5⅝	11⅜	55	17.00
436BS	6	18½	20¼	5⅜	10⅜	6¾	12¼	70	19.00
438BS	8	18½	20¼	5⅜	10⅜	6¾	14½	77	27.00

Note: This drain should only be used where slab thickness is at least 4 in. to provide for embedding double drainage flange in concrete.

Josam Improved Double Drainage Roof Drain with Flat Grate

440BSP Series—For the same purpose as 420SP, but where the double drainage feature is required.

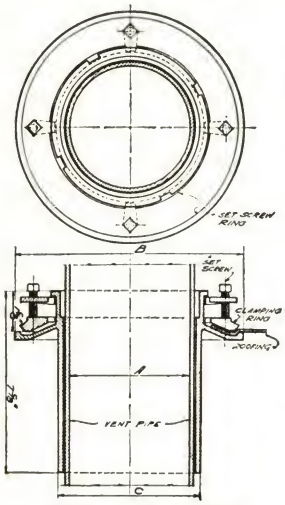


440BSP Series Drain

Dimensions in Inches

No.	A	B	B¹	C	C¹	D	E	F	Wt.,lb.	Price
442BSP	2	11¾	13¼	16	17½	8⅜	6	10¼	55	$16.00
443BSP	3	11¾	13¼	16	17½	8⅜	6	10¼	55	16.00
444BSP	4	11¾	13¼	16	17½	8⅜	6	10¼	55	16.00
445BSP	5	12¾	14¼	17¼	18½	9⅜	6	11⅜	64	18.00
446BSP	6	13¾	15¼	18⅛	20¼	10⅜	6	12¼	78	20.00
448BSP	8	13¾	15¼	20⅛	20¼	12¼	7	14½	82	28.00

VENT STACK SLEEVES, INTERCEPTORS, SEWER VALVES, SHOCK ABSORBERS



Josam Vent Stack Sleeve

Josam Vent Stack Sleeve

610A Series—This new type cast iron vent stack sleeve *positively eliminates necessity of a copper or lead flashing.* Can be placed in position during construction of concrete or wood roof deck and vent pipe carried through any time.

Hub or space at top of sleeve between pipe and sleeve should be filled with oakum and a roofer's elastic cement or poured lead joint, thereby making a watertight joint between sleeve and pipe.

610A SERIES VENT STACK SLEEVE

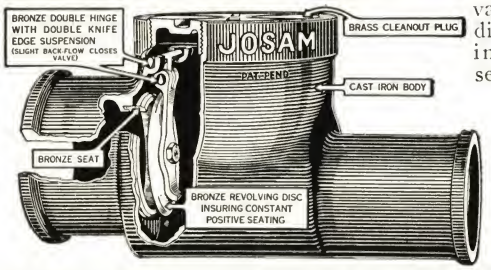
Dimensions in Inches

No.	A	B	C	Wt., lb.	Price
611½A	1½	6	2¾	8	$2.50
612A	2	6¾	3¼	9	2.50
612½A	2½	7	3¾	10	3.00
613A	3	7½	4¼	11	3.00
614A	4	8¾	5¼	15	3.50
615A	5	9¾	6¼	20	4.25
616A	6	10¾	7¼	22	5.00
618A	8	13	9½	24	9.00

Josam Open Seat Backwater Sewer Valve

Has bronze working parts and brass insert seat. Regularly furnished with bolted down iron cleanout cover. Can be furnished with threaded brass cleanout plug (see table). Body is of cast iron equivalent to extra heavy soil pipe. Outlet end is offset providing clearance of 1½ in. below the valve seat and valve disc allowing free passage of foreign matter through valve to outlet, precluding possibility of fouling valve.

Valve always open about ¾ in., except when functioning by flow of water in either direction. Double knife edge or fulcrum bearings positively respond to slightest movement required of valve. Revolving disc or flap valve insures positive seating.



Open Seat Backwater Sewer Valve, 1100 Series

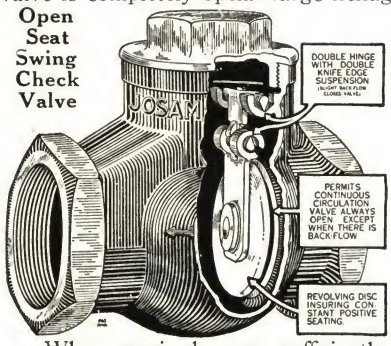
No.	1102	1103	1104	1105	1106	1108	1110	1112
Size.....in.	2	3	4	5	6	8	10	12
Weight.....lb.	18	26	32	50	60	115	190	250
Price:								
Bolted cast iron cover	$10.00	13.00	17.00	21.00	25.00	33.00	50.00	65.00
Threaded brass cover	.....	$18.00	22.00	26.00	30.00	38.00		

Prices for sizes 15, 18, 24 and 30 on request.

Josam Open Seat Swing Check Valve

Holds and controls bodies of liquid matter. Has open seat with revolving flap check or disc suspended on compound acting double fulcrum bearings. The disc, normally, hangs open about ⅛ in., permitting continuous flow regardless of sluggishness in circulation and closes readily with the slightest back flow movement of the water.

The globe shape of the high grade red brass body permits circulation of water around and under valve disc when valve is partially open, and permits flow of full area of line when valve is completely open. Large hexagon cap plug permits easy accessibility to working parts. Other than Josam check valves have closed seat and single pin bearings.



Open Seat Swing Check Valve

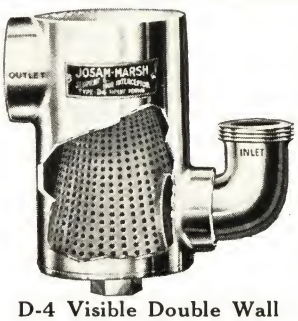
Size, in.	Price
⅜	$ 2.00
½	2.00
¾	2.25
1	2.80
1¼	3.65
1½	4.75
2	6.75
2½	15.00
3	24.00

When required, opens sufficiently to permit full waterway.

Josam Flap Valve—(Open seat) Series 1100½ for sewer outlets, sewer and water lines, sewage disposal plants. Construction and operation similar to backwater sewer valve. Placed at discharge end of sewer line the Josam flap valve is an absolute safeguard against back flow of sewage. Permits full waterway. Prices and sizes same as Josam sewer valves.

Josam-Marsh Hair and Sediment Interceptors

D-4 Visible Double Wall Seal Type—For lavatories in barber shops, beauty parlors, residences, etc. Prevents clogged pipes by removing from waste water all hair and foreign matter. Cast brass nickelplated body 6½x3¾-in. and has 2-in. seal. Has inlet connection for 1¼-in. outside diameter brass tubing. Outlet is tapped for 1½-in. iron pipe. Removable plug permits ready accessibility to brass filter screen. Non-siphoning. Weight, 6-lb. Installation permitted in all localities. List price $12.80.



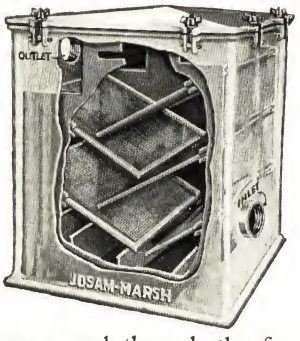
D-4 Visible Double Wall Seal Type

D-3 Type Josam-Marsh Hair and Sediment Interceptors—Same as Type D-4, except that Type D-3 has an internal wall or partition seal, which is not permitted by many sanitary codes. List price $12.80.

Josam-Marsh Dental and Surgical Sink Interceptors, Type C-2—Similar to Type C-1. Smaller and lighter. Recommended for dental, surgical and operating room sinks. Remove from waste water all solids, plaster, metals, cotton, lint, hair, etc. 10½ in. high, 5 in. square and made entirely of polished aluminum, excepting screen which is brass. Has a 3½-in. water seal and is non-siphoning. Inlet and outlet tapped 1½ in. Bottom is removable for cleaning. Weight approximately 8½ lb. List price $36.00.

Type C-1 Josam-Marsh Hospital Plaster Sink Interceptors

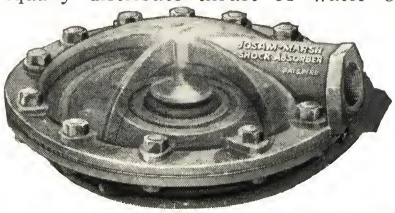
Removes from waste water all plaster of paris, solid or suspended, also cotton, lint, hair or other foreign matter which waste water may contain. Made of gray cast iron, porcelain, white enameled exterior, with all exterior clamps heavily nickeled. It is 18¼ in. high, 17¼ in. square and has 2-in. iron pipe connections. Cage is galvanized iron and the screens of brass. Interior is easily accessible for cleaning, as entire cage can be easily removed without any disconnecting.



Waste water enters through inlet pipe, is baffled and carried over the vertical plates and is then passed through the fine mesh-screens where the process of filtration takes place. The interceptor is absolutely non-siphoning and has 7½-in. seal. Weight, approximately 240 lb. List price, $130.00.

Josam-Marsh Shock Absorber—Multiple Spring Type

Eliminates waterhammer, sound and vibration in piping systems due to thrust and impact, relieving all strain and damage caused by the closing of quick closing valves or faucets, pump pulsations, etc. Constructed of two heavy malleable iron cadmium plated shells forming a chamber with baffle ribs to equally distribute thrust of water on "Everdur" metal diaphragm, the action of which aborbs the shock and dispels vibration and automatically, the noise. Applicable to individual, batteries or groups of fixtures. Request Shock Absorber Catalogue.



JOSAM-MARSH SHOCK ABSORBER

Type	Weight, lb.	Thread connection	Price
M½	9	½	$ 9.80
M¾	9	¾	9.80
M1	13½	1	16.50
M1½	25	1½	29.75
M2	32½	2	35.00
M3	.....	3	Prices furnished on application
M4	.....	4	

JOSAM ADJUSTABLE CLOSET OUTLET CONNECTION WATER-TIGHT AND GAS-TIGHT

No Putty Joints—Sanitary—Adjustable—Positive—Permanent

Simple and positive means for making a perfect and positive seal between closet bowls and waste pipes.

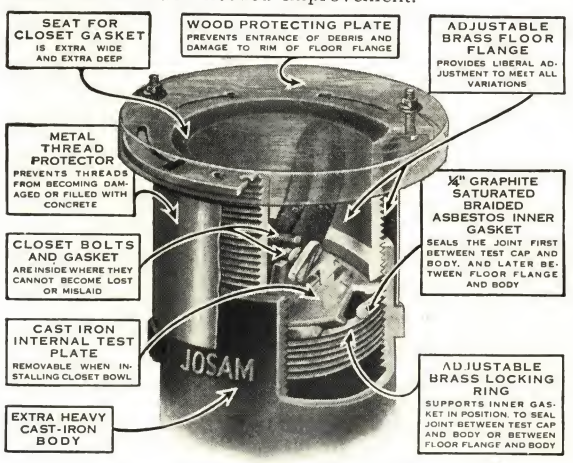
Eliminates the use of putty, litharge, plaster of paris, etc., which dry out and deteriorate, causing seal to crack or break upon slightest settling of building, and leaving openings for escape of sewer gas and water. See illustration for construction details.

The bowl gasket and inner gasket are of finest quality, graphite saturated asbestos which will never dry out or harden, constantly maintaining a positive and permanent seal regardless of any settling of the building.

Floor flange is vertically adjustable for any distance ordinarily required, and after setting at proper height, the gasket, which is flexible and resilient, acts as a cushion to prevent breakage of bowls or connections.

All parts are completely assembled at our factory, and the complete connection tested under 50 lb. hydraulic pressure before shipment. Ready for immediate installation upon arrival on job. No further work or attention required until actual installation of closet bowl is to be made.

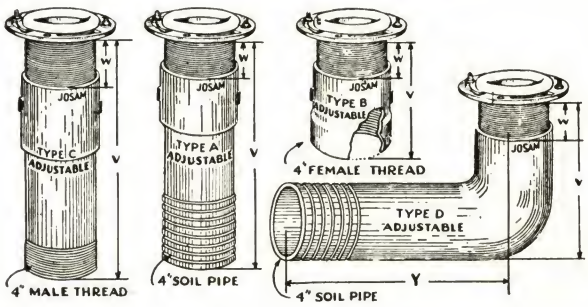
Vertical adjustability, so necessary in setting closet bowl, together with non-use of putty, litharge, or any other hardening material as described above, the fact that unit is ready for water test, and closet bolts, nuts, and washers are furnished with the connections, make the Josam Adjustable Closet Outlet Connection a much needed improvement.



Showing Features of Construction

Type	V Length in inches Min.	V Length in inches Max.	W Adjustment in inches Min.	W Adjustment in inches Max.	List Price
STRAIGHT CONNECTIONS 4 IN. FEMALE THREADED					
B 5	5	6	3/8	1 3/8	$7.00
B 6	6	8	3/8	2 3/8	7.00
STRAIGHT CONNECTIONS 4 IN. MALE THREADED					
C 4½	4½	5½	3/8	1 3/8	7.00
C 5½	5½	7½	3/8	2 3/8	7.00
C 6½	6½	9½	3/8	3 3/8	7.50
C 8	8	11	3/8	3 3/8	7.50
C10	10	13	3/8	3 3/8	7.50
C12	12	15	3/8	3 3/8	8.00
C14	14	17	3/8	3 3/8	8.00
C16	16	19	3/8	3 3/8	8.00
C18	18	21	3/8	3 3/8	8.50
C20	20	23	3/8	3 3/8	8.50
C22	22	25	3/8	3 3/8	8.50

Type	V Length of inlet, in. Min.	V Length of inlet, in. Max.	W Adjustment, in. Min.	W Adjustment, in. Max.	Y Center of inlet to end of outlet	List Price
STRAIGHT CONNECTIONS FOR 4 IN. SOIL PIPE						
A12	12	14	3/8	2 3/8	.....	$7.00
A18	18	20	3/8	2 3/8	.....	7.50
A24	24	26	3/8	2 3/8	.....	8.50
BEND CONNECTIONS FOR 4 IN. SOIL PIPE						
D12x7½	7½	9	3/8	1 7/8	12 in.	8.00
D18x7½	7½	9	3/8	1 7/8	18 in.	8.50
D24x7½	7½	9	3/8	1 7/8	24 in.	9.00
D12x7	7	8	3/8	1 3/8	12 in.	7.50
D18x7	7	8	3/8	1 3/8	18 in.	8.00
D24x7	7	8	3/8	1 3/8	24 in.	8.50



JOSAM-MARSH GREASE INTERCEPTORS

The Josam-Marsh Grease Interceptor is a decided improvement over devices previously used for the recovery of all kinds of grease. It is scientifically designed to recover the grease from waste water regardless of the water temperature.

It automatically evacuates all sediment, thereby leaving clean grease in the interceptor. This grease has a high commercial value as the removal of the sediment prevents decomposition, eliminating the forming of "free fatty acid gas" which destroys the glycerine properties of the grease. Glycerine content being essential to its value.

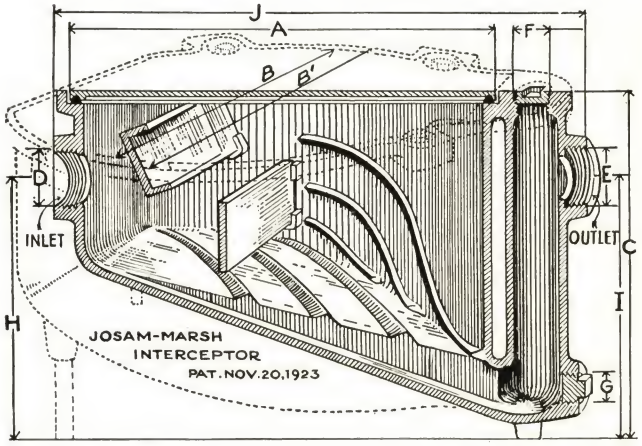
All odors which would result from sour water are eliminated, as the water is continually changing, evacuating the sediment which would cause fermentation and decomposition if allowed to remain in the interceptor. These advantages insure complete sanitation under all conditions.

Due to the construction of the Josam-Marsh Interceptor, the grease is recovered before reaching the waste lines. This entirely eliminates any trouble and maintenance cost due to grease clogged waste lines.

The Josam-Marsh Interceptor is not water-jacketed, thereby eliminating the cost of piping from cold water supply. Has no movable parts, is easily installed, portable, can be placed on floor or hung from ceiling. By simply removing cover, entire chamber is accessible for removal of grease. Grease accumulation can be skimmed off at any time without interrupting operation of interceptor.

The Josam-Marsh Grease Interceptors are made of heavy cast iron, in a complete range of sizes covering practically any requirement. They are constructed with the visible double wall seal as illustrated, or with the internal seal.

Constructed with flush top cover so that Interceptor can be located in floor construction with top flush with floor.



Size: With visible double wall seal	Size: With internal seal	Flow range, gal. per hr.	Fat cap. lb.	Average dimensions in inches: A	B	B¹	C	D	E	F	G	H	I	J	Net wt., lb.	Pipe conn.	List price
A-0	.....	55	20	13 1/4	9 3/8	11 1/4	11	1 1/2-2	1 1/2-2	1	...	8 15/16	8 15/16	16 1/4	72	Tapped	$ 25.00
A-1	A-1 1/2	100	30	16 1/2	11 3/4	13 1/2	13	2	2	1 1/4	1 1/2	10 1/8	10 1/8	19 3/4	72	Tapped	50.40
A-2	A-2 1/2	285	70	22	16	18 1/4	19 3/4	2-3	2-3	1 1/2	1 1/2	15 1/4	15 1/4	27	185	Tapped	97.00
.....	A-3 1/2	480	105	27 1/4	19 1/4	21 3/4	24 1/2	3-4	3-4	2	2	20 1/4	20 1/4	32 1/2	360	Calk	156.00
.....	A-5 1/2	825	140	29 7/8	22 3/8	25 1/4	28 3/4	4-5	4-5	2	2	23	23	38 1/4	539	Calk	275.00
.....	A-15 1/2	2100	205	37	27 1/2	29 1/4	33 1/2	4-5	4-5	2	2	27	27	46 1/2	710	Tapped	390.00
.....	A-25 1/2	3600	315	42 1/4	30 1/4	32 3/4	32 3/4	6	6	2 1/2	2 1/2	23 1/4	23 1/4	57 1/4	825	Calk	470.00
.....	A-50 1/2	8500	500	45 5/8	39 7/8	41 7/8	40	7	7	3	3	30 1/2	30 1/2	55 3/8	1650	Sewer	726.00
.....	A-75 1/2	13000	1120	69 1/2	52	54	48	7	7	3	3	36	36	81 1/2	3500	pipe	1,254.00
.....	A-150 1/2	24000	1850	102 9/16	71	73	54 1/2	8	8	10	10	42 1/2	42 1/2	110 9/16	6500	Flange	2,288.00

A-0, A-1, A-2, A-3, A-5 in both single and double wall seal types are provided with means of height adjustment. Inlet and outlet on A-0, A-2, A-3, A-5 and A-15 both types, can be increased as shown in table. Finish—painted enamel. Type A-0 can be held on wall brackets, furnished at extra cost.

DAVID LEVOW

"Fitrite" Bronze Roof Strainers; "Fitrite" Bronze Strainers and Frame; and "Fitrite" Bronze Beehive Strainers

TELEPHONE
CHelsea 3-2400

308 West 20th Street
NEW YORK, N. Y.

For "Fitrite" Adjustable Pipe Snow Guards and Skylight Gearing, see Manufacturers' Index

"Fitrite" Roof Strainers—for Flat Roofs Having Inside Cast Iron Leaders

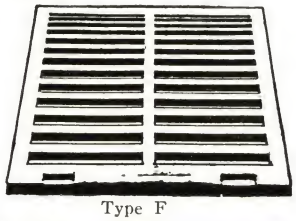
Type F—Perfectly flat. Extensively used for roofs and roof gardens requiring freedom from all obstruction; also for swimming pools.

Type R—The slight crown (1 in. high) does not seriously obstruct the roof, yet the construction is such that debris slides off easily. Especially recommended for flat tile or slag roofs having inside leaders, at center of roof.

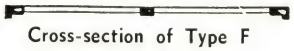
Type X—Recommended where drainage efficiency is the prime consideration. The extra high crown (3¼ in.) and narrow slits effectively keep out gravel, sticks, etc. Type X is especially desirable where leaders are at edge of roof.

Materials—All types made in solid bronze.

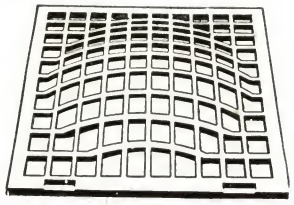
Features — "Fitrite" bronze strainers are about ¼ in. thick, will not rust, and are practically unbreakable—will easily support the weight of three husky men. Each strainer has two hinge holes allowing easy attachment by copper strip to leader box.



Type F

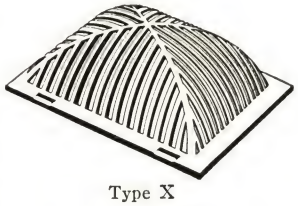


Cross-section of Type F



Type R

Cross-section of Type R
1 in. high

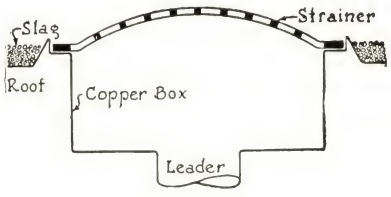


Type X

Cross-section of Type X
3¼ in. high

Application of "Fitrite" Strainer to Slag Roofs

Information concerning installations on other types of roofs gladly supplied on request



STRAINER SIZES

No.	Exact size, in.	Types
12-in.	11¾ x 11¾	F, R and X
10-in.	9¾ x 9¾	F, R and X
8-in.	8 x 8	F, R and X
6-in.	6 x 6	F, R

Specifications—All inside cast iron leaders shall be connected to roof through a copper box covered with "Fitrite" Bronze Strainer of the proper size and type as manufactured by David Levow, 308 West 20th Street, New York, N. Y.

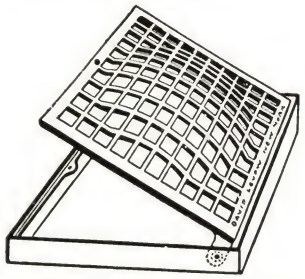
"Fitrite" Roof Strainers and Frame—One Unit

Particularly Adaptable for Tile Roofs

Material—Solid bronze.

Sizes—Made in all sizes as per strainers shown in opposite column, and furnished with any style strainer shown. Frame, 1½ in. high, ¼ in. thick.

Features — Makes strainer integral part of roof. Cannot be lost or moved out of position. Insures perfect fit. Strainer permanently hinged to frame. Easily opened for cleaning. Can be closed with machine screw or wire.

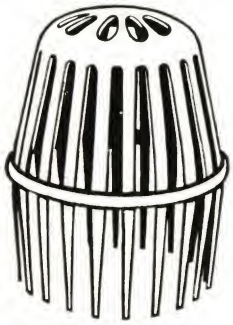


"Fitrite" Roof Strainer and Frame—One Unit

Specifications—All inside cast iron leaders shall be connected to roof, using "Fitrite" Bronze Frame and Strainer of the proper size and type, as manufactured by David Levow, 308 West 20th Street, New York, N. Y.

"Fitrite" Bronze Beehive Strainers

For Outside Leaders



"Fitrite" Bronze Beehive Strainer

Material—Solid bronze.

Sizes—3, 4, 5, 6, 7, and 8-in. diameter.

Features—Solid cast bronze strainer. Practically unbreakable. Will last for the life of the building.

Specifications—All outside round leaders shall be installed with "Fitrite" Bronze Beehive Strainers of the proper size as manufactured by David Levow, 308 West 20th Street, New York, N. Y.

THE R. C. MAHON COMPANY

Manufacturers of Cast Iron Roof Sumps

DETROIT, MICH.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Product

MAHON CAST IRON ROOF SUMPS.

For Mahon Permanent Steel Floor Forms, Steel Roof Deck, Kalamein and Tin Clad Doors and Rolling Steel Doors, see Manufacturers' Index.

Mahon Cast Iron Roof Sumps

The Mahon Cast Iron Roof Sump has been designed for absolute weathertightness, permanence, and greatest ease of installation. It is the result of many years of roofing experience, and is thoroughly practical to meet the need for a permanent, economical roof drain.

Manufactured in durable cast iron, the Mahon Sump is free from springs, bolts or loose rings and requires no elastic cement or solder for installation. The dome strainer locks in place by a simple turn and may be easily removed without disturbing either the sump or surrounding roofing. The sump bowl is fitted permanently into the roof deck and a copper apron, furnished with or without gravel stop, is calked into a raglet in the sump casting provided for the purpose. When used on gravel top roofs this gravel stop and the extremely narrow openings in the side of the dome strainer, provide a double protection for the drain.

Connection to the conductor pipe is made by means of a threaded joint which is a standard pipe thread and makes a perfect watertight connection.

Mahon Sumps never cause water to back up or lie on the roof —the strainer openings being equal to three times the area of the conductor pipe for which the sump is tapped. Mahon Cast Iron Sumps may be furnished tapped to fit 3, 4, 5 or 6-in. standard wrought iron pipe thread. Quantity production on this product permits an unusually low price.

Mahon Cast Iron Roof Sump

Outstanding Features

(1) Sump is available tapped to fit either 3, 4, 5 or 6-in. standard wrought iron pipe. If cast iron conductors are used, a short piece of wrought iron pipe is screwed into the sump and calked into the hub of the cast iron pipe.

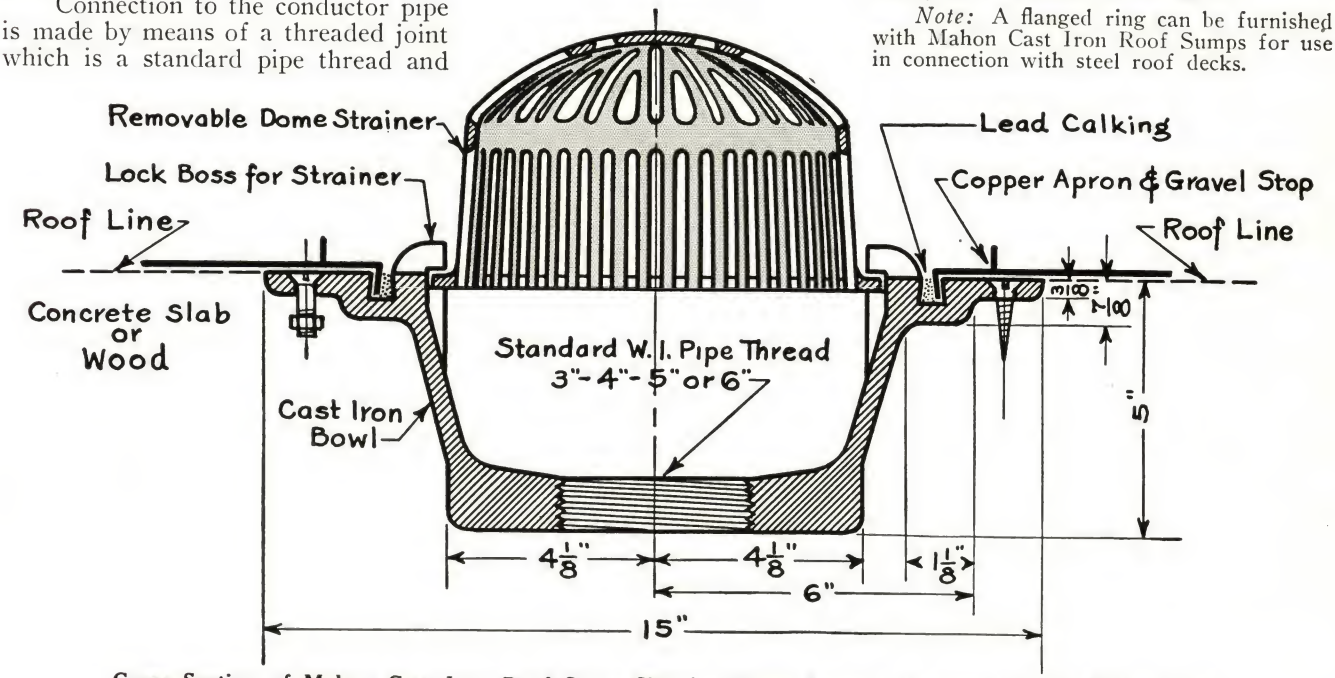
(2) A 16-oz. copper apron, with or without gravel stop, is furnished to be calked into a circular raglet in the sump bowl with lead, thereby making a perfect watertight connection with roofing material.

(3) Dome strainer may be removed without disturbing sump bowl or surrounding roofing.

A simple turn engages four cast iron lugs which lock the dome strainer securely in place.

(4) Openings in dome strainer are equal to three times the area of the conductor pipe, insuring full capacity of the drain at all times.

Note: A flanged ring can be furnished with Mahon Cast Iron Roof Sumps for use in connection with steel roof decks.



Cross Section of Mahon Cast Iron Roof Sump Showing Dome Locking Feature and Installation Data

THE RILE COMPANY, INC.

Manufacturers of Roof and Floor Sumps

247 McDougall Avenue
DETROIT, MICH.

Products

ROOF and FLOOR SUMPS.

Introduction

There has been a long-felt want among architects and engineers for a more lasting, permanent connection between roof and rain leaders, than that afforded by ordinary sheet metal. The integrity of any roof is restricted to the duration of its materials, for no roof can be stronger than the connections between roofing and rain leaders.

Roof Sump

Description—The Rile roof sump is an efficient, non-freezing, permanent rain conductor roof connection, forming a part of the general roof construction. It will effectively exclude foreign matter from the eduction or leader pipe.

Made of cast iron, the Rile roof sump is standard with many of the best architects and engineers for all classes of buildings and the various types of roof construction, including concrete, wood, book tile, hollow tile, gypsum roof tile, Federal tile, American tile, Truscon tile, or Hy-Rib.

Advantages—The Rile roof sump can not be readily broken, or stopped up, and is always accessible for cleaning.

Costs no more than the old soldered sheet metal types. Tapped for 4, 5, and 6-in. soil or wrought iron pipe.

The action of steam or sewer gases leaking through the drainage system and vented through the rain leaders has no effect on the Rile roof sump.

There are no soldering acids to cause trouble; no breaking of joints by expansion, contraction and buckling.

It will outlast the average roofing materials and is in position for the renewal of roofing or plumbing connections.

The use of Rile roof sumps effects a saving of from 3 to 6 weeks' time in the completion of every concrete structure in which they are used. By simply screwing a nipple and elbow to base of sump with a temporary pipe to discharge water outside of the building, sumps are ready for service the minute the structural roof slab is in place. Until such time as centering can be removed, to allow plumber to extend conductors and connect same, the lower stories are kept dry for flooring, the roof valleys and finish can be prepared for roofer, and finished roofing can be placed in advance of the plumbing.

Construction—Sump is made entirely of highest grade gray cast iron, and is entirely free from nuts, bolts, packed joints or other soldered or mechanical parts, and can be used for either wrought or cast iron conductor pipes. Main body, in the form of a cone frustum, is expanded into a flange at upper end. A removable cover, having perforation in the top and side openings, is seated in an annular seat in body by means of a peripheral flange. Bottom of body is screw-threaded to connect the cast or wrought iron eduction pipe.

Within the body is placed a removable catchbasin with integral perforated standpipe. Over the top of the catchbasin is placed a strainer, having perforations arranged radially and increasing in size toward the periphery, so that bulk of water and any foreign substance will pass downwardly (if at all) between the walls of catchbasin and the walls of standpipe strainer, and any foreign substances be retained in catchbasin.

Operation—The coarser foreign substances will be kept out by the cap. Smaller particles which may pass through the cap will be stopped by the strainer. Still finer sediment will be arrested and held in catchbasin.

Sump is readily cleaned by removing cap, strainer and catchbasin.

Installation—In order to properly secure sump to roofing so as to form a perfectly tight and strong joint, there is provided in upper flange of the body an annular dovetail groove, into which the inner circular edge of flashing plate is placed, by being flanged downwardly and inwardly. Dovetail groove is then filled with molten lead and calked, forming a perfectly tight, strong and permanent joint.

This means of securing the roofing metal work or flashing to sump is an important feature, as well as the general design of main body containing catchbasin, strainers, etc., in which the major portion of sump is suspended below the roof and subject to action of dissipated heat units within building, thus insuring its non-freezing qualities—an important factor in the design of buildings containing high tension electrical generating and transmission apparatus.

Specifications—Contractor for plumbing (or roofing) will furnish and place as indicated on drawings (location of sumps should be indicated on architect's working drawings), or as required (state number required 4, 5, or 6 in.) standard cast iron Rile roof sumps (THE RILE COMPANY, INC., 247 McDougall Avenue, Detroit, Mich.). Plumber to pour and calk final lead joint between flashings and sumps. Flashings to be provided and applied by contractor for roofing.

New Floor Sump

For use with any type of flooring—wood, plastic or cement. Dimensions: Body 11½ in. deep over all; tapped 4 in. only; top member round, 17-in. diameter, with cupped edge and heavy standing flange with 6 weep holes for seepage into sump.

Shipped with regular pot and flat strainers and a *heavy* flat top strainer. (Three strainers.)

Ideal for laboratory, laundry and washroom floors.

References

Recent installations and orders:

United States Government	Great Lakes Shipbuilding Co.
Aviation Dept. U. S. Army	Cincinnati Milling Machine Co.
United States Warehouses	United States Tire Corporation
Lincoln Motor Co.	Geo. A. Fuller Construction Co.
Lockwood, Greene & Co.	Stone & Webster Corporation
Corn Products Co.	Canadian Steel Corporation
Solvay Process Co.	Packard Motor Car Co.
Ontario Power Co.	Ford Motor Co.
General Electric Co.	Dodge Brothers (Motor Cars)
Leonard Construction Co.	Cadillac Motor Car Co.

And scores of other leading engineers and builders.

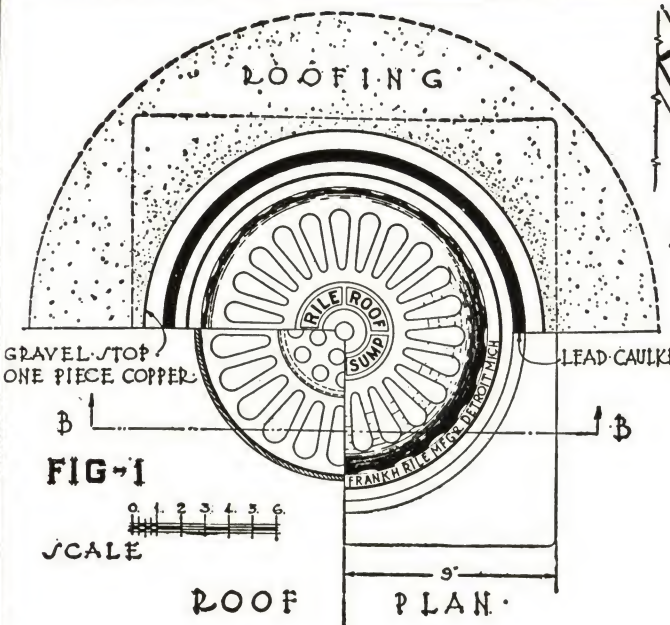


FIG-1

SCALE 0 1 2 3 4 5 6

ROOF PLAN.

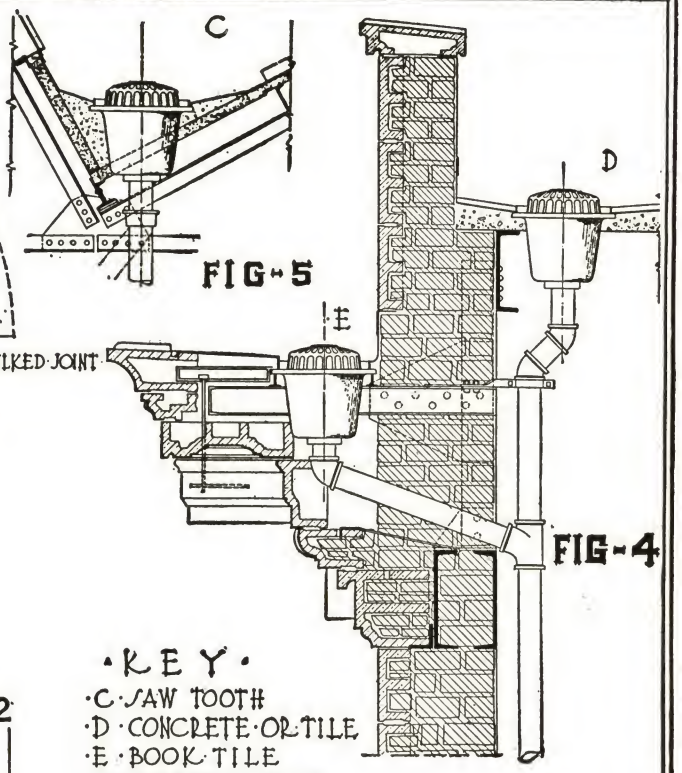


FIG-5

FIG-4

·KEY·
·C·SAW TOOTH
·D·CONCRETE OR TILE
·E·BOOK TILE
·F·CEMENT TILE

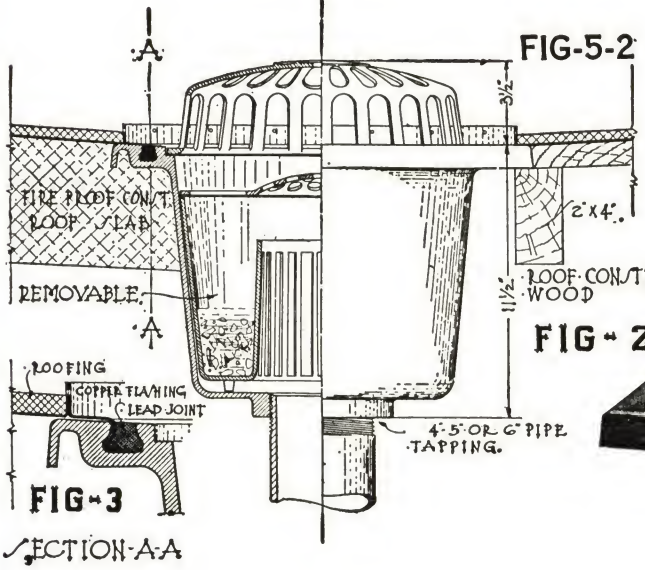


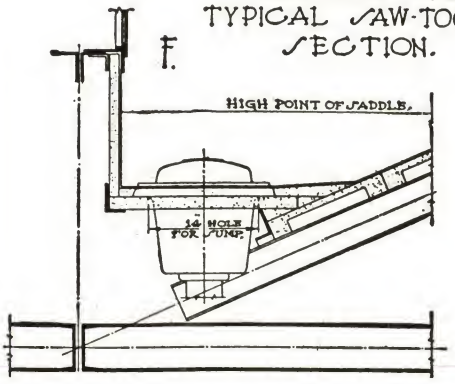
FIG-5-2

FIG-2

FIG-3

SECTION A-A

CEMENT TILE.
TYPICAL SAW-TOOTH SECTION.



NOTE.-MADE IN ONE SIZE ONLY
HEIGHT 15", WIDTH 18"
WEIGHT 100# TAPPED FOR EITHER
4", 5" OR 6" PIPE AS REQUIRED.

DRAWN FOR THE RILE COMPANY, INC.	METHODS OF INSTALLATION AND DETAILS OF RILE ROOF SUMPS	SHEET NO. 1 SCALE ⅜, 1½ & 3 EQUALS 1-0"

ESTABLISHED 1888 BARNEY GOLDMAN, President

SUPERIOR STANDARD ROOF AND FLOOR DRAINS

MANUFACTURED BY
SUPERIOR SKYLIGHT COMPANY, INC.
95 Webster Avenue, LONG ISLAND CITY, N. Y.

For Stage Skylight Ventilators, see Manufacturers' Index

Superior Standard Roof Drains

(1) Made of heavy cast iron, galvanized cast iron, brass or aluminum.

(2) Adaptable for all types of roof decks.

(3) A brass expansion sleeve works freely against ground graphited, asbestos packing. This packing is held into place by a ring under the pressure of three wingbolts.

It provides an expansion of 1½ ins. in each direction or a total expansion of 3 ins.

(4) Economical in cost and easy to install.

(5) Types of superior standard roof drains illustrated that are not shown with brass expansion sleeve can be equipped with same as a separate unit.

(6) Standard Type Roof Drains: Types "C," "L," "R," "S," "T" and "U" furnished in cast iron, galvanized cast iron, brass or aluminum. Types "A" and "B" furnished in aluminum only.

Chrysler Building, New York, N. Y.

Superior Cast Aluminum Roof Drains

(1) Made of cast aluminum only, which is non-corrodible and stronger than cast iron.

(2) Adaptable for all types of roof decks.

(3) A flexible lead expansion joint of convoluted folds between the bowl and conduit provides approximately 3 in. expansion and contraction. This flexible lead joint is protected against infiltration of concrete by a temporary corrugated paper collar.

(4) Equipped with an inner discharge tube which forms a warm air chamber and prevents freezing.

(5) A recent hydrostatic test by the Columbia University laboratory of 43 lbs. per sq. in. showed no leak in connection between the lead and aluminum.

(6) Easy to install, no adjustments, no nuts, bolts or fitments necessary.

Superior Roof Drains Insure Watertight Connections

All Superior Roof Drains whether made of cast iron, galvanized cast iron, brass, or aluminum, have a wide lead flange that insures a permanent watertight connection between the leader box and the roof.

The lower ends are ferruled to lead calk into cast iron pipes or threaded for wrought iron pipes.

Superior Roof Drains are adaptable to any type of roof decks. For roofs of flat brick, tile, inlaid slate or smooth cement, connection is furnished with a tile stop. When drain is to be used on a roof of gravel, slag or other plastic material, the bowl is provided with a suitable gravel stopper.

Should you have any roof drain problems that the description on these pages does not cover, please write and describe your problems. We shall be glad to co-operate with you.

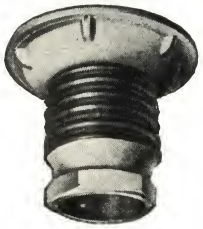
Type "A" Roof Leader Connection

This is intended for installation with a cast iron leader line and is provided with a ferrule end to be lead-calked into the leader line.

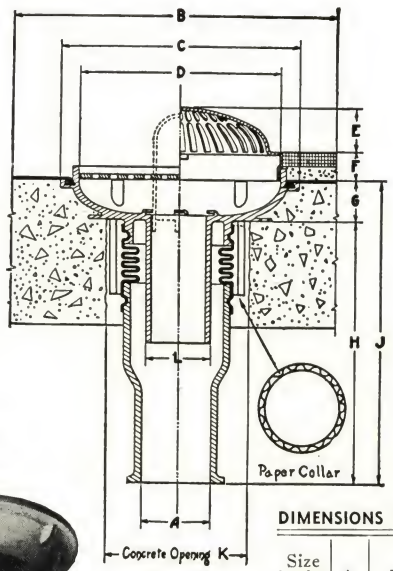
Type "B" Roof Leader Connection

This is made with a threaded end for use with threaded wrought iron pipe. Otherwise it is similar to type "A."

Type "A" Connection



Type "B" Connection



Detail Types "A" and "B"

Type "C" Roof Leader Connection

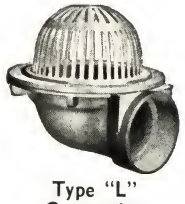
Without an expansion joint and is intended for use when the roof deck is too close to the underneath ceiling to permit the larger types to be used.

Type "C" Connection

Type "L" Roof Leader Connection

Type "L" is the same as Type "C" but made with side outlet for calking.

Particularly adaptable for ceiling use where height from ceiling to finished roof is limited and where conditions do not permit a straight connection to the leader line.



Type "L" Connection

DIMENSIONS TYPES "A" AND "B" SUPERIOR ROOF LEADER CONNECTION

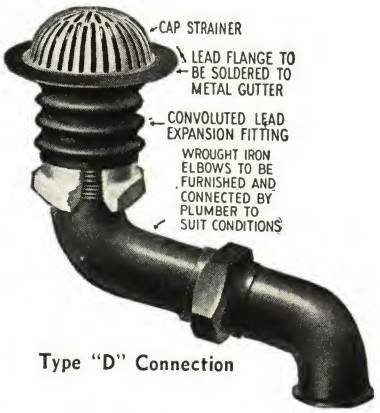
Size leader	A	B	C	D	E	F	G	H	J	K Roof opening	L	Wt. lb.
2	2	13½	8¼	6	2	1¾	1¾	9¾	11½	5½	2	7¼
3	3	15	8¼	6⅜	3¾	1¾	1¾	9¾	11½	6	3	7¼
4	4	19	11	9	5	1¾	1¾	12	13¾	7½	4	14
5	5	21	12¾	10⅜	5½	1¾	2½	12¾	15¼	8½	5	18
6	6	21½	13	10⅜	5½	1¾	2½	13	15½	9½	6	22½

Table gives approximate over-all dimensions in inches and will be helpful when drawing up specifications.

Type B: The dimensions of Type B are the same with the exception of the heights. The heights of Type B for leader sizes 3, 4, 5 and 6 in. are 7½, 9, 12 and 13 in., respectively.

Type "D" Roof Leader Connection

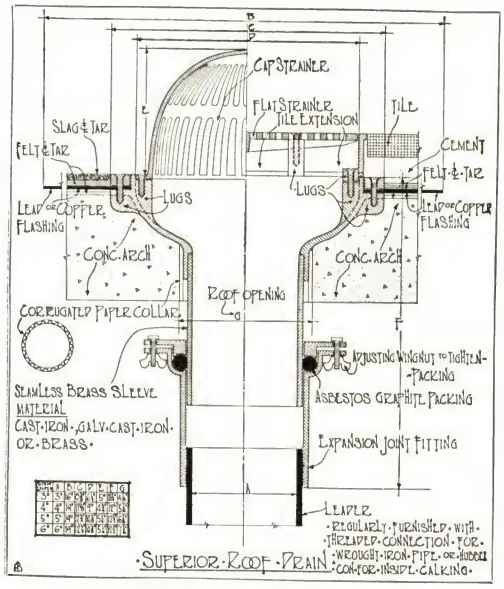
This is the same as Type "A" except for the elbow offset for stone and terra cotta cornices.



Type "D" Connection

Type "R" Roof Leader Connection

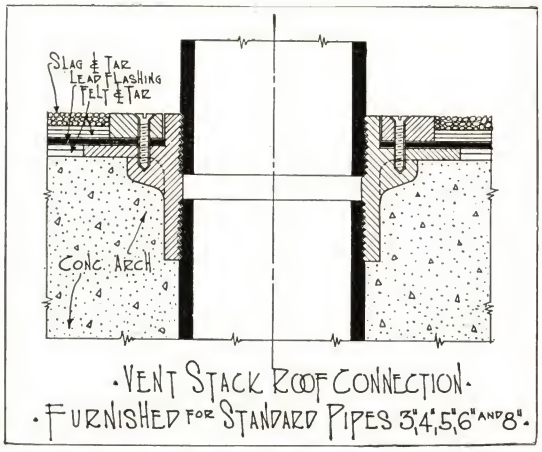
Intended for installation with a wrought iron pipe. Furnished in cast iron, galvanized cast iron, brass or aluminum. All standard pipe sizes.



Type "R" and Type "S" Connections

Type "S" Roof Leader Connection

Similar to Type "R" but furnished with a ferrule to be lead calked into a leader line. All standard pipe sizes.



Type "T" Roof Vent Stack and Leader Connection

Type "T" Roof Vent Stack and Leader Connection

This drain is designed to be used in connection with vent lines and affords a roof connection with all the advantages of our roof drains. When installed for long vent lines, we recommend the use of the brass expansion sleeve which is furnished as a separate unit. Regularly furnished in cast iron, galvanized cast iron, brass or aluminum.

Type "U" Roof Leader Connection

Type "U" Roof Leader Connection

This type drain connection was designed and used for installation in prominent public and municipal buildings, but is adaptable for all other types of building. Regularly furnished in cast iron, galvanized cast iron, brass or aluminum.

Tile Stop

Made of aluminum for use on roofs of flat tile or smooth cement finish.

Tile Stop

Strainers

Three types of strainers may be had. A cap strainer which sets over the entire bowl, a flat strainer which is used on promenades, and a bowl strainer which sets down into the leader bowl.

Bowl Strainer

Flat Strainer

Cap Strainer

Typical Installations of Superior Roof Drain Connections

Building	Location	Architect
New York Central Building	New York, N. Y.	Warren & Wetmore
Chrysler Building	New York, N. Y.	William Van Allen
New York Telephone Co.	Richmond Hill, N. Y.	Voorhees, Gmelin & Walker
Lefcourt National Building	New York, N. Y.	Shreve & Lamb
Equitable Life Insurance Building	New York, N. Y.	Starrett & Van Vleck
American Locomotive Building	Schenectady, N. Y.	R. G. White (Engr.)
State Homeopathic Hospital	Middletown, N. Y.	Sullivan W. Jones
Long Island Railroad Building	Long Island City, N. Y.	Long Island R. R. Co.
Security Insurance Building	New Haven, Conn.	H. K. Murphy
Bamberger Building	Newark, N. J.	Abbott-Merkt Co.
MacMillan Building	New York, N. Y.	Carrere & Hastings
Central Union Trust Building	Wheeling, W. Va.	Chas. W. Bates
New Hotel Netherlands	New York, N. Y.	Schultz & Weaver
Ford Administration Building	Detroit, Mich.	Albert Kahn, Inc.
Columbia High School	Columbia, Mo.	Wm. B. Ittner & Co.
Squibb Building	New York, N. Y.	Buchman & Kahn
Asbury Park Convention Hall	Asbury Park, N. J.	Warren & Wetmore

WADE IRON SANITARY MANUFACTURING CO.

Manufacturers of Wade "Accessible" Plumbing Specialties

1717-1721 South Canal Street, CHICAGO, ILL.

Products

BACKWATER VALVE DRAINAGE FITTINGS; WATER JACKET GREASE TRAPS and INTERCEPTORS; CAST IRON GREASE, CATCH, GARAGE, STEAM, CLEANOUT, BILGE PUMP, EJECTOR PUMP, and FLOOR DRAIN BASINS; FLOOR DRAINS; ROOF DRAINS; SHOWER DRAINS; MANHOLE COVERS, and DRAINAGE SPECIALTIES.

Services

Our Engineering Department is always glad to furnish detailed information regarding any of the specialties of our manufacture as to design or application. We are equipped to work out designs and full cost of any new sanitary equipment that may be required for special construction.

Catalogues

Our new Catalogue "D" contains full information, details, and specifications of all Wade Specialties, and will be furnished upon request, these pages showing only a selected number of articles.

Wade Backwater Valve with Flusher

Fig. D101

Absolute dependability characterizes this valve. Its extra heavy cast iron body and brass swing check valve will withstand all pressures, and will give permanent flood protection. The Flusher connection, exclusive to all Wade fittings, permits the valve faces to be thoroughly cleaned with water under pressure, thus eliminating possible stoppage of the valve action. Valves without this feature require frequent hand cleaning or else become unsatisfactory after short service.

The Wade Valve is adapted to receive any number of cast iron extensions making the sewer line always accessible from floor level, regardless of depth. Furnished in all sizes with gas tight bolted cover. Threaded cleanout furnished if desired.

Wade Combination Lock-out Valve

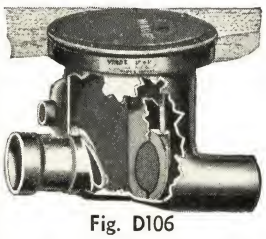


Fig. D106

This combination insures positive flood protection under all conditions. Its action is both automatic and manually operated. The latter action permits the closing of buildings or homes for extended periods of time without danger of unexpected floods causing damage. The extra heavy construction throughout insures a lifetime of service. The flusher enables clear water under pressure to be forced all over the valve faces, washing away any accumulated debris. The patented design of the sewer outlet prevents sewage from gathering under the valve. Made for 4, 6, and 8-in pipe.

Wade Backwater Floor Drains with Trap

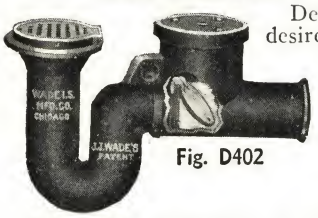


Fig. D402

Designed for all uses where it is desired to protect floors, pits, etc. from backwater. This type of floor drain is particularly desirable where a combined drain and deep seal trap is needed. This drain is furnished with or without backwater valve as desired, being equally valuable as a floor drain or cleanout.

The flusher connection is found on this drain also, making it possible to always keep the valve faces clean. If desired, both strainer and cleanout can be furnished in highly polished brass. The great accessibility of this type of floor drain makes it desirable for all sewer locations.

Wade Areaway Drain with Backwater Valve

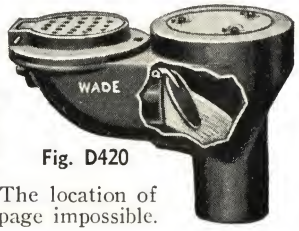


Fig. D420

Designed for areaways where the sewer line is high, and where a close connection must be made. Equipped with the reliable Wade backwater valve and flusher connection insuring positive action. The location of the valve in the drain makes stoppage impossible.

Wade Side Outlet Drain with Backwater Valve

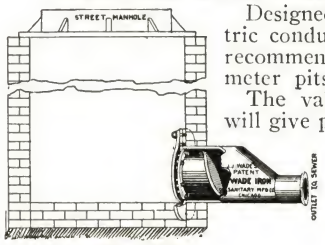


Fig. D130

Designed primarily for protecting electric conduit pits, this drain is also highly recommended for all street manholes, meter pits, elevator pits, etc.

The valve is extremely sensitive and will give permanent protection. Furnished with brass grate if desired, and when so equipped makes an excellent, economical swimming pool drain. Made in 4 and 6-in. sizes.

Wade "Accessible" Elbow Cleanout

This elbow was designed to prevent the clogging of sewer lines, waste pipes, and drain tile at junction joints. Its value cannot be too highly stressed, as there is practically a place in every building for one of these fittings. The ordinary elbow joining runs of pipe is laid at considerable depth. This makes it impossible to reach without breaking up the floor. The Wade Elbow can at all times be reached as it is adapted to receive cast iron extensions. The sewer can thus be easily rodded in any direction. The Flusher connection insures thorough cleaning without the manual work involved. We also manufacture cleanouts for "Y" connections and straight runs.

Fig. D126

Wade Cast Iron Basins

Wade cast iron basins are designed to take the place of brick or concrete basins to prevent grease, gravel, oil, and wastes of all kinds from entering the sewer. Cast iron basins last longer and are not subject to the attacks of acids that result from the decomposing sewage as are brickwork and concrete.

Fig. D300

Fig. D-300 is primarily a catchbasin and grease intercepting basin. When used in tandem connection this type cannot be excelled for efficiency, durability and sanitation.

Made in all sizes up to 60 in. diameter. Centers are of the bolted type with either wing bolts or countersunk bolts. Can be furnished with exposed outside seal if desired.

Wade Cast Iron Steam Blow-off Basins

Should be used in connection with every high pressure boiler. The use of these basins prevents the escape of live steam into the sewers where damage is bound to result.

Made in all possible sizes for all boiler horsepowers and pressures. These basins in tandem connection act as condensing and cooling units and have no equal in performance. Equipped with the flusher connection which permits cold water to be mixed with the incoming steam if desired.

Fig. D340

Wade Water Cooled Grease Trap

Fig. D220

By keeping the interior temperature of the trap always considerably less than the incoming waste water, the Wade Water Cooled Grease Trap is able to intercept more *grease per gallon* than any other type. A *complete* water jacket surrounds the entire trap, walls, bottom, and central partition, giving constant water circulation and maximum cooling area. Interceptors not water cooled cannot obtain the total grease content from waste water, because at excessively high temperatures the trap becomes as hot as the water, allowing the grease to pass through into the waste pipes and congealing there.

The operation is simple, not depending upon theory: the incoming waste water enters at bottom, is forced upward, and loses its grease content by precipitation after sudden contact with cold interior walls. Design of trap prevents too rapid outflow before chilling, an important point where high water temperatures prevail. Plain interceptors have not this feature.

Chemical analysis of waste water at an initial temperature of 160° F., after passing through the Wade Interceptor, disclosed a grease content of less than 1%—a remarkable proof of efficiency.

Complete details, sizes, capacities, etc., are shown in catalogue.

Wade General Purpose Interceptor

Designed as an all-around interceptor, this trap in its smaller sizes is particularly valuable for use with kitchen sinks where water cooled traps are not required. In its larger sizes this trap is ideal for hospitals, operating rooms, in optical and dental laboratories, as a plaster and lint interceptor, etc.

Fig. D210

All sizes are fitted with a central baffling partition forcing incoming waste water upward, allowing heavy particles to settle. Extra large deep water seal prevents particles from entering sewer. Cover is easily removable for cleaning.

If desired, this interceptor can be fitted with an exposed outside seal in place of the regular interior type. Low cost and high efficiency make this trap highly desirable.

Wade "Accessible" Floor Drain Basins

Fig. D380

Wade Floor Drain Basins are designed for concrete floors in laundries, factories, garages, service stations, manufacturing plants, etc., wherever there is an accumulation of mud or waste material. Few floor drains are equipped to intercept floor debris, allowing it to be washed into the sewer lines where it forms a solid substance; this condition necessitates tearing up the floor for repairs.

Wade Floor Drain Basins are made in all sizes for every plumbing requirement; the extra heavy grate will support all loads. These drains are extremely easy to clean, the center being quickly removable. Fig. D380 is equipped with a flange to protect ceilings from floor washings in multi-story buildings. For single floor installations drain without flange is recommended.

Fig. D388 illustrates the same drain except with an exposed seal for localities where such is required by building ordinance. This drain is also adapted to receive a bucket which is suspended on inside and easily removable. Both cover and cleanout can be furnished in brass if desired. Perforated or grated center is optional.

Fig. D388

Wade Slip-joint Roof Drain

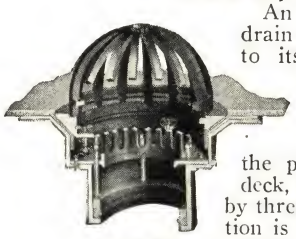


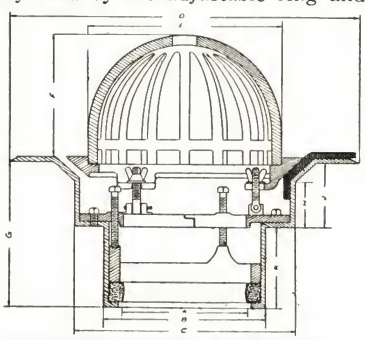
Fig. D450

An entirely new principle in roof drain construction, the Wade Drain, due to its slip-joint connection, eliminates all caulking, threading, and necessity of separate expansion joint. The installation is simple and quick: the drain is slipped over the pipe, fitted into place in the roof deck, after which the gasket is expanded by three bolts. Any expansion or contraction is absorbed by the graphited asbestos gasket.

The roofing material is flashed into the drain where it is permanently held by the adjustable ring and brass wing bolts, making a tight connection under which water cannot seep. Cost of copper flashing, caulking, and other methods to secure tight joint are eliminated.

Design of Wade Drain provides the most rapid water carry-off giving full flow and maximum capacity of down-spout pipe. It does not act as a catch basin, and thus cannot stop up. This feature is most valuable at times of emergency roof capacity, preventing pool formations.

Made in all sizes for various types of roof decks. Also made in small sizes for narrow valleys and small roof areas. All bolts are of Everdur non-corrosive metal. Fitted with flat grate for promenade decks and set-backs when so specified.



DIMENSIONS (INCHES) STANDARD SIZE DRAINS

Size	A	B	C	D	E	F	G	H	J	K	Wt.
3	3	5½	7¼	12	8½	5	7½	2½	3¼	4¼	40
4	4	6⅜	11⅜	18¼	10⅝	6½	7½	2½	3¼	4¼	78
5	5	7¼	11⅜	18¼	10⅝	6½	7½	2½	3¼	4¼	80
6	6	8¼	11⅜	18¼	10⅝	6½	7½	2½	3¼	4¼	82
8	8	10⅜	11⅜	18¼	10⅝	6½	7½	2½	3¼	4¼	85

DIMENSIONS (INCHES) SMALL SIZE DRAINS

Size	A	B	C	D	E	F	G	H	J	K	Wt.
2	2	4½	7¼	12	8½	5	7½	2½	3¼	4¼	38
3	3	5½	7¼	12	8½	5	7½	2½	3¼	4¼	40
4	4	6⅜	7¼	12	8½	5	7½	2½	3¼	4¼	42
5	5	7½	9½	13¾	10⅝	6½	7½	2½	3¼	4¼	50
6	6	8¼	9½	13¾	10⅝	6½	7½	2½	3¼	4¼	52

Wade "Accessible" Cast Iron Basin Seals

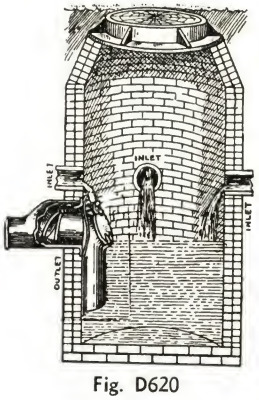


Fig. D620

Where brick or concrete catch basins are used, it is dangerous to health and sanitation to use a deep water seal unless of cast iron. Brick seals are extremely porous, inaccessible for rodding, and are very liable to be broken, allowing the escape of poisonous gases. The use of Wade cast iron seals prevents this danger, as is recognized by the more modern practices of sanitary engineering.

All types of Wade seals are fitted with gas tight hinged cleanout door, providing quick access to sewer lines. Furnished with or without back water valve.

Wade cast iron basin seals are so practical, so accessible, so simple in construction and installation that they should be incorporated in all drainage plans, and to this end we ask the investigation of architects and engineers.

Wade Cast Iron Manhole and Basin Covers

Wade cast iron covers are designed for every conceivable purpose and are of all possible types and sizes, representing the largest assortment of covers in the country.

Fig. D510 shown is the light weight bolted type and should be placed on all basins to prevent the escape of gas. This is the latest and most sanitary cover made.

Wade covers are made in all sizes and for all loads including types for street and gutter use. The centers may be had bolted, loose, solid, perforated or grated, round or square. Special covers made upon order. Catalogue illustrates nearly one hundred types.

Fig. D510

THE HARRINGTON OUTLET

AGENTS

T. NEW CONSTRUCTION COMPANY

520 West 29th Street

NEW YORK, N. Y.

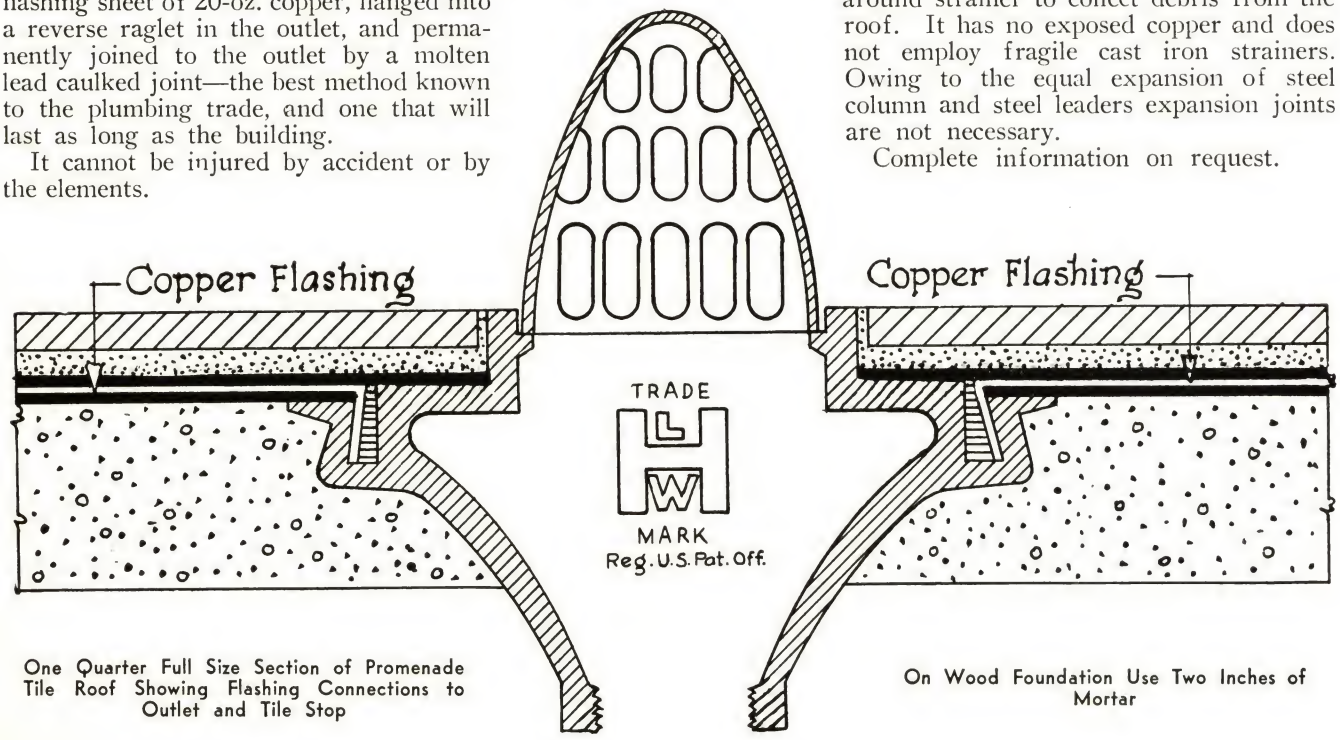
For Promenade Tile, Brick, Slag or Smooth Surface Roofs

The Harrington outlet is practical, economical, permanent and foolproof. The connection with the membrane waterproofing of the roof is made with a seamless flashing sheet of 20-oz. copper, flanged into a reverse raglet in the outlet, and permanently joined to the outlet by a molten lead caulked joint—the best method known to the plumbing trade, and one that will last as long as the building.

It cannot be injured by accident or by the elements.

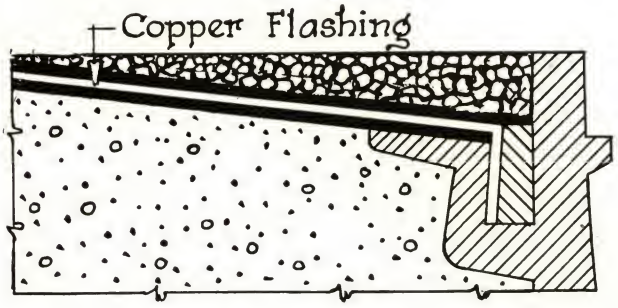
It has no bolted sections, clamps, rings, membrane flashings, copper pans with many soldered joints, soldered tile or slag stops. There is no annular space around strainer to collect debris from the roof. It has no exposed copper and does not employ fragile cast iron strainers. Owing to the equal expansion of steel column and steel leaders expansion joints are not necessary.

Complete information on request.



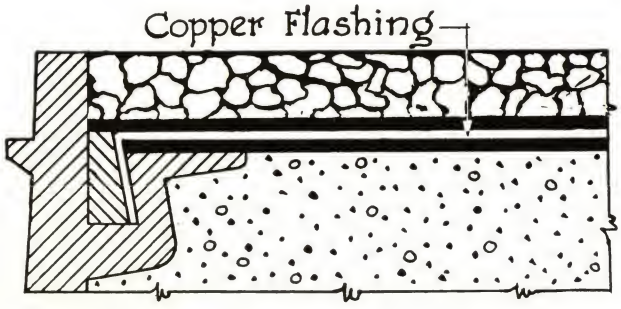
One Quarter Full Size Section of Promenade Tile Roof Showing Flashing Connections to Outlet and Tile Stop

On Wood Foundation Use Two Inches of Mortar



One Half Full Size Section of Smooth Surfaced Roof Showing Flashing Connection to Outlet.

Notice the gravel armor around outlet, protecting the membrane at point of greatest wear.



One Half Full Size Section of Slag Roof Showing Flashing Connection to Outlet

ESTABLISHED 1891

BUHRING WATER PURIFYING CO.

42 Murray Street, NEW YORK, N. Y.

REPRESENTATIVES

NEW YORK, N. Y., Boston Water Purifier Company, 40 Murray Street CHICAGO, ILL., Allen-Buhring Purifying Service, 107 No. Wacker Drive
BOSTON, MASS., Boston Filter Co., Harvard Square, Charlestown District

Products

WATER PURIFIERS, FILTERS.

Also Drinking Fountains, Sanitary Bublers, Coil Coolers.

BUHRING
Reg. U. S. Pat. Off.

Sizes—The Buhring Purifier is made in three sizes, Nos. 14, 15 and 16.

DIMENSIONS AND CAPACITIES

Size, No.	Dimensions, in.	Inlet, in.	Rate of flow, per min., gal.	Capacity, per year, gal.	Weight, lb.
14	8 x 8	⅜	½–1½	5000	20
15	8 x 12	⅜	½–2	7000	25
16	12 x 22	½	1 –3	35000	100

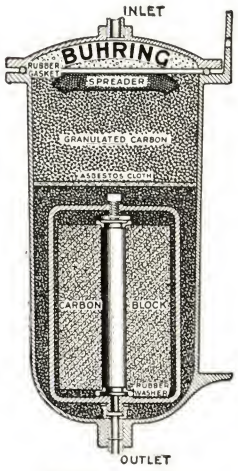
Rate of flow will vary in accordance with water pressure and density of carbon blocks used. Capacities are based on New York, N. Y. water when in normal condition, or its equal.

For drinking water systems, figure one No. 16 Unit for every gallon per minute capacity of circulating pump.

Buhring System Purifier

The Buhring System Purifier is for filtering and purifying water used for drinking purposes in hotels, restaurants, homes, offices, ice plants and other places where water free from impurities is essential. The Buhring eliminates all organic matter, either in suspension or physical solution, as well as considerable matter in chemical solution. The water is also decolorized and deodorized as the foreign matter is removed.

The Buhring System Purifier delivers the water pure and sparkling with all of its natural qualities retained.



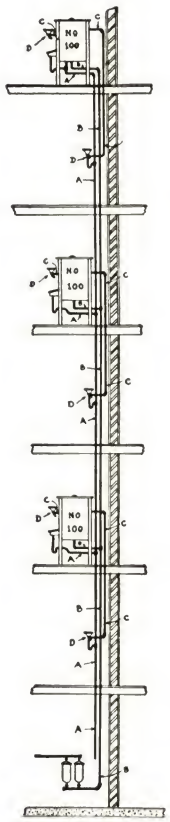
Sectional View Buhring Purifiers Nos. 15 and 16

Construction—The purifier is a cast iron pot with removable cover, protected against corrosion, which holds the filter bed. The pot has a water inlet at the top and outlet at the bottom. Inlet and outlet fitted with standard screw pipe threads for connection to water system. The filter material consists of perfectly sterilized granulated charcoal of different grains, asbestos and a moulded carbon block.

The carbon block is mounted on pure gum washers by means of a frame or cross bar support in such manner that no metal or other material is present in outlet bore of carbon block.

Operation—The water entering the top of the purifier is released in a bed of loose granulated charcoal (a spreader is placed in this bed to force water over larger areas) passes through to a layer of asbestos cloth, through the asbestos cloth to another bed of charcoal where it strikes the carbon block, forcing its way to the outlet pipe. The larger and heavier impurities are stopped by the charcoal fields and final purifying is done by the carbon block.

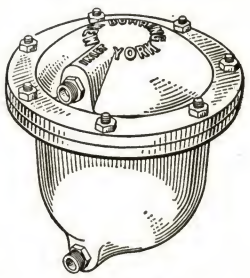
Carbon Block—The density and hardness of the carbon block is gauged according to the pressure and quality of the water where purifier is to be used. Density of each block being determined after location is decided. The carbon elements are replaceable and should be renewed when absorbent properties become inert.



Small Building Installation

A—Waste pipe
B—Purified water supply
C—Cold water supply
D—Bubble regulator

No. 14—This size Purifier was designed chiefly for use with electric water coolers and can be installed underneath most of them, being only 8 in. in height. Inlet and outlet connections are on the side so as to eliminate headroom and castings are heavy enough to withstand most any water pressure met in ordinary practice. Different types of brackets can be used to support purifier in various positions. No. 14 has a capacity up to 15 gallons a day.

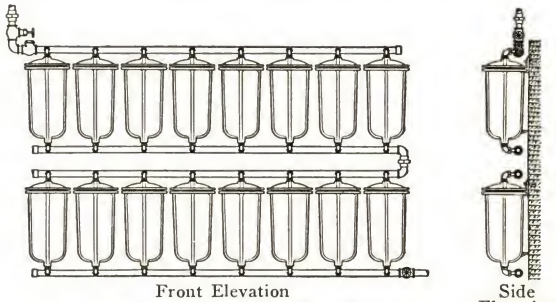


No. 14

No. 15—For use where not more than 20 gallons per day are needed.

No. 16—For use where quantities up to 100 gallons per day are needed.

When a quantity in excess of 100 gallons per day is required, the No. 16 is used in parallel, and any capacity can be obtained this way. The units are then hung in rows to suit the location allotted to them and connected by means of tinned brass headers and fittings.



Front Elevation Side Elevation

Battery of No. 16 Buhrings

NO. 16 FOR ICE PLANTS

Tons of ice per day	½	1	2	3	4	5	6	7	8	10	12	15	20
Double units in compound	2	4	8	12	14	16	18	20	22	24	30	36	40

Tests—The Buhring Purifier has passed many tests in its 40 years of service. Results of said tests furnished upon application.

Cleaning—Cleaning is by *renewal* only. Where water is extremely bad, a special back-wash connection may be used to lengthen the life of carbon elements. Records are kept so that on orders for renewals the correct carbon block can be furnished.

CALIFORNIA FILTER COMPANY, INC.

981 Folsom Street, SAN FRANCISCO, CALIF.

DISTRICT SALES OFFICES

SEATTLE, WASH., 514 Fourth Avenue

LOS ANGELES, CALIF., 4157 Beverly Boulevard

Products

WATER PURIFICATION and TREATING EQUIPMENT: Water Filters, Pressure and Gravity; Hypo Sterilizing Devices; Chlorine Control Apparatus; Liquid Chlorine; Water Softeners; Rate of Flow Indicator; Recorders; Controllers; Dry Chemical Feeders; Venturi Meters.

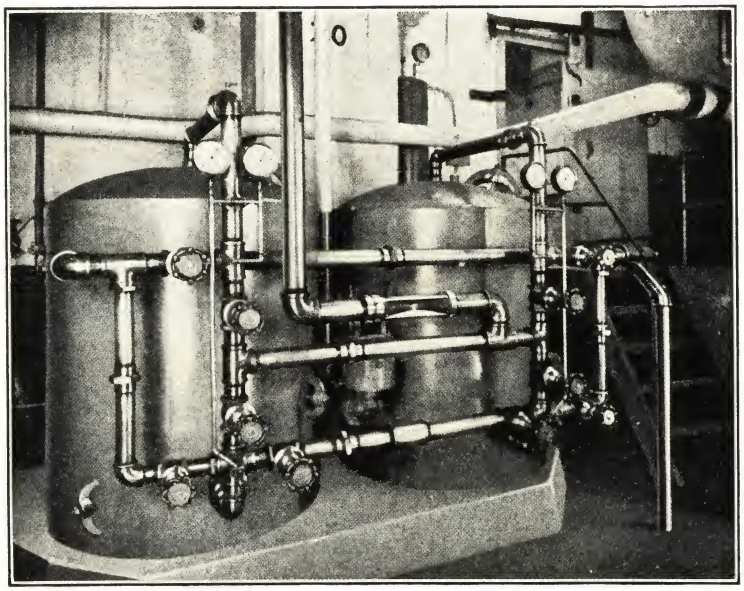
TRADE-MARK

Water Filters

Pressure Type—Constructed of steel plate; underdrain systems, cast or galvanized iron pipe; strainer heads, zinc-free bronze; coagulant tanks of cast iron.

Operation—Usually connected directly to existing water systems without change of piping arrangements or supplying additional pumping equipment.

Gravity Type—Steel, wood or concrete.



Duplex Vertical Pressure Filter, Type K

FILTER SPECIFICATIONS AND SCHEDULE OF SIZES AND CAPACITIES

Type	Size diameter, in.	Inlet, outlet piping, in.	Waste pipe, in.	Height over all, ft. in.	Floor space required, ft. in.	Capacity in U. S. gallons At 2-gal. rate Minute	Hour	Total wt., lb.
			Vertical Filters					
A	12	¾	1	5—0	1—6 x 2—0	3	180	450
	16	1	1¼	5—0	1—10 x 2—11	4	240	750
	20	1	1¼	5—0	2—0 x 3—3	7	420	950
J	30	1½	1½	5—7	3—6 x 5—0	10	600	1,300
	36	1½	1½	5—7	3—6 x 5—5	15	900	2,000
K	40	2	1	5—9	4—0 x 5—6	18	1,080	2,500
	42	2	2	5—9	4—2 x 5—9	20	1,200	2,700
	48	2½	2½	5—11	4—6 x 6—0	25	1,500	3,500
	50	2½	2½	5—11	4—6 x 6—3	28	1,680	3,700
	54	2½	2½	6—0	4—6 x 6—7	32	1,920	4,400
	60	2½	2½	6—0	5—0 x 7—3	40	2,400	5,500
L	66	3	3	6—2	5—6 x 7—9	48	2,880	6,700
	72	3	3	6—5	6—0 x 8—3	57	3,420	8,000
	78	3	3	6—6	6—6 x 8—9	67	4,020	9,300
	84	4	4	6—10	7—0 x 9—6	77	4,620	10,700
	96	4	4	7—2	8—6 x 10—7	100	6,000	13,400
	Diam. length		**Horizontal Filters**					
H-6	6 x 8	4	4	7—6	6—6 x 10—9	96	5,760	17,000
	6 x 10	4	4	7—6	6—6 x 12—9	120	7,200	21,300
	6 x 12	4	6	7—6	6—6 x 14—10	144	8,640	25,500
	6 x 14	6	6	7—6	6—6 x 17—0	168	10,080	29,750
	6 x 16	6	6	7—6	6—6 x 19—0	192	11,520	34,000
	6 x 18	6	6	7—6	6—6 x 21—0	216	12,960	38,250
	6 x 20	6	6	7—6	6—6 x 23—0	240	14,400	42,500
H-8	8 x 10	4	6	10—2	10—0 x 16—0	160	9,600	29,200
	8 x 12	6	6	10—2	10—0 x 18—0	192	11,520	35,100
	8 x 14	6	6	10—2	10—0 x 20—0	224	13,440	40,900
	8 x 16	6	8	10—2	10—0 x 22—0	256	15,360	46,800
	8 x 18	6	8	10—2	10—0 x 24—0	288	17,280	52,600
	8 x 20	8	8	10—2	10—0 x 26—0	320	19,200	58,400
	8 x 25	8	10	10—2	10—0 x 31—0	400	24,000	73,300

Gauntt Dry Chemical Feeders

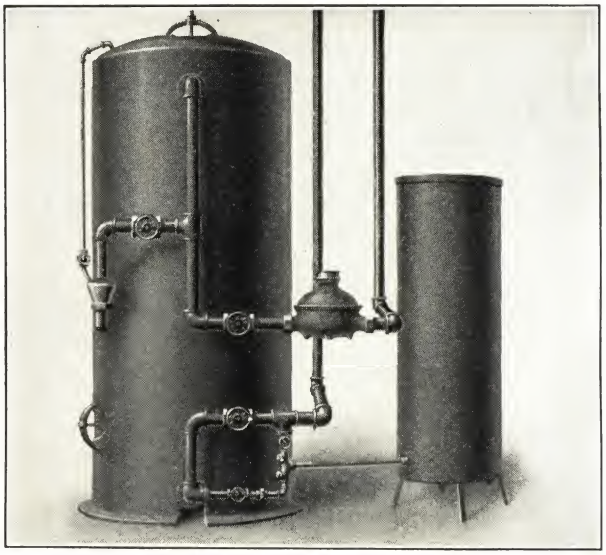
All sizes and capacities for coagulants and lime, dry or solution feed.

Calcilite (Zeolite) Water Softener

The Calcilite mineral has a higher exchange value than most zeolites on the market, giving a greater capacity between regenerations. The mineral is of crystalline, white, porous structure, always delivering clear soft water. It is specially adapted to use for the household, laundry, industrial plants, and hotels.

Complete units of both pressure and gravity types are furnished. In the pressure types we furnish both vertical and horizontal units with interconnecting piping where more than one unit is supplied. The equipment includes all the necessary piping, control valves, water meters, and brine tank.

The features of quick regeneration and greater capacity between regenerations makes the Calcilite Softener the most satisfactory for domestic use, as attention to the equipment is reduced to a minimum. Valves are conspicuously marked and full directions for installation and operation are furnished.



Calcilite Water Softener

Rate of Flow Indicator

Designed for accurate, simple indication of water velocities by means of a Pitot tube inserted in any size line—wood, steel or cast iron.

Venturi Meters, Rate Controllers, Recorders

Builders Iron Foundry equipment, all sizes and capacities.

CONSOLIDATED FILTERS CO., INC.

Consol Filters for Water Purification

138 Prince Street, NEW YORK, N. Y.

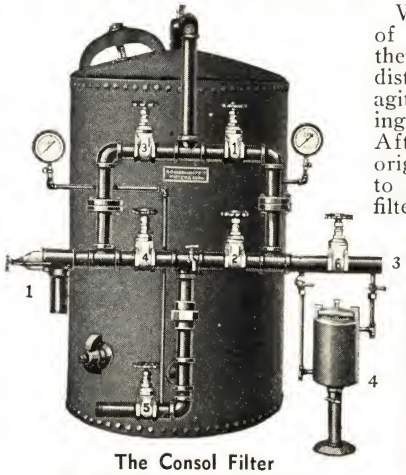
THE EXTRA DEPTH OF CONSOL FILTERS GIVES FINER FILTRATION

For a quarter of a century we have specialized in water filtration. Our experience acquired during this time has enabled us to improve the construction of our filters and simplify the cleaning system. Consol Filters today combine marked simplicity of construction with an unusually high operative efficiency.

Wide Range of Uses of Consol Filters

Consol Filters, because of their dependability and construction, are today specified for hospitals, schools, swimming pools, industrial plants, film laboratories, laundries, beverage plants, public buildings, ice plants, hotels, private dwellings, etc.

Consol Filters work equally well on hot water. When used for hot water, the filter is charged with Consol "Combone," a special process pure animal boneblack.



The Consol Filter

(1) Waste water cleaning outlet. (2) Filtered water. (3) Inlet. (4) Coagulator (alum pot)

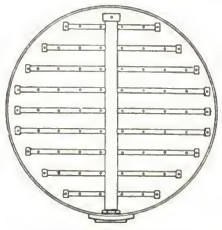
Special Features of Consol Filters

Extra Depth—Most engineers agree on a filter bed 38 ins. deep to filter water at the rate of 3 gal. per sq. ft. of filtering area per minute. However, it frequently happens that floor space is limited or that water is so badly discolored that a filter bed of greater depth is needed. To meet this condition, all Consol Filters are built from 8 to 12 ins. higher than standard. For this reason filtrate delivered by Consol Filters is exceptionally clear.

Dependable Valve System—The decidedly simple Consol Valve System eliminates the use of compound valves and internal rakes.

This simple system controls the correct distribution of the water, which enters the filter at the top and discharges through the manifold system at the bottom, perfectly filtered.

Tightly Packed Filter Bed—Great care is used in selecting the best quality quartz and gravel of uniform size for Consol Filters. This assures a tightly packed filter bed that delivers a remarkably fine filtrate, free from all matter in suspension.



Consol Distributor Manifold

Distributor Manifold—Consol Filters over 24 ins. in diameter are fitted with Consol Distributor Manifold consisting of a main trunk pipe with branch pipes at right angles covering the entire inside base and firmly embedded in cement up to the level of the heavy duty brass strainer screens. These screens are fitted into the manifold and so spaced that the water is distributed evenly.

Bronze Screens—Consol Filters under 24 ins. in diameter are equipped with a single large size heavy duty bronze perforated screen extending completely across the filter at the bottom, and a similar screen extending down 12 ins. from the top.

Strong Construction—Consol Filters are constructed of heavy gauge steel with flanged and dished heads having seams riveted and calk-welded and all material hot dipped galvanized after fabrication.

All sizes are tested for 100 lbs. working pressure and are given a hydrostatic test of 150 lbs.

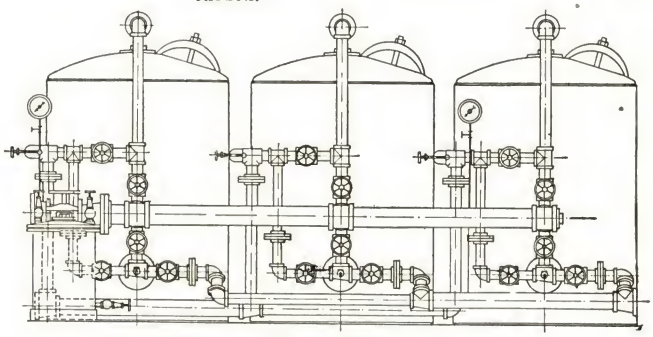
Operation of Consol Filters

When the valves are set for filtering, the raw water enters at the top of the filter and by means of a baffle plate and spreading screens, is distributed evenly over the entire surface of the filter bed. Passing downward through the filter bed and strained through the distributor manifold, the filtered water discharges through the outlet at the base of the filter.

When the filter is to be cleaned, the flow of water is reversed. The raw water then enters at the bottom through the distributor manifold and, passing upward, agitates and washes the entire filter bed, forcing the accumulated impurities to pass out. After cleaning, the valves are reset in their original position. The filtered water is run to waste for a few minutes to pack down the filter bed and the filter is then ready for use.

Models and Capacities

Consol Filters are made in single units, double units and in batteries of multiple units. These units may be charged with either quartz, boneblack or combinations to suit requirements. One large filter is less expensive than two or more smaller ones of equal capacity. Two or more units can be so piped that the filtered water from one may be used to wash the other. Washing each unit with filtered water preserves the filter bed. This multi-cylinder connection is particularly desirable where the water to be filtered is discolored and turbid.



Battery of Three Consol Filters

CAPACITIES FOR CONSOL FILTERS

No.	Filter shell diam., in.	Supply and outlet pipes, in.	Capacity, gal. per hour
14	14	¾	180 to 240
16	16	1	250 to 330
20	20	1½	350 to 460
24	24	1½	550 to 730
30	30	1½	900 to 1200
36	36	2	1250 to 1650
42	42	2	1800 to 2400
48	48	2½	2400 to 3200
54	54	2½	2900 to 3800
60	60	2½	3600 to 4800
66	66	3	4200 to 5600
72	72	3	5100 to 6800
78	78	3	6000 to 8000
84	84	4	7000 to 9300
96	96	5	9000 to 12000

All filter shells are 60 ins. high, not including head.

The minimum capacities given herewith are figured for water at a pressure of 30 lbs., with the filter operating at the rate of 3 gal. per minute per sq. ft. of filtering area. If the water to be filtered is *extremely* turbid and muddy, the capacity will be less. Whereas, if the water has but a small amount of matter in suspension, it is fair to figure the greater capacity.

Our Extensive Service

Within a radius of 50 miles of New York, we deliver all Consol Filters free of charge. And, if requested, within 100 miles, we personally supervise the installation. After the installation is completed, we start the filters in operation.

Our experience in handling various kinds of water supplies under all conditions and for a vast range of uses enables us to ascertain the proper size and type of filter required. This advisory service we render gratis to architects, engineers and contractors.

CRANE CO.

Manufacturers of Water Softeners

836 South Michigan Avenue, CHICAGO, ILL.

For List of Branches and Sales Offices, see our Plumbing Section

Product

WATER SOFTENERS, Industrial and Household.

For our pages on Water Heaters, Gas Fired Boilers, Water Supply Systems, Plumbing Fixtures, see Manufacturers' Index.

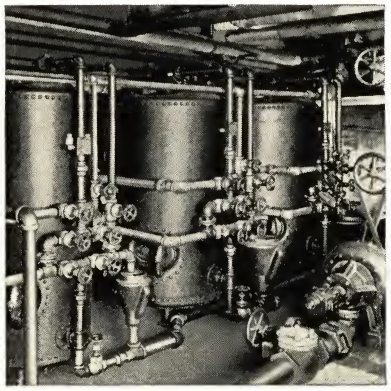
Crane-Warlo Water Softeners

These up-flow systems, for the removal of all lime and magnesium in water, are supplied in sizes and capacities for every use, industrial, household, and municipal. The tanks of the smaller household machines are of corrosion resisting cast iron; those of the larger, of welded steel; and those of the industrials, of steel, both riveted and welded. The distributing system is planned to supply water uniformly to the mineral bed, avoiding both channeling and packing. Top strainers prevent the loss of mineral and eliminate rate of flow controls. Special orifice regulates accurately the time of contact between mineral and brine, regardless of pressure, while the patented regeneration cycle saves salt and water waste.

An exclusive mineral is used in all Crane Softeners. It is unique in that it combines the high capacities of synthetic minerals with the rapid flow rate of natural green sand.

Industrial Softeners

Crane-Warlo Industrial Softeners meet practically every requirement. They have a softening capacity three times that of green sand and will produce full capacity and a constant supply of soft water at high flow rates. Standard sizes range from 24 to 120-in. tank diameter; special sizes for any capacity.



Typical Crane-Warlo Industrial Installation

Domestic Softeners

The *Crane-Warlo* Water Softener and the *Warlo*.

Style SA-22—This softener requires but little time or attention. The brine tank needs refilling only after every tenth regeneration. Regeneration is simplified to moving a hand lever to two different positions, then returning it to its original setting.

Crane-Warlo Water Softener Style SA36

Style SA-36—This operates on exactly the same principle as the SA-22. It differs only in its larger size, and the fact that heavy steel has been substituted for cast iron in the tanks to reduce weight.

Style CW-22, CW-36—Made in two sizes, this hand-operated softener dependably supplies Crane-Warlo soft water at the lowest possible cost.

OTHER CRANE-WARLO HOUSEHOLD WATER SOFTENERS

Size	SA-22 CW-22	SA-36 CW-36
Maximum flow rate intermittent service in gal. per minute	10	20
Hardness of water in grains per gal.	Gallons soft water per regeneration	
8	2750	4500
10	2200	3600
12	1833	3000
14	1571	2571
16	1375	2250
18	1222	2000
20	1100	1800
22	1000	1636
24	916	1500
26	846	1384
28	785	1285
30	733	1200
32	687	1125
34	647	1058
36	611	1000

To choose the right softener for the home, multiply the number of gallons of water used every two weeks by the grains of hardness. Then consult the table and select one of similar capacity.

The New Warlo Softener

The new *Warlo* Water Softener sells at the lowest price consistent with quality. It is made in brine tank and hand-operated types. The former regenerates at the turn of two control levers; the latter requires in addition the pouring in of salt. Low price in these softeners represents no sacrifice in dependability or service. They feature the up-flow softening and down-flow regeneration utilized in the most expensive softeners; all valves, fittings, and working parts are of Crane quality.

CAPACITIES OF NEW WARLO WATER SOFTENERS

Size	HO-12	BT-15
Maximum flow rate	6	6
Hardness of water in grains per gal.	Gallons soft water per regeneration	
8	1500	1874
10	1200	1500
12	1000	1250
14	857	1071
16	750	937
18	666	833
20	600	750
22	545	681
24	500	625
26	461	577
28	428	536
30	400	500
32	.....	469
34	.....	441
36	.....	416

THE FILTRINE MANUFACTURING COMPANY

ESTABLISHED 1910

Manufacturers of Filters and Water Coolers

51-53 Lexington Avenue, BROOKLYN, N. Y.

Products

FILTERS for water (hot or cold), syrups, vegetable oils, extracts, preserving brine, etc., capacities 1 to 100 gal. per minute.

WATER COOLERS and FILTERS, combined, cooled by ice.

Also ELECTRIC WATER COOLERS, small and large capacities, and CIRCULATING DRINKING WATER SYSTEMS.

Filtrine

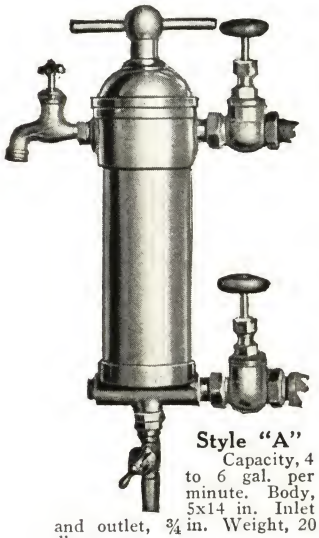
Filtrine is the filtering material used in all "K-System" filters. This fabric contains the essential qualities of a filtering material, as specified by recognized standard authorities, here and abroad, viz.: all filtering devices must be constructed so as to allow frequent renewal of filtering bed.

Why? Because no medium can retain its purifying power indefinitely. The oftener it is changed, the more effective the filter.

Filtrine retains all suspended matter, rendering the water clean and pure. To clean the filter take out the dirty "spent" sheet and replace with new. Upkeep cost is very low.

"Filtrine" Style "A" Filter

This filter is designed to be set in the supply line, feeding a number of outlets. Filtered water can be drawn from the filter at the same time it is supplying other outlets.



Style "A"
Capacity, 4 to 6 gal. per minute. Body, 5x14 in. Inlet and outlet, ¾ in. Weight, 20 lb.

Especially suitable for: *Drinking water lines* in factories, hotels, office buildings, banks, theaters, etc. *Hot water lines* in private homes, apartments, etc. *For general installation* in bottling plants, laboratories, restaurants, ice-making plants, etc.

For greater capacity, filters can be mounted in multiples.

Operation—Water enters center standpipe from the bottom where the force is broken by the specially designed "baffle." From the standpipe the water works outward through the encasing cylinder of "Filtrine," depositing all the suspended matter on the surface of the filtering material, the purified water flowing off at either of the outlet valves.

Made of heavily nickeled brass, valves and fittings of finest material. Tested for 75 lb. working pressure. All capacities are based on 25 lb. pressure per sq. in.

To clean, merely close inlet and outlet valves, open waste, remove top and lift out, and replace the "Filtrine." The entire replacement takes less than one minute.

Style "B"
Capacity, 15 to 20 gal. per minute. Weight, 100 lb. Floor space required 18x18 in. x 24 in. high. 1½-in. inlet. 1½-in. outlet

"Filtrine" Style "B" Filter

Suitable for general circulating water systems in hotels, theaters, restaurants, apartment houses, department stores, and for filtering water for swimming pools, ice plants, factory and industrial use.

Installed at any point in the water service line.

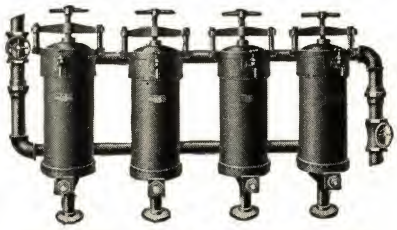
Made of galvanized iron. Can be installed in batteries of two or more units with capacities up to 100 gal. per minute.

Style "B" Filter in Multiple Units—Where a large amount of water is used we manufacture multiple units of Style "B" filters.

Any number of these filters may be installed in a battery to care for a large supply of water.

They will be found very practical and will give unexcelled service in homes, hotels, schools, clubs, swimming pools, ice plants, etc.

Equally applicable to either cold or hot water supply.



Style "B" Filters in Multiple Unit
Space required for above, 2x2 ft. x 4 ft. high. Capacity, 75 to 100 gal. per minute. Weight, 500 lb.

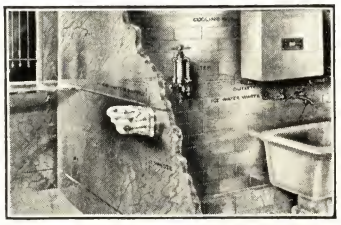
"Filtrine" Wall Bubbler Type 5A

"Filtrine" wall bubbler takes the place of elaborate circulating drinking water system. Cooling box and filter located in one room, sanitary drinking fountain brought out in main room. Original expense and upkeep are moderate.

Steel cooling box of white enamel, dimensions according to available space (usual size 25½x11x20 in.), tinned copper lining, cork insulation; block tin cooling coil, in conjunction with cooling cell.

Style No. 1 filter. Sanitary drinking fountain furnished to suit client.

Designed for stores, banks, restaurants, theaters, offices, etc.



Typical "Filtrine" Wall Bubbler Installation
Note the absence of the unsightly, unsanitary and space wasting bottle cooler

"Filtrine" Automatic Circulating Water Cooling System

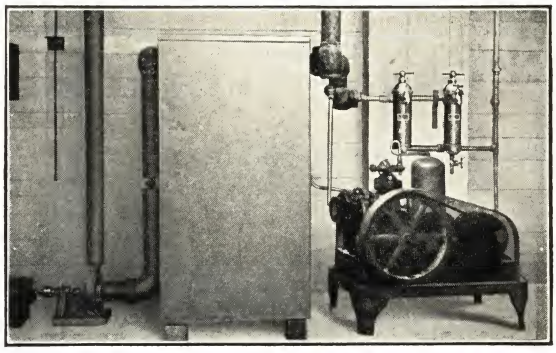
Fully automatic circulating drinking water systems with capacities up to 50 gal. per hour.

Comprising pressure storage cooling tank; automatic refrigerating machine, circulation booster pump; Style "A" filters.

Large storage cooler enclosed in heavy insulated steel container.

Cooling tank, riveted and welded.

Sizes from 4 to 75-gal. storage.



Typical "Filtrine" Water Cooling System

"Filtrine" Electric Coolers

Self-contained and remote types for offices, factories, hospitals, clubs, restaurants, featuring large reserve capacities to meet heavy peak demands.

INTERNATIONAL FILTER CO.

59 East Van Buren Street, CHICAGO, ILL.

OFFICES IN PRINCIPAL CITIES

CANADIAN DISTRIBUTERS, General Supply Co. of Canada, Ltd. OTTAWA, TORONTO, MONTREAL

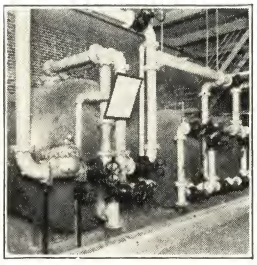
Products

WATER PURIFICATION EQUIPMENT of every type and size, for every need and purpose.

INFILCO PRODUCTS

International Zeolite Softeners

Built in standard sizes, vertical and horizontal pressure types. Will meet the most exacting requirements in hotels, hospitals, office buildings, laundries, textile mills, etc., wherever a pressure softener and water of "zero" hardness is required. Furnished singly, in pairs, or in batteries of three or more units; complete with brine tank, brine control, operating valves and piping, etc.



Crystalite Softener

International zeolite is known as Crystalite, a registered trade name. Crystalite is extremely rapid in softening and regenerating actions; capable of considerable overload capacity and operation at high rates of flow. Rapid softening action is desirable in securing flexible softener operation and to permit flow rates to meet any seasonable demand for soft water. Regeneration requires under thirty minutes for all operations.

Crystalite
The Super Rapid Zeolite

In addition to rapid action properties, Crystalite is of high exchange capacity, ranging from 8000 to 12,000 grains of hardness per cubic foot when regenerated with from 4 to 9 pounds of salt per cubic foot. Higher salt economy than 0.5 pounds per 1000 grains hardness can be obtained by reducing the salt used and exhausting the Crystalite to a lesser degree.

Crystalite is a manufactured zeolite of the gel type. As furnished for use, it is graded to proper grain size for the conditions under which it is to operate. It resembles crushed glass in appearance, and its durability or hardness may be described by the statement that the particles will scratch glass.

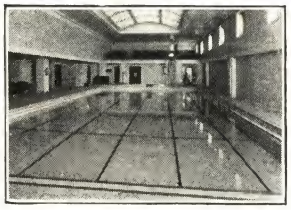
International Lime-Soda Softeners

Built in both the "Hot-Flow" and cold-process types; capacities 250 gallons per hour to several million gallons per day. Built in styles to conform with local operating conditions—wood, steel or concrete tank construction, ground or top operated.

Uniformity of treatment guaranteed under all conditions.

International Swimming Pool Equipment

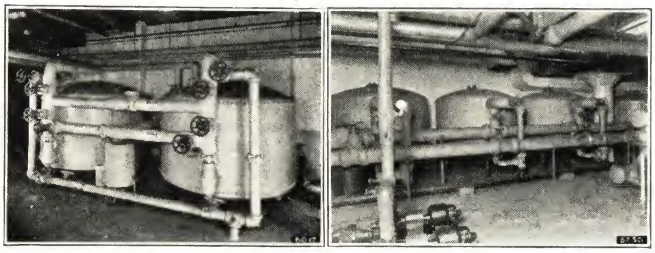
Includes International filters and coagulant feeders with special heater, circulating pump, sterilizer, hair catcher, vacuum cleaner and pool fittings—correlated and selected to assure pure, sparkling clear water in the pool at all times. Complete equipment furnished for pools of all sizes, from the smallest plunge to extensive outdoor installations.



International Sand Filters

The pressure type is built in four styles —D, E and R with vertical steel shells and Style H with horizontal steel shells. Capacities from 170 gallons per hour to any number of million gallons per day. Filters can be used singly or in battery of two or more units. Furnished complete with wash and collecting manifold system, full charge of filtering material, all immediate pipes, valves and fittings necessary for operation, pressure coagulant feeder, pressure gauges, sampling cocks, sight glass, etc.

Recommended for filtration, under pressure, of water for industrial plants, public institutions, hospitals, office buildings, hotels, apartment buildings, bakeries, dairies and all food product plants, etc. Specially designed plants for swimming pools.

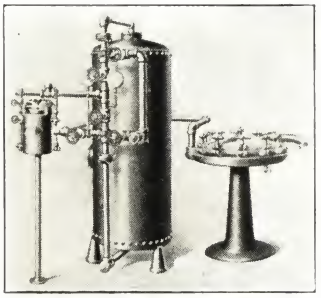


Pressure Type Sand Filter Installations

International Disk Filters

Built in four sizes, 75 to 600 gallons per hour. Used for fine filtration, being designed for putting the finishing touch of filtration on water that is already comparatively clean. Uses compressed cotton fiber disks which are discarded when clogged.

Restaurants, tea rooms, hotels, office buildings, etc., can make their drinking water most inviting by installation of the combination International Sand Filter and Disk Filter.



Sand and Disk Filter

Miscellaneous Equipment

Standard equipment to meet every problem of water purification. Gravity filter plants; mechanical filter equipment; steam-operated water stills; sterilizers; color, iron and oil removal plants, etc.

Co-operative Service

INTERNATIONAL FILTER CO. specializes in water purification for industrial, municipal and domestic purposes. We maintain a complete laboratory and staff of engineers to make reports and recommendations. This service is intended to co-operate and not conflict with the work of any representative or engineer appointed by the prospective purchaser.

Bulletins describing every type of equipment gladly sent on request.

THE PERMUTIT COMPANY

Water Softeners, Filters, Water Treating Apparatus for Every Purpose

TELEPHONE
BOgardus 4-7490

440 Fourth Avenue, New York, N. Y.

CABLE ADDRESS
"Permutit, New York"

SALES OFFICES

BOSTON, MASS., 705 Statler Building
BUFFALO, N. Y., 712 Brisbane Building
CHATTANOOGA, TENN., 1013 Provident Building
CHICAGO, ILL., 332 So. Michigan Avenue
CLEVELAND, OHIO, 1408 B. F. Keith Building
DETROIT, MICH., 2120 Union Guardian Building
INDIANAPOLIS, IND., 333 No. Pennsylvania Street
JACKSONVILLE, FLA., 131 E. Bay Street
KANSAS CITY, MO., 215 Pershing Road
LOS ANGELES, CAL., 909 Wright-Callender Building
MINNEAPOLIS, MINN., 1046 McKnight Building
OKLAHOMA CITY, OKLA., 3005 No. Robinson Street
PHILADELPHIA, PA., 20 So. 15th Street
PITTSBURGH, PA., 921 Union Trust Building
ST. LOUIS, MO., 1423 Chemical Building
SAN ANTONIO, TEX., 510 West Lynwood Avenue
SAN FRANCISCO, CAL., 1012-1014 Balboa Building
SPARTANBURG, S. C., 222 Montgomery Building

Products

HOUSEHOLD WATER SOFTENERS and FILTERS.

Also Industrial Water Treating Equipment for all purposes. Power Plant Specialties.

What Zeolite Water Softeners Are

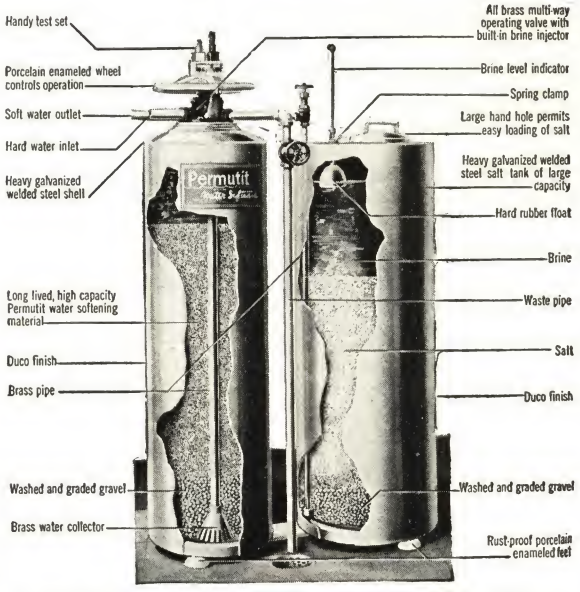
The water softening material is called zeolite, and possesses the power to abstract all hardness from water. It is contained in a steel tank, and the flow of water is controlled by a simple valve arrangement. Zeolite lasts indefinitely, periodical washings with common salt solution maintaining it in efficient condition.

Use

Permutit Zeolite Water Softeners are used in power plants to prevent scale, in laundries to save soap and soda and improve quality, in textile mills to eliminate troubles, in buildings to prevent pipe lines from clogging and in hotels, hospitals and private homes where the luxury of soft water is appreciated for personal use.

Permutit Organization

Permutit Zeolite Water Softeners are backed by the pioneers in this method of water treatment. THE PERMUTIT COMPANY introduced Zeolite Water Softening into the United States. It is one of the oldest, largest, and most successful in this field of water treatment. Highly developed laboratories and technical skill, combined with its 18 sales offices, enable it to give authoritative service on all kinds of water problems.



Construction Features of Model HS Permutit Water Softener
Other models are available. Write for complete data.

Household Water Softener Easy to Operate

Any plumber can install it. The operation is controlled by an operating wheel which is turned through successive positions.

A child can do it.

How to Find the Size Needed

If you know the water hardness in grains per U. S. gallon, allow 50 gal. per day for each person in the household (including servants), calculate the consumption per week, and reading across from water hardness in the attached table, choose the model Permutit Water Softener that will furnish a quantity of water just in excess of calculated weekly consumption.

If you do not know the water hardness, write THE PERMUTIT COMPANY for a water sample shipping container, and return a sample for free analysis. There will be no obligation.

Complete specifications, prices, etc., on all Permutit Equipment is available upon application. There is a size and type of Permutit Equipment for any building of any type—from the smallest home to the largest industrial plant or skyscraper. THE PERMUTIT COMPANY'S expert knowledge is at your disposal for any water treating problem.

CAPACITY IN GALLONS OF WATER THAT CAN BE SOFTENED BETWEEN REGENERATIONS

Hardness in grains per U. S. Gal.	Model			
	H9-HS9-	H12-HS12	HS15	HS18
2	6000	10500	16500	24000
3	4000	7000	11000	16000
4	3000	5250	8250	12000
5	2400	4200	6600	9600
6	2000	3500	5500	8000
7	1715	3000	4175	6860
8	1500	2625	4125	6006
9	1335	2335	3665	5333
10	1200	2100	3300	4800
11	1090	1910	3000	4365
12	1000	1750	2750	4000
13	925	1615	2540	3690
14	855	1500	2355	3430
15	800	1400	2200	3200
16	750	1310	2060	3000
18	665	1165	1830	2665
20	600	1050	1650	2400
22	545	955	1500	2180
24	500	875	1375	2000
26	460	805	1270	1845
28	430	750	1180	1715
30	400	700	1100	1600
32	375	655	1030	1500
34	350	615	970	1410
36	330	585	920	1330
38	315	550	870	1265
40	300	525	825	1200
42	285	500	785	1145
44	270	475	750	1090
46	260	455	715	1040
48	250	435	690	1000
50	240	420	660	960

ROBERTS FILTER MANUFACTURING CO.

606 Columbia Avenue
DARBY, PA.

Products

ROBERTS FILTERS, FILTRATION PLANTS and FILTER APPLIANCES for every water purification requirement.

For our page on Swimming Pool Equipment, see Manufacturers' Index.

Types and Uses

Pressure type and gravity type filters, with capacities from 1 gal. per hour to 1,000,000 gal. an hour and larger.

Filters for residences, apartment houses, hotels, institutions, hospitals, swimming pools, industrial drinking water systems, mills and factories, water works and municipalities. See table below, classifying filters as to type of service.

CLASSIFICATION AS TO TYPE OF SERVICE

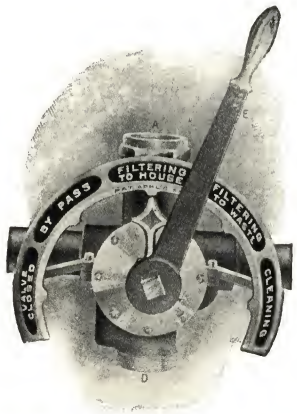
Type of Service	Roberts Germproof Stone Filters	Vertical Pressure Filters							Horizontal Pressure Filters	Wood Tank Gravity Filters	Rectangular Concrete Gravity Filters
		Style D	Style M	Style E	Style O	Style G	Style H	Style L			
Individual faucet use	x										
Residences (small and medium)		x	x	x	x						
Residences (large)				x	x						
Apartment houses				x	x	x					
Hotels and institutions				x	x	x	x	x			
Theaters		x	x	x	x	x					
Department stores				x	x	x		x			
Swimming pools (ordinary)				x	x	x	x				
Swimming pools (large)								x	x		
Factory drinking water systems		x	x	x	x	x	x				
General industrial use				x	x	x	x	x	x		
Large industrial water supply									x	x	x
Town or city water works								x	x	x	x

Operation

Water enters filter at top, passing downward through the filter bed, collects in strainer system at bottom and discharges through outlet.

Filter bed consists of specially graded pure silica sand, resting on graded silica gravel. In some cases quartz, marble, or refined bone charcoal are employed. Attached to inlet line of filter there may be (and usually is) employed a Roberts automatic coagulant feeder, which accurately feeds a slight quantity of alum into the raw water.

In all vertical pressure filters, except Styles "H" and "L," the entire operation is governed by the Roberts single control valve.



Roberts Single Control Valve

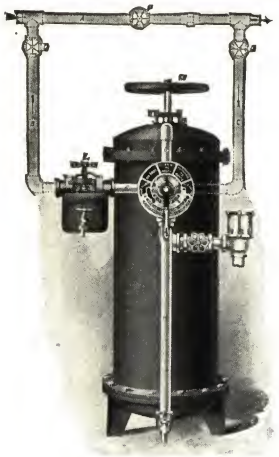
Cleaning of all Roberts filters is thoroughly and easily accomplished by a reverse flow of water, which lifts and "liquefies" the sand bed, scouring it on itself and flushing the removed matter to the sewer.

A sight glass on the waste line indicates when the washing is complete.

Roberts Style "D" Filter

The model household filter. Cast iron construction. Equipped with coagulant feeder, single control valve, sight glass. Also has agitator, operated by hand wheel, which is used during washing to assist in breaking up the filter bed.

Made in 12, 16 and 20-in. sizes.

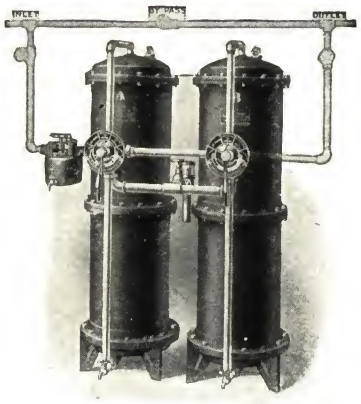


Style "D" Filter

Roberts Style "M" Filter

Widely used in residences of the better class. Consists of two cast iron filters, connected *in tandem* for double filtration. First cylinder charged with sand and ground marble; second cylinder with refined bone charcoal. First cylinder removes suspended matter; second cylinder reduces or removes odor, taste and color. Equipped with single control valves, sight glass and coagulant feeder.

Made in 12, 16 and 20-in. sizes.



Style "M" Filter

Roberts Style "E" Filter

Cast iron construction—in sections. Can readily be taken through small doorways. Equipped with coagulant feeder, single control valve and sight glass. Filling and inspection hole (4 in.) in top; larger sizes also have standard manhole in each shell section. (See illustration Style "O.") Pleasing appearance; substantial in looks and in fact.

Made in 8 sizes, 12 to 50 in.

Style "E" Filter

Roberts Style "O" Filter

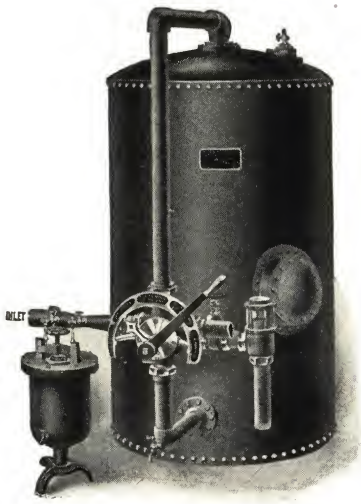
Consists of two Style "E" filters connected *in tandem* for double filtration. Principle similar to Style "M," but larger units. Two Style "G," or Style "H" units may also be connected up as a double filter. Specially adapted for waters containing dissolved color, taste and odor.

Made in 5 sizes, 24 to 50 in.

Style "O" Filter

Roberts Style "G" Filter

Steel construction; top head bumped convex, bottom head concave. Equipment and connections similar to Style "E." Handhole in top, manhole in shell. Made in 5 sizes, 30 to 60 in.



Style "G" Filter

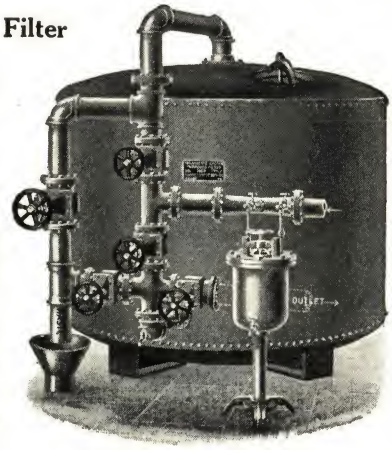
Roberts Style "H" Filter

Same as Style "G," except single control valve omitted. Operation controlled by 5 gate valves. Made in 5 sizes, 30 to 60 in. Connections as illustrated on Style "L."

Roberts Style "L" Filter

Steel construction; both heads bumped convex. Filtered water collector system consists of central manifold and laterals of the perforated pipe type. Equipped with gate valve control, coagulant feeder and waste funnel. Manhole in top head.

Made in 66, 72, 78, 84 and 96-in. sizes.



Style "L" Filter

VERTICAL PRESSURE FILTERS, DIMENSIONS AND CAPACITIES

Size (inside diam.) in.	Filtering area, sq. ft.	Capacity, gal. per min.* Unit rate 2	Unit rate 3	Unit rate 4	Unit rate 5	Height overall, in.	Pipe connections in.† Inlet and outlet	Waste to sewer	Floor space, ft.
12	.78	1.56	2.34	3.12	3.90	58	1	1¼	3 x2½
16	1.39	2.78	4.17	5.56	6.95	63	1	1¼	3 x3
20	2.19	4.38	6.57	8.76	10.95	64	1	1¼	3 x3
24	3.14	6.28	9.42	12.56	15.70	64	1¼	1½	3¼x3
30	4.91	9.82	14.73	19.64	24.55	74	1½	2	4½x3
36	7.07	14.14	21.21	28.28	35.35	76	2	2½	5 x3½
42	9.62	19.24	28.86	38.48	48.10	78	2	2½	6 x4
48	12.56	25.13	37.70	50.24	62.80	77	2½	3	6½x4½
54	15.90	31.80	47.70	63.60	79.50	78	2½	3	7 x5
60	19.63	39.26	58.89	78.52	98.15	82	2½	3	7 x5½
66	23.76	47.52	71.28	95.04	118.80	87	3	4	8½x6
72	28.27	56.54	84.81	113.10	141.40	94	3	4	8½x6½
78	33.17	66.34	99.51	132.70	165.90	96	3	4	9 x7
84	38.48	76.96	115.40	153.90	192.40	98	4	5	10 x7½
96	50.26	100.50	150.80	201.00	251.30	100	4	5	10½x8½

*See "Notes on Specifications."
†Special or oversize connections can be furnished.

Notes on Specifications

Specify filters by *inside diameter*. If diameter is not specified, the term "capacity" is meaningless unless accompanied by the following "at a unit rate of filtration not exceeding ... gal. per min. per sq. ft. of effective cross-sectional filter area." Example: A 42-in. (inside diameter) filter has an area of 9.62 sq. ft. (42-in. circle) and at a unit rate of 4 has a capacity of 38.48 gal. per min.; while at a unit rate of 3, capacity is 28.86 gal. per min.

The *unit* rate of filtration that may be safely employed in a given case is determined by two factors: (a) the character of the raw water, and (b) the quality of filtered water desired. When bacterial efficiency and complete clarification are desired, a 2-gal. unit rate is the maximum. For clarification of a turbid water use a 2-gal. unit rate; of a slightly turbid water, a 3-gal. unit rate; and of a good water (such as New York City) a 4 or 5-gal. unit rate. For recirculating *swimming pools* the standard unit rate is 3. *No unit rate in excess of 5 gal. should ever be employed.*

In filter practice, the accepted meaning of clarification is the removal of practically all suspended matter visible to the naked eye, rendering the water bright, clear and sparkling.

Capacity of a double filter (two cylinders *in tandem*) is that of a single filter of same diameter cylinder.

Always specify maximum pressure to which filters will be subjected in operation.

Roberts standard cast iron filters are built for a working pressure of 60 lbs. and tested to 100 lbs.; steel filters are for working pressure of 60 or 100 lbs. and subjected to a test 50% in excess of working pressure.

Filters for higher pressures supplied, where required.

Other Styles

We manufacture Roberts stone filters for individual faucet use. Over 500,000 in use. Capacities 1 to 60 gal. per hour. Prices $5.00 to $70.00. Catalogue on request.

Horizontal pressure filters, wood tank gravity filters and rectangular concrete gravity filters for large installations. Complete information upon application.

Send for bulletins or, if more convenient, see SWEET'S ENGINEERING CATALOGUE for data on larger sizes.

General

Roberts equipment is being used satisfactorily for domestic, industrial and municipal installations. The pure, clear and sparkling water delivered at all times is convincing proof of its efficiency.

More than 900,000,000 gal. of water are being satisfactorily treated daily by Roberts filters.

Strength and durability are two of their main characteristics.

THE REFINITE COMPANY

GENERAL OFFICES AND LABORATORIES
OMAHA, NEBR.

REPRESENTATIVES IN PRINCIPAL CITIES

Products

REFINITE INDUSTRIAL SOFTENERS.
REFINITE DOMESTIC SOFTENERS.
REFINITE RAPID MINERAL.
Also Refinite Rapid Pressure Filters.

Refinite Industrial Water Softeners

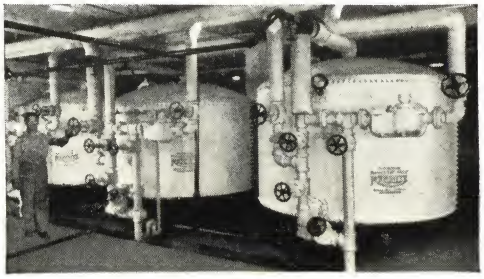
Refinite Softeners are the result of 14 years' experience in the water softening field. They embody the latest improvements in design which make for long life and ease of operation. We always use the famous Refinite Rapid Regenerating Mineral which has been proven through years of service to have extremely long life. Refinite Softeners are always designed with an ample factor of safety so that nearly every installation gives from 20% to 30% in excess of the guaranteed capacity.

Refinite Rapid Mineral

Refinite Mineral (a natural product) is made only by THE REFINITE COMPANY who own the mines and the processing patents. Fourteen years in constant use have proven Refinite Mineral to have no superior. It has high capacity, long life, and does not dissolve or wash from the container, nor does it give off rusty water.

Another striking proof of the superiority of Refinite Mineral is the fact that a large part of our output goes to replace other makes of mineral in water softeners. Write for the list of over 200 institutions who have discarded other makes of mineral for Refinite. Refinite Mineral is adaptable to any type of softener and the substitution is extremely simple.

Exchange Building, Union Stock Yards, South Omaha, Nebr.
Supplied with Refinite Perfect Soft Water for use in its kitchen and boilers



Three 108-in. Water Softeners

The three softeners illustrated above are installed in one of the largest and most up-to-date laundries in the country. This laundry has always used Refinite Softeners it being one of the first laundries to wash their customers' clothes in zero soft water.

These softeners are all regenerated by the Refinite Rapid Regenerator which is placed in the salt room 50 ft. from the softeners and the regenerator is only 30 ins. in diameter

Specifications for Industrial Water Softener

Capacity—Furnish and install a water softener having a capacity for .... gallons per each regeneration when softening water of .... grains hardness.

Regeneration—The softener must be of the Rapid Regenerating type and so constructed that a complete regeneration can be made within 40 minutes' time.

Softener Tank Construction—The tank shall be of heavy riveted construction and tested for 100 lbs. working pressure.

Meter—The meter shall be of the bell alarm type and connected so that a bell will ring when the softener has reached its rated capacity.

Samples and Information

THE REFINITE COMPANY will be glad to send samples of Refinite Mineral and architect's A.I.A. File 29d32 upon request.

"SA" Series

Refinite Domestic Water Softeners

Refinite Domestic Water Softeners are made in a complete range of sizes suitable for any size home. To suit every need and purse three different models are built.

(1) "M" series, hand operated type, which is lowest in price but built to a high quality standard. (2) "D" series which incorporates the famous mono lever control. This model has been our best seller for the past five years. (3) New model "SA" series which is the semiautomatic type and is the last word in domestic softeners. The regeneration is entirely controlled by simply moving one lever and there is no chance of mistakes or confusion. It has no complicated mechanism to get out of order or require service.

Refinite Softeners do not produce rusty water.

PRICES AND CAPACITIES OF REFINITE DOMESTIC WATER SOFTENERS

Grains hardness per U. S. gallon		10	15	20	25	30	35	40	Shipping wgt., lb.
Size	Price								
SA18	$235.00	3100	2600	1550	1240	1030	887	775	850
SA22	375.00	5500	3670	2750	2200	1830	1570	1375	1200
D-14	145.00	1550	1030	775	620	518	442	388	515
D-18	195.00	3100	2600	1550	1240	1030	887	775	720
D-22	375.00	6200	4140	3100	2480	2060	1775	1550	1250
M-12	100.00	1250	835	625	500	417	357	312	350
M-16	150.00	2500	1665	1250	1000	834	715	624	510

"D" Series

WM. B. SCAIFE & SONS CO.

FOUNDED 1802

Water Filters and Water Softening Systems

Executive Offices, Laboratory and Works
OAKMONT, PA.

PITTSBURGH OFFICE, Oliver Building — NEW YORK OFFICE, 101 Park Avenue — CHICAGO OFFICE, First National Bank Building

Products

WATER FILTERS (Gravity and Pressure) for industrial uses, municipalities, public buildings, swimming pools and residences.
WATER SOFTENERS for boiler feed, residences and industrial uses.

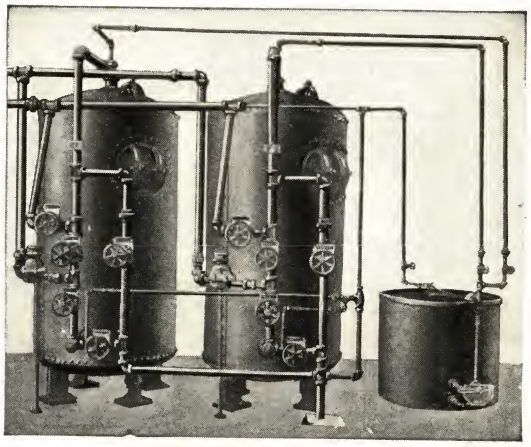
Pressure Filters

Pressure filters are designed to operate with water under pressure. They are built of steel plate in vertical sizes to 120 in. in diameter. For larger capacities they are built horizontally to 25 ft. long. Unsurpassed for office buildings, swimming pools and industrial plants.

Single Vertical Pressure Filter

Zeolite Softening System

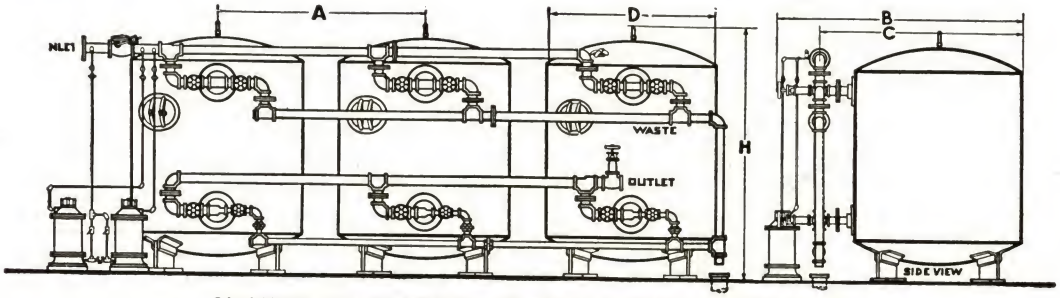
Designed to remove lime and magnesia hardness to zero by soap test. Durable mineral that gives clear, soft water immediately after regeneration. Automatic salt dissolving, measuring and introducing device. Especially adapted for hotel, office building, hospital, textile and laundry use.



Scaife Zeolite System

Bulletins

No. 196. Pressure Filters
No. 202. Continuous Softeners
No. 205. Zeolite Softeners, Industrial
No. 209. Zeolite Softeners, Household
No. 210. Intermittent Softeners
No. 211. Water Softeners for Railroads
No. 212. Gravity Filters
No. 214. Hot Process Softeners



CAPACITIES AND DIMENSIONS FOR SINGLE VERTICAL PRESSURE FILTER

Cat. No.	Dimensions: Diam. D in.	Height H ft. in.	See drawing: A ft. in.	B ft. in.	C ft. in.	Area sq. ft.	Capacity per minute, rate per sq. ft.: 2 gal.	3 gal.	4 gal.	Wash water per min. based on 12 gals. per sq. ft. filter area	Approx. shipping weight, lb.	Approx. weight when in operation, lb.	Size of connections: Inlet outlet and waste, in.	Rewash, in.
8	30	7— 2	3—6	4— 0	3— 4	4.9	10	15	20	59	3200	5400	1½	1¼
9	36	6— 9	4—0	4— 7	3—10	7.0	14	21	28	84	3635	6200	2	1¼
10	42	6—11	4—6	5— 2	4— 5	9.6	19	29	38	115	4750	8300	2	1¼
11	48	7— 0	5—0	5—11	4—11	12.5	25	38	50	150	5950	10600	2½	1¼
12	54	7— 2	5—6	6— 5	5— 5	15.9	32	48	64	191	7490	13500	2½	1¼
13	60	7— 4	6—0	7— 0	5—11	19.6	39	59	78	235	9025	16700	3	1¼
14	66	7— 5	6—6	7— 6	6— 5	23.7	47	71	95	284	10945	20500	3	1¼
15	72	7— 7	7—0	8— 3	7— 0	28.2	56	85	113	338	12850	24200	4	1½
16	78	7— 9	7—6	8— 9	7— 6	33.1	66	99	132	397	14650	28200	4	1½
17	84	7—10	8—0	9— 3	8— 0	38.4	77	115	154	461	16750	32700	4	1½
18	90	8— 0	8—6	10— 1	8— 7	44.1	88	132	176	529	18810	37400	5	1½
19	96	8— 2	9—0	10— 7	9— 1	50.2	100	151	201	602	21300	42800	5	1½
21	108	8—10	10—0	11—11	10— 3	63.6	127	191	254	763	28700	56000	6	2
23	120	9— 2	11—0	12—11	11— 3	78.5	157	236	314	942	34710	68300	6	2

Note: Weights based upon 100 lb. per sq. in. working pressure to 60 in., inclusive, and upon 65 lb. per sq. in. to 120 in., inclusive.

COCHRANE CORPORATION

3154 North 17th Street, PHILADELPHIA, PA.

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Products

DEAERATING HOT WATER GENERATORS.
OPEN FEED WATER HEATERS.
PRESSURE FILTERS.
BACK PRESSURE VALVES.
DRAINERS OR TRAPS.
DISCHARGERS.
FLOW METERS for Steam or water in pipes.

Also Metering Heaters, Storage Heaters, Closed Heaters, Deaerating Heaters; Hot Process Water Softeners, Cold Process Water Softeners; Steam and Oil Separators; Steam Purifiers; Boiler Blow-off Valves; V-notch Meters; Continuous Boiler Blow-off Systems, etc.

Slogan: *"To Economize, Cochranize."*

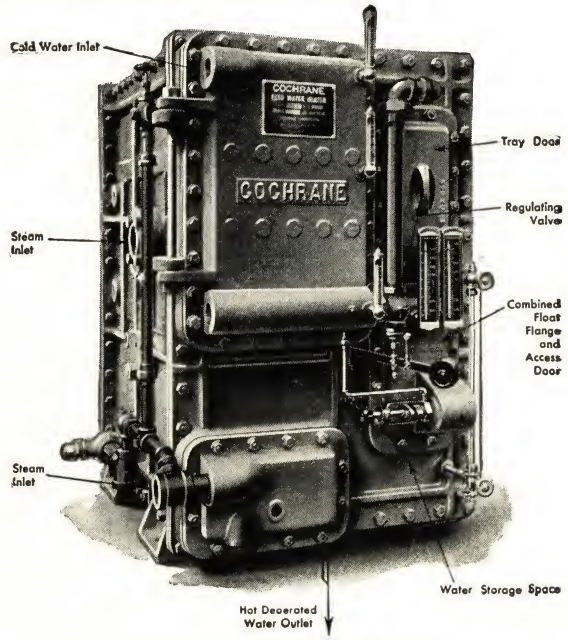
Cochrane Deaerating Hot Water Generator for Building Service

Banishes pipe corrosion and "red water. It supplies hot water that contains no dissolved oxygen, and which, therefore, cannot rust piping and boilers. Iron or steel piping can be used throughout, instead of the more costly copper or brass.

The Cochrane Deaerating Hot Water Generator has been specially designed for crowded engine and boiler rooms with low ceilings. It is of compact cubical form and can be installed in a corner or up against the ceiling, occupying no floor space and giving the maximum suction head on the circulating pump.

Live or exhaust steam is used, the temperature of the heated water being held constant automatically.

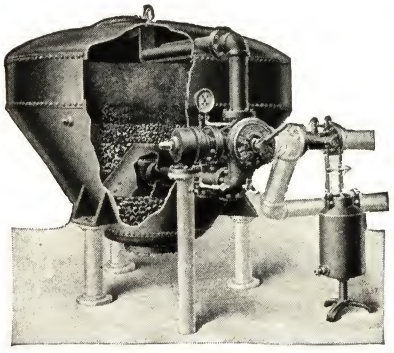
Various methods of installing deaerators and arranging the hot water piping systems of buildings are described and illustrated in the Cochrane Bulletin No. 686.



Deaerating Hot Water Generator

Open Feed Water Heaters

Utilize exhaust steam to heat water for boiler feed and other purposes, and also serve as hot wells or return tanks, controlling the make-up automatically. The exhaust not consumed in heating the water is purified of oil for the heating system. Can be combined with V-notch meters, hot process softeners, storage tanks or deaerators.



Pressure Filter

Strainerless Conical Filters

A new improved design for clarifying water for drinking, washing, swimming pools, industrial processes, boilers, etc.

Multiport Back Pressure Valve

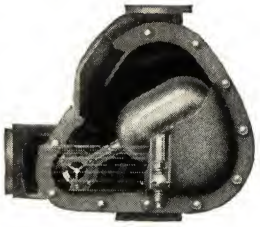
Multiport Back Pressure Valves

Differ from the ordinary back pressure valves in that a number of small disks are used instead of one large disk, reducing the size, weight and travel of the disks and insuring noiselessness and absolute safety.

Traps, Drainers and Dischargers

Remove condensate or drips from low or high pressure heating or drying coils, radiators, jackets, steam and oil separators, steam purifiers, etc.

Steam or Oil Separator



Drainer or Low Pressure Trap

Flow Meters

Simple, reliable and accurate devices for indicating, recording and integrating flow of water, steam or air in pipes. The chart and indicator scales have uniform divisions. Combined pressure and temperature recording pens can be included.

Integrating Flow Meter

THE WHITLOCK COIL PIPE COMPANY

Manufacturers and Engineers

HARTFORD, CONN.

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Manufacturers of STORAGE HEATERS; INSTANTANEOUS HEATERS; FEED WATER HEATERS; FUEL OIL HEATERS; HEAT EXCHANGERS; SWIMMING POOL HEATERS; CONDENSATION or DRIP COOLERS; CONVERTERS (hot water heating systems); PREHEATERS.

Also makers of Coils and Bends of any size and shape from Iron, Steel, Copper, and Brass Pipe and Tubing.

WHITLOCK HEAT TRANSFER EQUIPMENT

Engineering Service

Architects and engineers interested in heat transfer apparatus will be interested in literature and data which we are publishing from time to time. We will gladly furnish sample specification sheets, typical installation diagrams, and specific advice on any problem in this line.

Personal Service

We maintain sales offices or representatives in each of the cities listed above. Many of these men were trained in our factory and have had practical experience in both laboratory and field. All of them are fully qualified to give personal service on any specific problem.

WHITLOCK TYPE K STORAGE HEATERS

For Use with Live or Exhaust Steam

General

Whitlock Type K Storage Heaters are used wherever large quantities of hot water are required at irregular intervals. By using a small amount of steam steadily, sufficient heat is stored to supply ample hot water for peak requirements with a steady load on the steam boiler. Hotels, apartment houses, office buildings, schools, hospitals, laundries, textile mills and other buildings have obtained their hot water supply from these heaters for many years.

Test

Before shipment, every heater is subjected to a hydrostatic test pressure as required by the laws of the State in which it is to be installed—with a minimum of 50% in excess of the working water pressure specified. A test certificate is sent to the customer.

Three Models of Type K Storage Heaters

Horizontal Storage Heater—*Construction*—Shell is of steel plate, to A.S.T.M. Specifications 78-27, firmly riveted. The bumped heads are not the conventional type, but are curved to the contour of a semiellipsoid, by means of knuckle radii which are from four to eight times as great as required by the A.S.M.E. Unfired Pressure Vessels Code.

Heating section is of heavy gauge, seamless copper U-bends, removable as a unit for cleaning and inspection.

Tube sheet is of heavy rolled steel.

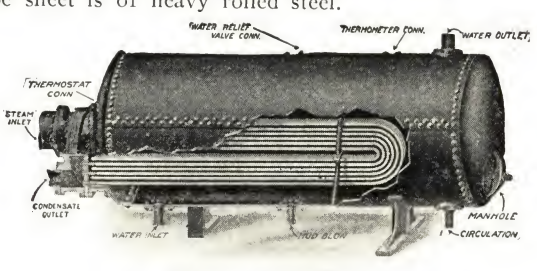


Fig. 1. Type K Horizontal Storage Heater

Tube support is of rolled or cast bronze.

Head or steam chamber is of best commercial grade cast iron.

Manhole is 11x15 ins. with double yoke on heaters of 30-in. diameter or greater; 6x8-in. handholes on smaller diameter heaters.

Note: This standard construction may be varied to meet unusual operating conditions.

Tables, etc.—The 1931 issue of Bulletin 40, describing and illustrating the different designs and applications of these heaters and giving much other data, will be sent on request.

Table II on the following page lists some of the more commonly used sizes, and gives the capacities and principal dimensions.

Vertical Storage Heaters for Use Where Space Is Limited—All of the previous material has related primarily to the more common horizontal storage heaters. Space requirements at times make it more desirable to install a vertical heater.

Type K Vertical Heater shown in Fig. 2 is designed especially for these conditions with the heating section low in the shell and supported on pipe legs and side brackets.

This type of heater is is made in the same standard sizes of shells and heating capacities as the Type K Horizontal Heater.

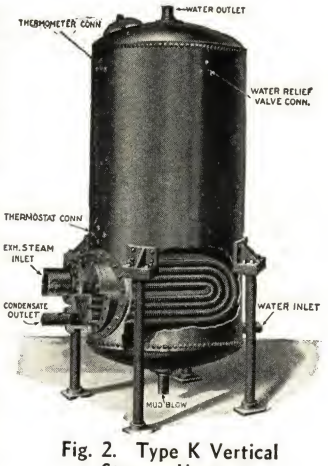


Fig. 2. Type K Vertical Storage Heater

Combination Live and Exhaust Steam Horizontal Storage Heater—The Combination Type K is provided with two heating sections as shown in Fig. 3 on next page. In this case the primary section uses what exhaust steam, drips or condensation returns are available, and the auxiliary section uses live steam under thermostatic control to complete the heating required.

Where possible we urge the architect or engineer

to consult a Whitlock Engineer (or write us the details) as a few other factors enter into this problem which can not be entirely covered in these pages.

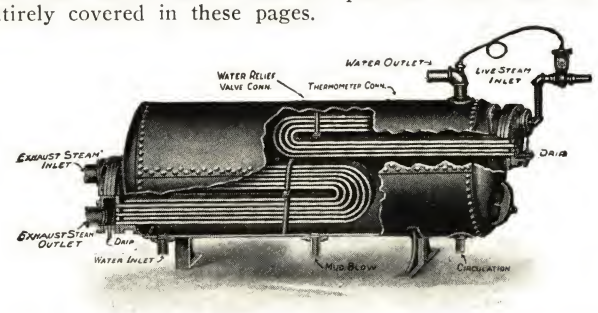


Fig. 3. Type K Combination Live and Exhaust Steam Horizontal Storage Heater

TABLE I. WORKING PRESSURES IN WHITLOCK STORAGE HEATERS (ALL TYPES)

Diam. of shell, in.	Thickness of shell, in.				
	¼	5/16	⅜	7/16	½
18	230	280	340	400	450
24	170	210	250	300	340
30	140	170	200	240	270
36	110	140	170	200	230
42	100	120	150	170	190
48	80	110	130	150	170
54	75	95	110	130	150
60	70	85	100	120	140
72	55	70	85	100	110
84	50	60	75	85	95
96	40	55	65	75	85

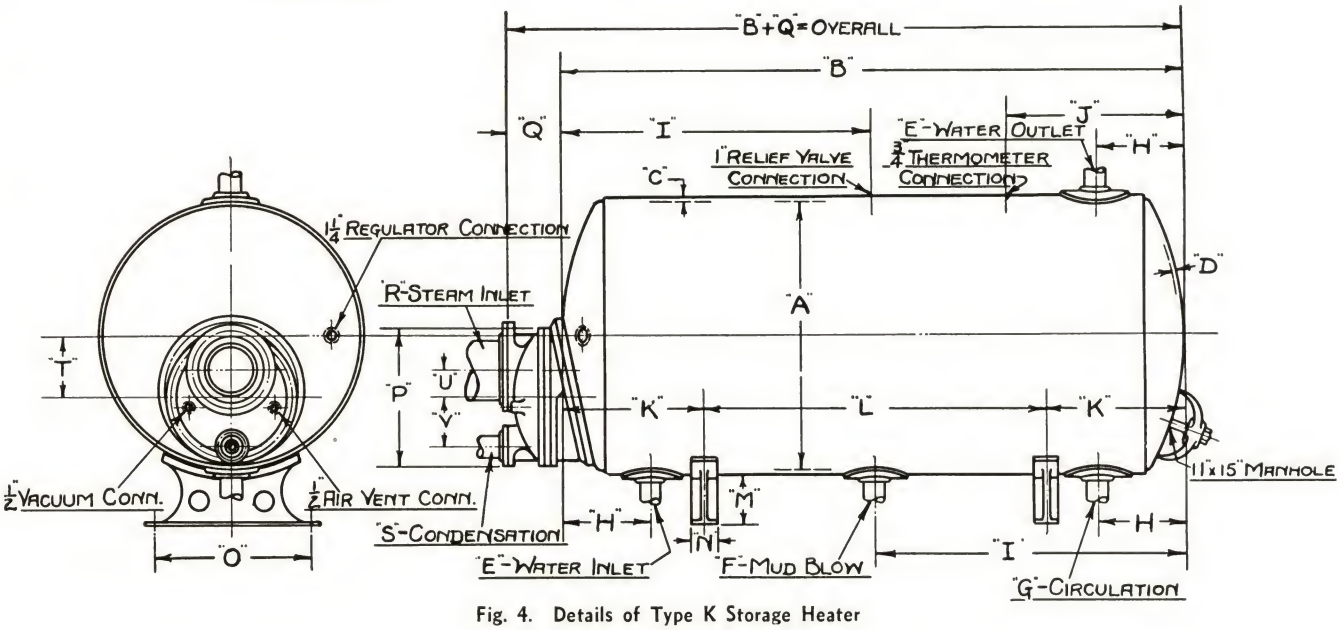


Fig. 4. Details of Type K Storage Heater
(Patent applied for)

TABLE II. WHITLOCK TYPE K STORAGE HEATERS (HORIZONTAL)

SHELLS																				HEATING SECTIONS									
														Standard cradles			Pipe leg cradles												
No.	Gallons—one filling	"A" Diam., in.	"B" Length, in., add "Q" for over all	"C" Thickness of shell	"D" Thickness of head, in.	Weight, lb.	"E" Water inlet and outlet, in.	"F" Mud blow, in.	"G" Circulation, in.	"H" Location of water connection, in.	"I" Location of mud blow, in.	"J" Location of thermometer, in.	"K" Location of cradles, in.	"L" c. c. of cradles	"M" Height, in.	"N" c. c. of bolt holes, in.	"O" c. c. of bolt holes, in.	"M" Height, in.	"N" Diam. of pipe legs, in.	"O" c. c. of pipe legs, in.	No.	Gallons per hour	Smallest shell into which section will fit, in.	Weight of entire section, lb.	"P" Diam. of head port, in.	"Q" Add to "B" for over all, in.	"R" Max. and std. steam inlet, in.	"S" Max. and std. condensation	"T" Center heater to center of section	"U" Location of steam inlet, in.	"V" Location of cond. outlet, in.
1	65	18	60	¼	⅜	400	2	2	.....	10	30	22	18	24	4	1½	11	2	1½	15	H0	100	18x48	75	9¼	6¼	2	1		1 7/16	2½
2	80	18	72	¼	⅜	450	2	2	.....	10	36	22	18	36	4	1½	11	2	1½	15	H1	150	18x60	80	9¼	6¼	2	1		1 7/16	2½
3	118	24	60	¼	⅜	600	2	2	.....	11	30	23	19	22	6	1¾	14	2½	2	17	H2	200	18x72	90	9¼	6¼	2	1		1 7/16	2½
4	141	24	72	¼	⅜	700	2	2	.....	11	36	23	19	34	6	1¾	14	2½	2	17	H3	250	18x48	175	12½	7½	3½	2		2¾	3½
5	164	24	84	¼	⅜	800	2	2	.....	11	42	23	19	46	6	1¾	14	2½	2	17	H4	300	18x48	185	12½	7½	3½	2		2¾	3½
6	185	30	60	¼	⅜	750	3	2	.....	12	30	24	20	20	7	1¾	19	3	2	22	H5	350	18x60	190	12½	7½	3½	2		2¾	3½
7	220	30	72	¼	⅜	850	3	2	.....	12	36	24	20	32	7	1¾	19	3	2	22	H6	400	18x60	200	12½	7½	3½	2		2¾	3½
8	255	30	84	¼	⅜	950	3	2	.....	12	42	24	20	44	7	1¾	19	3	2	22	H7	500	18x72	210	12½	7½	3½	2		2¾	3½
9	290	30	96	¼	⅜	1050	3	2	.....	12	48	24	20	56	7	1¾	19	3	2	22	H8	550	18x72	215	12½	7½	3½	2		2¾	3½
10	365	36	84	5/16	½	1300	3	2	.....	14	42	26	22	40	8	1¾	21½	3½	2½	25½	H9	600	18x84	220	12½	7½	3½	2		2¾	3½
11	420	36	96	5/16	½	1450	3	2	.....	14	48	26	22	52	8	1¾	21½	3½	2½	25½	H10	700	24x60	300	15¼	7½	5	2		2¾	4½
12	475	36	108	5/16	½	1600	3	2	.....	14	54	26	22	64	8	1¾	21½	3½	2½	25½	H11	800	18x96	260	12½	7½	3½	2		2¾	3½
13	525	36	120	5/16	½	1800	3	2	2	14	60	26	22	76	8	1¾	21½	3½	2½	25½	H12	900	18x108	270	12½	7½	3½	2		2¾	3½
14	575	42	96	5/16	½	1850	4	2	.....	17	48	29	26	44	8	2	25½	3 7/16	3	26	H13	1000	18x120	235	12½	7½	3½	2		2¾	3½
15	720	42	120	5/16	½	2150	4	2	2	17	60	29	26	68	8	2	25½	3 7/16	3	26	H14	1250	24x84	370	15¼	7½	5	2		2¾	4½
16	860	42	144	5/16	½	2500	4	2	2	17	72	29	26	92	8	2	25½	3 7/16	3	26	H15	1500	24x108	425	15¼	7½	5	2		2¾	4½
17	1000	42	168	5/16	½	2900	4	2	2	17	84	29	26	116	8	2	25½	3 7/16	3	26	H16	1750	24x120	450	15¼	7½	5	2		2¾	4½
18	950	48	120	⅜	½	2350	4	2	2	18	60	30	27	66	9	2	29	4	3	24½	H17	2000	30x96	570	18¼	8½	6	2½		3¼	5½
19	1140	48	144	⅜	½	3250	4	2	2	18	72	30	27	90	9	2	29	4	3	24½	H18	2400	30x120	620	18¼	8½	6	2½		3¼	5½
20	1310	48	168	⅜	½	3700	4	2	2	18	84	30	27	114	9	2	29	4	3	24½	H19	2830	30x132	670	18¼	8½	6	2½		3¼	5½
21	1480	48	192	⅜	½	4100	4	2	2	18	96	30	27	138	9	2	29	4	3	24½	H20	3230	36x96	860	21	9 3/8	8	2½		4 5/16	6⅞
22	1190	54	120	⅜	½	3250	4	2	2	20	60	32	30	60	9	2	33	4½	4	27	H21	3300	36x108	920	21	9 3/8	8	2½		4 5/16	6⅞
23	1430	54	144	⅜	½	3700	4	2	2	20	72	32	30	84	9	2	33	4½	4	27	H22	4030	36x120	950	21	9 3/8	8	2½		4 5/16	6⅞
24	1670	54	168	⅜	½	4200	4	2	2	20	84	32	30	108	9	2	33	4½	4	27	H23	4400	36x132	1020	21	9 3/8	8	2½		4 5/16	6⅞
25	1900	54	192	⅜	½	4700	4	2	2	20	96	32	30	132	9	2	33	4½	4	27	H24	4830	36x96	1200	24	9⅝	10	3		5 5/16	8⅛
26	1420	60	120	7/16	9/16	4300	4	2	2	20	60	32	30	60	10	2	37	4½	4	31	H25	5400	36x108	1300	24	9⅝	10	3		5 5/16	8⅛
27	1710	60	144	7/16	9/16	4900	4	2	2	20	72	32	30	84	10	2	37	4½	4	31	H26	6000	36x120	1380	24	9⅝	10	3		5 5/16	8⅛
28	2000	60	168	7/16	9/16	5600	4	2	2	20	84	32	30	103	10	2	37	4½	4	31	H27	7000	42x96	1950	30	11 7/8	12	4		6½	10½
29	2300	60	192	7/16	9/16	6200	4	2	2	20	96	32	30	132	10	2	37	4½	4	31	H28	8000	42x96	2000	30	11 7/8	12	4		6½	10½
30	2460	72	144	7/16	9/16	5700	4	2½	2½	23	72	35	34	76	8	2⅛	40	8	4	39	H29	9000	42x108	2300	30	11 7/8	12	4		6½	10½
31	2880	72	168	7/16	9/16	6400	4	2½	2½	23	84	35	34	100	8	2⅛	40	8	4	39	H30	10000	42x108	2460	30	11 7/8	12	4		6½	10½

½ "A"—½ "P" or ½ Diam. Shell Minus ½ Diam. Head Port

WHITLOCK INSTANTANEOUS HEATERS

Uses

Whitlock Instantaneous Heaters are made in several different types for a variety of uses.

With Storage Tank—An instantaneous heater may be used to supply hot water to a storage tank by either gravity or forced circulation. For details of such applications, see Bulletin 40.

Types of Whitlock Instantaneous Heaters

Type R—This type with heating section made up of U-bends of seamless copper tubing firmly expanded into a rolled steel tube sheet, is recommended for all usual conditions, as it is of simple construction and allows for unlimited expansion and contraction. Standard shells are of cast iron on smaller sizes and steel on the larger sizes but can be made to suit working conditions.

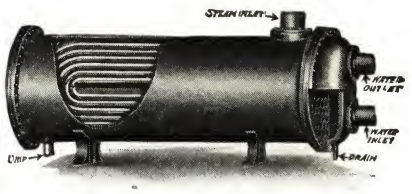


Fig. 5. Whitlock Type R Instantaneous Heater, U-bend Pattern

Table III shows capacity and general dimensions of the standard two-pass, four-pass and multi-pass heaters at various temperature ranges. A Whitlock Engineer should be consulted for advice on other temperature ranges and higher steam pressures. Bulletin No. 25-SA, containing full particulars, sent on request.

Type AC—Copper coil design, similar to Type A Feed Water Heater shown in Fig. 7, in which the water heated comes in contact with copper and bronze only. Of value, too, in heating liquids which corrode iron or steel. Write for Bulletin No. 24-SA.

Type S—Similar to the Type R, except that the heating section is made up of straight tubes with one end expanded into a rigid tube sheet and the other end expanded into a floating tube sheet to allow for expansion and contraction. These heaters are used where the water deposits a large quantity of mud or scale-forming materials and must be cleaned frequently. Bulletin on request.

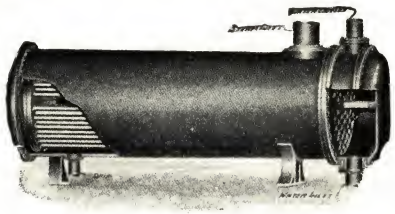


Fig. 6. Whitlock Type S Instantaneous Heater

TABLE III. STANDARD SIZES, CAPACITIES, DIMENSIONS AND WEIGHTS OF WHITLOCK TYPE R INSTANTANEOUS HEATERS

	Two-pass. Temp. Range 40° to 80° F.						Four-pass. Temp. Range 40° to 120° F.						Multi-pass. Temp. Range 40° to 180° F.					
Size No.	Capacity, gal. per hour	Overall length, in.	Diam. shell, in.	Water connections, in.	Steam connections, in.	Weight, lb.	Capacity, gal. per hour	Overall length, in.	Diam. shell, in.	Water connections, in.	Steam connections, in.	Weight, lb.	Capacity, gal. per hour	Overall length, in.	Diam. shell, in.	Water connections, in.	Steam connections, in.	Weight, lb.
0	150	11 3/8	7	3/4	1 1/4	80	80	11 3/8	7	3/4	1	80	25	15 3/8	7	3/4	1	90
1	350	14 3/8	7	1 1/4	1 1/2	90	150	16 3/8	7	3/4	1 1/4	100	60	26 3/8	7	3/4	1 1/4	125
2	650	19 3/8	7	1 1/2	1 1/2	110	300	21 3/8	7	1	2	115	150	37 3/8	7	3/4	1 1/2	160
3	1100	23 3/8	7	2	2	130	480	26 3/8	7	1	2	135	200	39 1/2	9 1/2	1	1 1/2	280
4	1600	29 3/8	7	2	2 1/2	145	650	31 3/8	7	1 1/4	2 1/2	150	250	48 1/2	9 1/2	1	2	325
5	1900	34 3/8	7	2	3	170	800	38 3/8	7	1 1/4	2 1/2	170	300	31 3/4	9 1/2	1	2	250
6	2550	24 3/4	9 1/2	2 1/2	3	240	960	24 3/4	9 1/2	1 1/2	3	220	400	40 3/4	9 1/2	1 1/4	2 1/2	300
7	3200	30 3/4	9 1/2	2 1/2	3 1/2	270	1350	30 3/4	9 1/2	2	3	270	500	43 3/4	9 1/2	1 1/4	3	325
8	3800	35 3/4	9 1/2	2 1/2	4	300	1600	35 3/4	9 1/2	2	3 1/2	300	600	48 3/4	9 1/2	1 1/4	3	350
9	5100	43 3/4	9 1/2	3	5	360	2100	43 3/4	9 1/2	2	4	350	800	52	12	1 1/2	3 1/2	575
10	6350	55 3/4	9 1/2	3	5	420	2600	55 3/4	9 1/2	2 1/2	5	420	1000	61	12	1 1/2	3 1/2	645
11	7950	45	12	4	6	610	3300	52	12	2 1/2	5	620	1250	74	12	1 1/2	4	760
12	9550	52	12	4	6	670	4000	61	12	3	6	700	1500	59 7/8	15	2	5	870
13	12700	67	12	4	8	810	5300	79	12	3	6	860	2000	72 3/8	15	2	5	1020
14	15900	51 7/8	15	5	8	930	6600	55 7/8	15	3 1/2	8	940	2500	59	17	2 1/2	6	1035
15	19100	59 7/8	15	5	8	1040	8000	65 7/8	15	4	8	1070	3000	71	17	2 1/2	6	1175
16	25600	59	17	6	10	1320	10500	71	17	5	10	1390	4000	89	17	2 1/2	8	1420
	Sizes 0 to 10, inclusive, have 3/4-in. o. d. No. 18 BWG copper tubes. Remainder have 1-in. o. d. No. 17 BWG copper tubes.						Sizes 0 to 10, inclusive, have 3/4-in. o. d. No. 18 BWG copper tubes. Remainder have 1-in. o. d. No. 17 BWG copper tubes.						Sizes 0 to 8, inclusive, have 3/4-in. o. d. No. 18 BWG copper tubes. Remainder have 1-in. o. d. No. 17 BWG copper tubes.					

Above capacities based on steam at atmospheric pressure corresponding to a temperature of 212° F. Companion flanges are furnished for connections 3 in. and larger. Supporting cradles will be furnished only when specified. Larger size heaters can be furnished if needed.

WHITLOCK HEATERS FOR VARIOUS CLASSES OF SERVICE

Feed Water Heaters

Type A American Standard Feed Water Heater has been the standard design for this service for over 30 years. For some cases, heaters of Type R or Type S construction are used for this service also. Write for Bulletin No. 13-SA.

Fuel Oil Heaters

With the increasing use of oil as fuel, the importance of a properly designed fuel oil heater becomes more and more evident. We offer several types fitting every possible condition as to capacity, temperature range and cost.

We are prepared to recommend the proper type for any condition. Bulletin No. 31-SA containing complete information sent on request.

Heat Exchangers

In addition to the apparatus described in these pages, we manufacture all types of heat transfer equipment.

Our years of experience in this line are at the command of prospective customers everywhere.

Swimming Pool Heaters

For this service the water is heated as it goes to the pool for the first time or as it is recirculated through the filters and purifiers to the pool again. Best practice calls for a heater capable of heating the entire contents of the pool from 40° to 80° F. in from 10 to 12 hours. For complete table of capacities of heaters for this service, write for Sheet D-59-A.

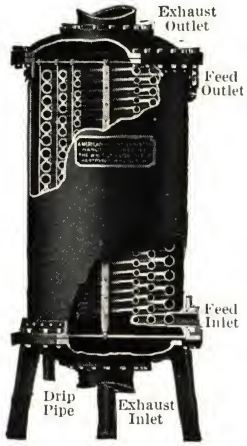


Fig. 7. Type A Standard Feed Water Heater

Condensation or Drip Coolers and Preheaters

In this use returns from heating systems and various steam apparatus are piped to the shell of the heater. Baffles keep them in close contact with the tubes through which the water is circulating. The condensation is thus cooled and the service water preheated before going to the main service heater. These coolers are especially useful where the steam used is purchased from an outside source and condensation cannot be returned to the boiler.

It is frequently illegal and always inadvisable to discharge hot returns directly to the sewer. Saving this heat is decidedly worthwhile and it will be found economical in the long run to install a cooler with sufficient surface to recover a large proportion of this heat.

For further information on these coolers, see Bulletin 100 and 25.

HOT WATER HEATING SYSTEMS

Hot Water Convertor

One class of installation in which the Type "R" instantaneous heater is widely used, is in the heating of water for hot water heating systems. As so applied the heater is usually known as a "convertor."

The Illustrations

The illustrations herewith show typical installations of this class, Fig. 8 showing a single unit as connected for a residence or building, and Fig. 9 showing a battery of three units as used in large factories or institutions.

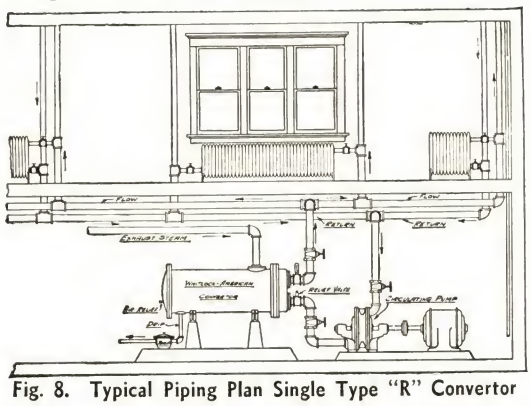


Fig. 8. Typical Piping Plan Single Type "R" Convertor

Both of these illustrations show the so-called "forced circulation" method of operation, that is with the water being forced through the convertor, radiation and connecting piping by means of a pump.

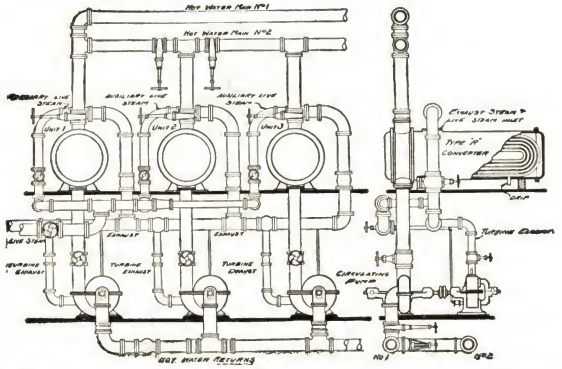


Fig. 9. Typical Piping Plan of 3 Type "R" Convertors Connected Parallel

The "gravity circulation" method is also widely used, in which the flow through the system is induced by the difference in specific weight of the ascending hot column of water issuing from the convertor and the descending cool column of water leaving the radiation.

The essential differences between these two systems are the following:

The advantages of the gravity method are simplicity, absence of any moving parts and elimination of power cost for promoting the circulation. The advantages of the forced method are, on the whole, more pronounced. They include the possibility of using smaller pipe lines to supply a given amount of radiation, a smaller convertor for a given duty, the ability to carry the heating water for long horizontal distances, the ease of exact control of the amount of heat supplied to the radiation and the possibility of carrying relatively heavy over-loads.

In gravity systems both the pipe lines and convertors must be so proportioned as to allow keeping the water velocity from about 50 to 100 ft. per minute, as the total head available to effect the circulation is relatively small and the head losses due to friction must therefore be kept extremely low. In the forced system on the other hand, the water velocity may be raised 250 to 300 ft. per minute or even higher and the resulting loss of head due to friction is limited only by the limit which it is desired to place on the power used to effect circulation.

Whitlock Type "R" convertors are regularly built for both gravity and forced circulation, the design and construction being carefully proportioned in each case, to meet the desired operating conditions.

Tables

The tables given herewith, Table IV and Table V are sample rating tables for Type "R" convertors of various capacities. A few words in explanation of these tables are in order.

In Table IV ratings are expressed in square feet of direct radiation since this is the method generally used in connection with gravity hot water heating systems. The figure given is total radiation, hence, in selecting the proper size of convertor for any given project the total radiating surface of the supply mains and branches must be included in the figures used. Where the exact radiating surface of the supply main and branches is not known, or it is not desired to calculate this exactly, it is customary to add 25% to the total amount of direct radiation, to allow for this factor. Ratings based on any ranges not given in this table will be furnished on application.

In Table V the ratings are based on gallons of water per minute, this being the most commonly used method in connection with the forced circulation type of system. Ratings based on ranges not given in this table will, of course, be gladly figured and supplied.

In both of these tables the size of convertor required to perform a given duty is indicated by a symbol number consisting of two numbers or a number and a letter. The first number in each case refers to the size of the standard Type "R" convertor or heater (required for the given duty) as given in our Bulletin No. 25. Where the second figure is a number or the letter M, it indicates the number of passes recommended in the heater (that is 2-pass, 4-pass or multi-pass). Where the letter S follows the first number, it indicates a "special" heater having the same diameter as a standard two-pass Type "R" heater of the size number indicated, but a somewhat smaller over-all length. Exact specifications of these "special" heaters will be furnished on request for any given duty.

TABLE IV. SIZES WHITLOCK TYPE "R" CONVERTORS FOR VARIOUS DUTIES—GRAVITY CIRCULATION

Radiation, sq. ft.	160°-180° 150 B.t.u. per sq. ft. radiation per hr.					160°-190° 150 B.t.u. per sq. ft. radiation per hr.				
	0 lb.	5 lb.	10 lb.	20 lb.	30 lb.	0 lb.	5 lb.	10 lb.	20 lb.	30 lb.
1,000	8	6	6-S	6-S	6-S	9	6	5	4	3
1,500	9	7	6	6-S	6-S	10	8	7	6	6-S
2,000	11	11-S	11-S	11-S	11-S	11	9	8	7	6
2,500	12	11-S	11-S	11-S	11-S	12	11-S	11-S	11-S	11-S
3,000	12	11-S	11-S	11-S	11-S	13	11	11-S	11-S	11-S
3,500	13	11	11-S	11-S	11-S	14	11	11-S	11-S	11-S
4,000	14	14-S	14-S	14-S	14-S	14	12	11	11-S	11-S
5,000	15	14-S	14-S	14-S	14-S	16	13	12	11	11-S
7,500	16	16-S	16-S	16-S	16-S	17	15	14	14-S	14-S
10,000	18	18-S	18-S	18-S	18-S	18	16	16-S	16-S	16-S
12,500	18½	18-S	18-S	18-S	18-S	19	17	16	16-S	16-S
15,000	19½	19½-S	19½-S	19½-S	19½-S	19½	18	18-S	18-S	18-S
17,500	19½	19½-S	19½-S	19½-S	19½-S	21-S	18	18-S	18-S	18-S
20,000	20	19½-S	19½-S	19½-S	19½-S	21	19½-S	19½-S	19½-S	19½-S
25,000	22-S	22-S	22-S	22-S	22-S	22	19½	19½-S	19½-S	19½-S
30,000	22	22-S	22-S	22-S	22-S	23	21	19½	19½-S	19½-S
35,000	24-S	24-S	24-S	24-S	24-S	24-S	22-S	22-S	22-S	22-S
40,000	24-S	24-S	24-S	24-S	24-S	24	22	22-S	22-S	22-S
45,000	24	24-S	24-S	24-S	24-S		22	22-S	22-S	22-S
50,000							24-S	24-S	24-S	24-S
60,000							24-S	24-S	24-S	24-S
70,000										

TABLE V. SIZES WHITLOCK TYPE "R" CONVERTORS FOR VARIOUS DUTIES—FORCED CIRCULATION

Gal. per min.	Steam at 0 lb. gauge					
	160°-180°	160°-185°	170°-195°	160°-190°	170°-200°	160°-195°
10	3-4	4-4	5-M	5-M	7-M	6-M
20	6-4	7-4	9-4	8-4	10-M	9-M
30	8-4	9-4	10-4	10-4	11-M	11-M
40	9-4	10-4	11-4	11-4	13-M	13-M
50	10-2	11-4	13-M	12-4	14-M	13-M
75	12-4	13-4	14-M	14-M	16-M	15-M
100	13-2	14-4	16-4	15-4	17-M	16-4
125	14-4	15-4	16-4	16-4	18-4	17-4
150	15-4	16-4	17-4	17-4	18½-4	18-4
175	16-4	16-4	18-4		19-4	18½-4
200	16-4	17-4	18½-4	18-4	19½-M	19-M
250	17-2	18-4	19-4	19-4	21-4	20-4
300	18-4	18½-4	20-4	19½-4		21-4
350	18½-2	19-2	21-4		22-4	22-4
400	18½-2	19½-4		21-4		
450	19-2	20-4	22-4		23-4	
500	19½-4	21-4		22-4		23-4
550	20-4	21-4			24-4	
600	20-4		23-4			24-4
650	21-2	22-4		23-4	25-4	
700	21-2					
750	21-2		24-4			25-4
800	21-2	23-4		24-4		
900	22-2		25-4			

THE WHITLOCK PREHEATER

Economy in the Use of Hot Water

The conservation, recovery and useful application of waste heat is a problem in which THE WHITLOCK COIL PIPE COMPANY is particularly concerned. One phase of this problem, the recovery of heat from waste hot wash water, dye liquors and other waste hot liquids, is one which has seen a great deal of development during the last ten years. The several types of Whitlock "Preheater" now on the market represent a practical solution for every problem of this nature.

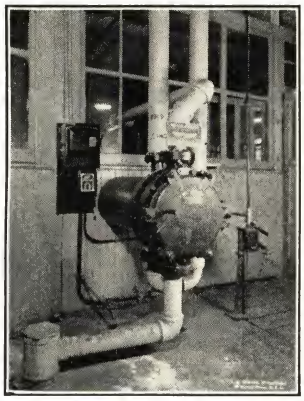


Fig. 10. Whitlock Closed Type Preheater, Single Stage

A Message Especially to Architects

During the last five years, particularly, the adoption of this equipment by the commercial power laundry industry has grown rapidly until now the Whitlock Preheater is generally accepted as standard equipment for such plants.

The possibilities of substantial and continued savings in laundries operated by hotels, hospitals and institutions, are just as great. This fact is daily gaining wider recognition and a number of prominent buildings of these types are now so equipped.

For the most economical application of the Whitlock Preheater to such buildings, we offer the services of a trained and experienced staff of field engineers, stationed in the district offices listed at the head of this catalogue, and supplemented by an organization of authorized representatives in the cities as also listed.

Description of Whitlock Preheater

The standard "Whitlock Preheater," sometimes known as the open type, is shown in Fig. 11 and the units in Fig. 13. It is built in standard sizes as shown in Table VI. For the purpose of this table a ratio, of hot waste to fresh cold water, of 10 to 7 has been assumed. This is a ratio which conforms very closely to average practice in many washing operations in laundries, textile mills, etc., but many individual cases will vary considerably from this average and special recommendations will be made on request.

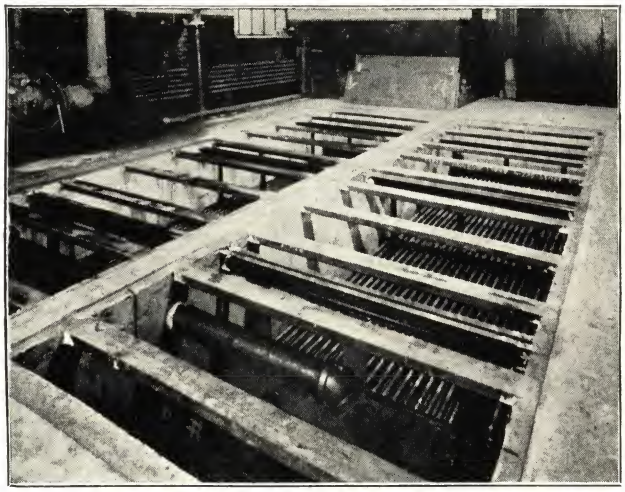


Fig. 11. Typical Installation Whitlock 2-stage Standard Preheater with Covers Off

Another type of Whitlock Preheater, sometimes known as the closed type, is shown in Fig. 10. This is also known as the Whitlock Unatherm Preheater, because it makes use of the *Unatherm Circuit* in order to attain maximum thermal efficiency.

The choice between an open and closed type preheater depends entirely on the conditions in each particular case.

A preliminary survey by a Whitlock Engineer is especially recommended in the case of a prospective preheater installation.

For more details write for Bulletins No. 50 and No. 75.

The final test of the efficiency of any type of waste heat recovery equipment is the magnitude of what is known as the "approach interval," that is, the difference between the average temperature of the incoming waste or heating medium and that of the outgoing fresh medium, which is being heated. The smaller this "approach interval" is, and the more uniform the temperature of the outgoing fresh medium, in spite of fluctuations in load and operating conditions, the higher is the thermal efficiency of the unit. A chart is shown here (Fig. 12), illustrating typical result from a 20,000 gal. per hour Whitlock Standard Preheater. Equally good results, even better under some conditions, can be secured with a Whitlock Closed Type or Unatherm Preheater.

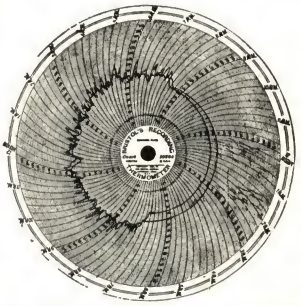


Fig. 12. Chart Showing Temperature of Incoming Hot Waste Water and Outgoing Hot Fresh Water

TABLE VI. CAPACITIES OF WHITLOCK PREHEATERS

Waste water, gal. per hr.	Water to be heated, gal. per hr.	Ship. wt. per unit, lb.	Water conn., in.	Waste water, gal. per hr.	Water to be heated, gal. per hr.	Ship. wt. per unit, lb.	Water conn., in.
900	630	950	2	6000	4200	3450	3
1100	760	1000	2	6300	4400	4000	3
1300	920	1050	2	6600	4600	4100	3
1550	1090	1120	2	6900	4800	3000	4
1800	1260	1170	2	7100	5000	3200	4
2000	1400	1320	2	7400	5200	3400	4
2400	1600	1400	2	7700	5400	3600	4
2900	2000	2150	3	8300	5800	3900	4
3100	2200	2300	3	8900	6200	4400	4
3400	2400	2450	3	10000	7000	4650	4
3700	2600	2700	3	11000	7800	5250	5
4000	2800	2850	3	12300	8600	5800	5
4300	3000	3150	3	14300	10000	6300	5
4600	3200	3350	3	17100	12000	7550	5
4900	3400	2600	3	21000	14500	9500	6
5100	3600	2800	3	24200	17000	10900	6
5400	3800	3000	3	26000	18000	11800	6
5700	4000	3250	3	30000	21000	14100	6

Note: Heating 50° to 85°; cooling 120° to 95°; single stage required. Heating 50° to 100°; cooling 120° to 85°; two stages required.

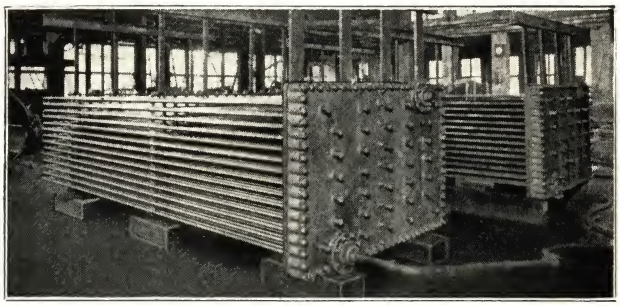


Fig. 13. Whitlock Standard Preheater Units, 2-stage with Overhead Supports

EXCELSO PRODUCTS CORPORATION

DIVISION OF AMERICAN RADIATOR STANDARD SANITARY CORPORATION

65 Clyde Avenue, BUFFALO, N. Y.

BRANCHES IN ALL PRINCIPAL CITIES

The Product

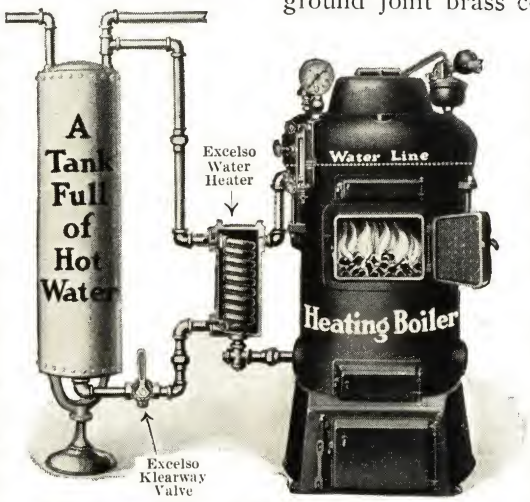
EXCELSO Indirect Water Heaters utilize any steam or vapor heating boiler to furnish unlimited hot water for all tap purposes at practically no cost as long as the boiler is being fired.

The principle of operation is simply the transfer of heat from one body of water to another. Water from the heating boiler flows around the coils of the EXCELSO Heater, thereby heating the domestic water supply which circulates through the coils and into the storage tank.

EXCELSO Indirect Water heaters range from 30 to 2,000 gal. capacity. Larger outputs can be had by installing two or more heaters in battery.

Its Application

EXCELSO Indirect Water Heaters are easily installed on any steam or vapor heating boiler. They are usually connected just below the water line. On round cast iron and tubular steel boilers, usually only one tapping is required. On cast iron sectional boilers, particularly where large heaters are used, all sections should be tapped as illustrated below. This, and the other sketches, show the most common types of EXCELSO installations. Regardless of the size, all installations are made along the same lines. In some cases, where constant steam pressure is available, the heaters are connected above the water line. Generally speaking, however, the most economical results are had with the heater below the water line.



Typical Installation of Excelso Single Coil Water Heater

Round type steam boiler and range boiler. An automatic storage, gas or electric heater may be used instead of range boiler. Note Klearway Valve for flushing out installation

Cost of Operation

The boiler load imposed by an EXCELSO Heater is very small. On average installations for residences and small apartments, the cost of operating the heater is practically nothing. On large installations, the cost of heating water with an EXCELSO is 50% to 75% lower than by separate heating.

Its Construction

Construction of the heater is simple and foolproof. Helically wound, removable copper coils are connected inside of self-draining cast iron shells by patented ground joint brass connections.

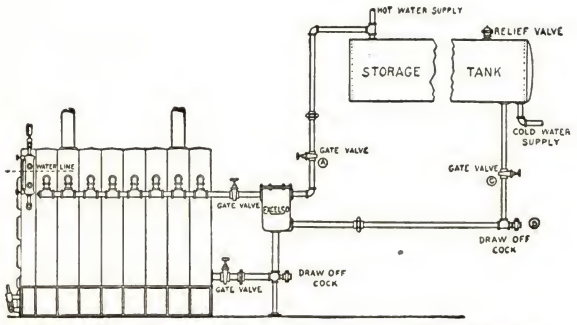
These connections are an *exclusive* EXCELSO feature, eliminating the use of gaskets and thereby doing away with the chief cause of leaks. All of the water being heated passes through the copper coil while the water or steam from the heating boiler passes through the cast iron shell and around the coil.

Water being heated comes in contact with copper and brass only, assuring the delivery of clean, pure hot water to the storage tank. All parts are readily accessible and interchangeable. There are no moving parts and nothing to get out of order.

Special Uses

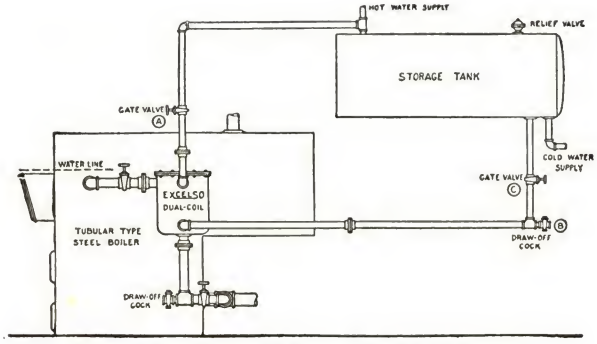
EXCELSO Heaters are not limited in their use to heating the domestic hot water supply. They are often used to warm sprinkler tanks and swimming pools, to heat open vats or tanks and for auxiliary radiation.

EXCELSO Heaters with special coils are also used to handle various chemical solutions. EXCELSO Gray Heaters, equipped with admiralty metal coils, are used extensively for heating heavy grades of fuel oil to improve the combustion of oil burners and permit the use of low priced fuel oil.



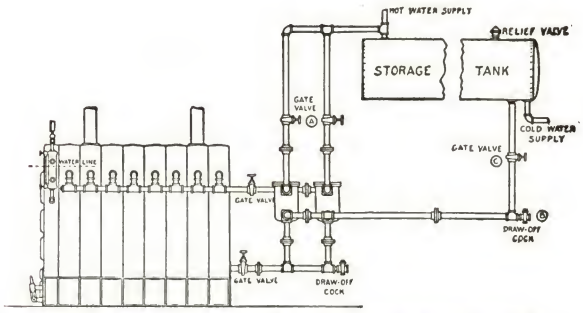
Typical Installation of Large Size Excelso Water Heater

Connected to sectional steam boiler by means of header. Tap all except front and back sections on boilers fired with oil, gas or stoker



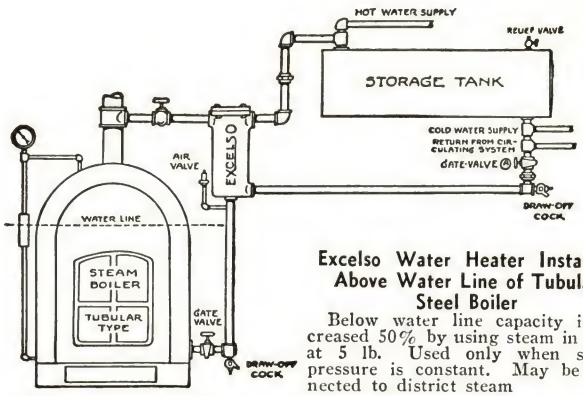
Typical Installation of Excelso Dual Coil Heater

Attached to steel heating boiler. When boilers are not tapped, connection is easily made by welding coupling to boiler shell. Many boilers are tapped



Typical Installation Large Excelso Water Heaters Connected in Battery

Full size piping should be used throughout. Where two pipes join to one the area of the single pipe should be equal to the area of the two



Excelso Water Heater Installed Above Water Line of Tubular Steel Boiler

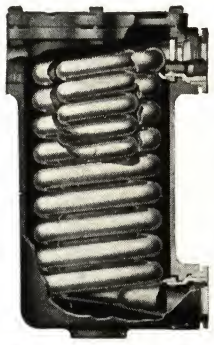
Below water line capacity is increased 50% by using steam in shell at 5 lb. Used only when steam pressure is constant. May be connected to district steam

Note: The EXCELSO Klearway Valve is a simplified unit to facilitate keeping any hot water supply system in perfect working order by the positive removal of sediment or rust accumulations. This single unit through a two-way action, provides for the cleaning of tank, heater and feed lines and replaces two gate valves and draw-off cock formerly necessary for this purpose

EXCELSO INDIRECT WATER HEATERS

Excelso Single Coil Indirect Heaters

Seven sizes from 30 to 140 gal. for small and medium sized residences. Equipped with two brass unions, removable copper coil and EXCELSO patented ground joint brass connections



Excelso Double Coil Indirect Heaters

Five sizes from 160 to 420 gal. for small apartments, stores, large residences, etc. EXCELSO Gray Heaters, extensively used for preheating fuel oil, are made in all sizes listed below

Excelso Triple Coil Indirect Heaters

Three sizes from 500 to 1000 gal. for large apartments, small hotels, hospitals, garages, etc. Large diameter tubing in coils assures full flow through the all-copper and brass waterways

Excelso Dual Coil Indirect Heaters

Three sizes from 1200 to 2000 gal. for very large apartments, hospitals, hotels, swimming pools, auto washing stations, etc. Practically unlimited capacities can be had by installing two or more of these heaters in battery

DIMENSIONS—CAPACITIES

	Single Coil							Double Coil				Triple Coil				Dual Coil		
Size of heater	Jr.	11	12	13	14	15	16	25	26	27	28	34	35	36	37	42	44	46
Length, in.	8½	10½	14	11½	15	19½	24½	12½	15	19	23¼	18¾	21	25	29	21½	25¼	29¼
Width, in.																26	26	26
Diameter, in.	5	5	5	6½	6½	6½	6½	9	9	9	9	13¾	13¾	13¾	13¾	13¾	13¾	13¾
Shell openings, in.	1	1	1	1½	1½	1½	1½	2	2	2	2	3	3	3	3	4	4	4
Coil openings, in.	¾	¾	¾	1	1	1	1	1½	1½	1½	1½	2½	2½	2½	2½	3	3	3
C. C. coil openings, in.	5¾	7⅛	10½	7⅝	11⅜	15¼	19¼	6⅜	8⅞	13⅝	17¾	11½	13⅝	17¾	21½	13⅝	17¾	21½
Weight, crated, lb.	12	14	19	30	38	43	50	65	70	90	100	180	200	225	240	360	410	470

Heating Water Below Water Line of Steam or Vapor Boilers

Size of heater	Jr.	11	12	13	14	15	16	25	26	27	28	34	35	36	37	42	44	46
Tank cap., gal.	30	30	42	60	82	120	140	160	180	250	372	500	600	800	1000	1200	1600	2000
		32	52	66	90				220	300	420							
		40			100													

Temperature rise 100° in 3 hours.

Heating Water with Live Steam

Size of heater	Jr.	11	12	13	14	15	16	25	26	27	28	34	35	36	37	42	44	46
Tank capacity, gal.	45	50	75	100	150	200	220	250	300	450	600	750	900	1200	1500	1800	2400	3000

Temperature rise 100° in 3 hours, steam at 5-lb. pressure.

Hot Water Radiator Heating Capacities

Size of heater	Jr.	11	12	13	14	15	16	25	26	27	28	34	35	36	37	42	44	46
Radiator capacity, sq. ft.	45	45	67	90	135	180	210	240	300	450	600	750	900	1200	1500	1800	2400	3000

Dealers and Stock

Sold and installed by plumbers and steamfitters everywhere.

EXCELSO
WATER HEATERS
AND KLEARWAY VALVES

Catalogue

Complete detailed catalogue mailed on request.

Stocked and sold by leading wholesalers, and boiler and radiator manufacturers everywhere

THE NATIONAL PIPE BENDING CO.

Incorporated 1883
156 River Street, NEW HAVEN, CONN.

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Products

WATER STORAGE HEATERS (Bulletin No. 68); INSTANTANEOUS WATER HEATER (Bulletin No. 55); FEED WATER HEATERS (Bulletin Nos. 51A, 53); COAL BURNING COPPER COIL TANK HEATERS (Bulletin No. 52A).

FRE FLO HEATERS—Submerged Type (Bulletin No. 70), Fuel Oil Heaters; also Heat Exchangers of special design.

NATIONAL "RED HEAD" STORAGE HEATERS

A Standardized Product for Immediate Delivery

Heaters of the Highest Grade—Capacities, 80 to 2500 Gals. per Hour

Advantages of Using "Red Head" Heaters

National RED HEAD Storage Heaters are built to meet the hot water requirements of Apartments, Clubs, Hotels, Schools, Industrial Plants, Hospitals, etc. By eliminating odd sizes and capacities, and specializing on those sizes which will meet normal, average heating requirements, RED HEAD Heaters are available *for immediate delivery*. Due to standardization of sizes, no deviation can be made.

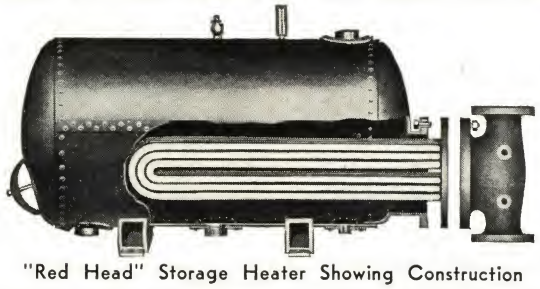
On installations requiring unusual sizes of construction, use Bulletin No. 65 on National line of "Individually Engineered" Storage Heaters, or refer your problem to our Engineering Service Department.

Construction

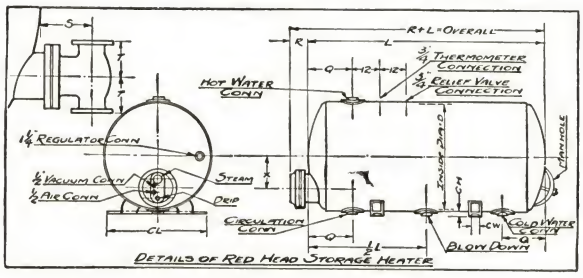
Tanks—Made of tank steel having convex bumped heads of flange steel and fabricated in accordance with standard boiler shop practices.

Heating Element—The "U" Bends are of 1¼-in. No. 16 B.W.G. (.065-in. wall) commercially pure seamless drawn Anaconda copper tubes expanded in forged steel tube sheets. They are flared at back, beaded at front, and covered on open ends by a divided cast iron steam distribution chamber tapped for steam inlet and condensation drain. All bolted joints are machined and packed with sheet gaskets. Each bend is composed of one single length of tube. All National heating elements are easily removed.

Port—Heavy rolled steel; electric welded construction.



"Red Head" Storage Heater Showing Construction



DETAILS OF RED HEAD STORAGE HEATER

Piping Connections—Water inlet and outlet connections are reinforced screwed connections made through boiler flanges riveted to tank. Smaller tappings for air and water relief valves, thermometers, etc., are either welded steel spuds or are drilled and tapped through tank.

Manhole—A standard 11 x 15-in. manhole is provided in all RED HEAD sizes above 18 in. Of heavy construction with steel plate, yoke and bolt. Located for easy access.

Test—Built for 100 lbs. working pressure, tested to a hydrostatic pressure of 150 lbs. Heaters will be tested to meet any state requirements. The National's Certificate of Inspection accompanies shipping papers guaranteeing the heater has met the above tests and is absolutely tight.

DATA ON NATIONAL "RED HEAD" STORAGE HEATERS

TANKS

No. Hor.	Gallons storage, one fill	Sizes in inches: Diam.	Sizes in inches: Lgth.	Weight empty, lbs.	Standard opening, in.: Water	Standard opening, in.: Blow	Circulation	Dim. Q	Cradles: C. L. Length	Cradles: C. W. Width	C. H. Height
A	80	18	72	380	1½	1	1	10	18½	2½	⅜
B	141	24	72	530	2	1	1	10	25	3	1⅛
C	220	30	72	870	2½	1¼	1¼	12	28	3	¾
D	310	36	72	1020	2½	1¼	1¼	14	33	4	1⅞
E	365	36	84	1130	2½	1¼	1¼	14	33	4	1⅞
F	475	36	108	1350	2½	1¼	1¼	14	33	4	1⅞
G	575	42	96	1750	3	1½	1¼	16	36	4	1½
H	645	42	108	1900	3	1½	1¼	16	36	4	1½
I	720	42	120	2050	3	1½	1¼	16	36	4	1½
J	860	42	144	2350	3	1½	1¼	16	36	4	1½
K	940	48	120	2410	3	1½	1¼	18	39	4	1
L	1130	48	144	2770	3	1½	1¼	18	39	4	1
M	1300	48	168	3100	3	1½	1¼	18	39	4	1
N	1425	54	144	3750	4	1½	1¼	18	46	5	1¾
O	1665	54	168	4300	4	1½	1¼	18	46	5	1¾
P	2000	60	168	5200	4	2	1½	18	49	5	1⅜
Q	2460	72	144	6500	5	2	1½	21	55	5	1
R	2875	72	168	7600	5	2	1½	21	55	5	1

HEATING ELEMENTS

No.	Gallons heated per hour	Shortest tank into which element will go	Wt. in lbs.	Port size, ins.	Port Projection, "R", in.	Steam Connections: Inlet screwed	Steam Connections: Outlet screwed
NS- 1	80	18 x 72	85	5	6¾	1	½
NS- 2	100	18 x 72	88	5	6¾	1¼	¾
NS- 3	150	18 x 72	96	5	6¾	1¼	¾
NS- 4	200	18 x 72	117	6	6¾	1½	1
NS- 5	250	18 x 72	122	6	6¾	2	1¼
NS- 6	300	18 x 72	185	8	6½	2	1¼
NS- 7	350	36 x 84	189	8	6½	2	1¼
NS- 8	400	36 x 84	195	8	6½	2½	1¼
NS- 9	450	42 x 96	205	8	6¼	2½	1¼
NS-10	500	42 x 96	210	8	6¼	2½	1¼
					"S"	Flgd.	Flgd.
NS-11	600	42 x 96	260	8	8⅞	3	2
NS-12	700	42 x 108	270	8	8⅞	3	2
NS-13	800	42 x 108	285	8	8⅞	3	2
NS-14	900	42 x 108	343	9	10⅝	3½	2
NS-15	1000	42 x 108	357	9	10⅝	3½	2
NS-16	1250	42 x 108	440	10	12	4½	2½
NS-17	1500	42 x 108	468	10	12	4½	2½
NS-18	1750	42 x 108	575	12	12⅜	5	3
NS-19	2000	42 x 108	620	12	12⅜	5	3
NS-20	2500	42 x 108	755	14	13	6	3½

Above sizes are standard. Sizes other than shown are special and built to order. Send for Bulletin No. 65.

The above heating capacities (gallons per hour) are based on raising the temperature of the water from 50° to 180° F. using steam from 0°to 5 lb. gauge pressure. Heating capacities at various other pressure will be furnished if desired.

How to specify 900 Gal. Storage 500 G, P. H. heating, designate NS10J.

NATIONAL "MULTI-FLOW" COAL BURNING COPPER COIL TANK HEATER

An Efficient Heater for Use Requiring Up to 450-gal. Tank Capacity

The MULTI-FLOW Tank Heater is a unit, complete in itself, which can be placed in the most convenient location. Designed and built to produce a clean supply of hot water continuously and at low cost. Adapted for domestic use, restaurants, beauty parlors, barber shops, small hotels, apartments, etc., and for heating sun-rooms, small bungalows, garages, etc. The MULTI-FLOW in the average family will keep hot water at every faucet 24 hours of the day on 20 lbs. of coal, or at a cost of 10 to 15 cents a day.

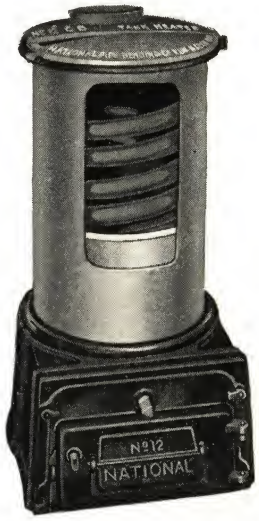
Advantages—Copper coil and bronze fittings insure no rusty water. Fire brick combustion chamber makes it easy to maintain fire. Lift draft, triangular grates and solid base on all sizes. Extremely attractive—red vitreous enamel jacket, top and base in gloss black japan. Moderately priced, within the reach of everyone.

It is easy to connect. All parts are easily replaceable. Particularly free of servicing troubles. Once installed, it gives lasting satisfaction.

Construction—Top, base and grate are of grey cast iron. Case is of heavy gauge iron. Combustion chamber above the grate is fire brick lined and in the hot gas zone, directly exposed to the radiant heat of fire, is a double inter-wound coil of heavy Anaconda copper seamless tubing, the ends of which are brazed into bronze manifolds, to which is connected the circulating piping to storage tank.

The fire brick combustion chamber is *below the coil*. This means the fire is easily maintained because it is not subject to sudden chilling and killing around outer edges when hot water is drawn off and cold water rushes in; it also eliminates the danger of cracked fire pots as it is not subject to sudden expansion and contraction. Fire brick retains heat, insuring in quick pick-up in heating efficiency because coal ignites readily upon refueling.

All sizes give excellent results on hot water radiation heating. Accomplished in two ways; first, by connecting up a closed system under pressure with radiation and hot water tank protected by relief valve; second, for radiation only by common method of expansion tank.



No. 12 Heater

The Coil

Designed to give a very rapid circulation of water across heating surface and, being made of copper, will absorb heat so rapidly that its surrounding case is seldom hot. Tested to 600 lbs. hydrostatic pressure, it will stand up under any city water pressure. Made in three sizes. No. 12 Heater is best suited to the average single house, No. 16 Heater, for the large residence, small hotel or apartment house; No. 20 Heater, for large capacity installation.

Aqua-Matic Regulator Outfit

At a cost within the reach of everyone, the MULTI-FLOW can be made automatic by equipping it with the National Aqua-Matic Regulator Outfit. This outfit is made for No. 12 and No. 16 MULTI-FLOW Heaters (no outfit for No. 20 size).

It will maintain a constant supply of hot water at every faucet 24 hours of the day for a period of 2 or 3 days without any attention. It operates the drafts and saves one-quarter of the coal bill by preventing overheating.

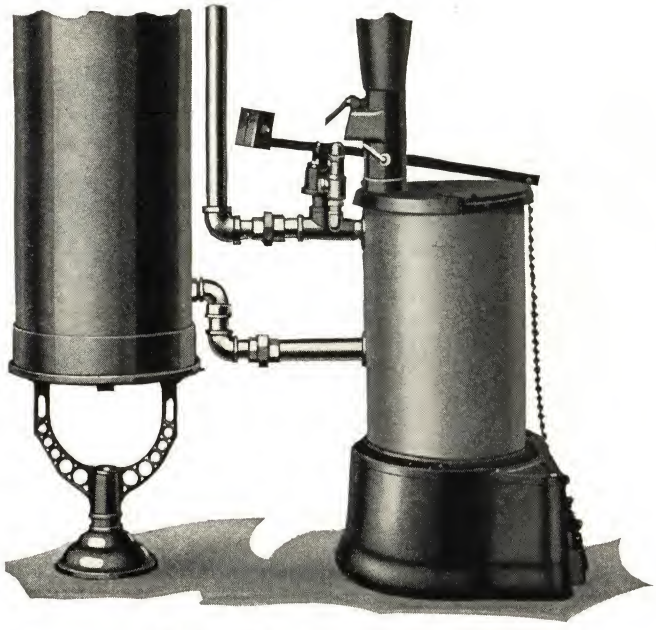
The National Aqua-Regulator Outfit is a complete unit in itself ready to install without the trouble of cutting, tapping and threading pipes; furnishing and fitting tees, elbows, etc., or of adjusting pulleys, etc. The Aqua-Matic Outfit is packed in a separate carton and is marketed separately.

DATA ON NATIONAL "MULTI-FLOW" TANK HEATERS

Sizes are based on a 100-degree rise above intake temperature and the time required

Tank cap., gals.	No. of heater	No. hrs. to heat tank	Gals. per hr.	Degree rise per hr.	Radiation, sq. ft.	Fire pot diam., in.	Grate area, sq. ft.	Fuel cap., lbs.	Smoke pipe, in.	Tank Hgt. in.	Diam. of top, in.
*40	12	1⅓	30	80	155	10	.54	50	4½	30	14
**60	12	2	30	52	155	10	.54	50	4½	30	14
†90	12	3	30	35	155	10	.54	50	4½	30	14
††150	16	2½	63	43	300	14	1.06	143	5½	33	18
‡200	16	3½	63	32	300	14	1.06	143	5½	33	18
‡‡250	16	4	63	25	300	14	1.06	143	5½	33	18
§300	20	2¾	110	36	475	18	1.48	258	7	45	24

For other size tanks the ratio is in approximate proportion as above.
*For 1 bath and usual number of lavatories, kitchen sink and laundry.
**For 2 baths, or 1 bath and shower, besides the usual number of kitchen sinks, lavatories and laundry trays.
†For large homes, triplexes, clubs, etc., having 3 baths besides other fixtures.
††For 4 to 6 baths and corresponding fixtures. Also for a 4-suite building.
‡For apartments, clubs, large homes, etc., having 6 to 8 baths and fixtures.
‡‡For apartments, clubs, large homes, etc., having 8 to 10 baths and fixtures.
§For apartments, clubs, etc., having 10 to 12 baths and fixtures.



Installation of Aqua-Matic Regulator Outfit

Enlarged View of Aqua-Matic Regulator Outfit

ESTABLISHED 1880

THE PATTERSON-KELLEY CO.

Water Heating Engineers and Manufacturers of Hot Water Heaters for More Than 50 Years

102 Park Avenue
NEW YORK, N. Y.

BRANCH OFFICES IN PRINCIPAL CITIES

Products

PATTERSON HOT WATER SERVICE HEATERS; STORAGE and INSTANTANEOUS TYPES.

Also manufacturers of Converters for hot water heating systems; Swimming Pool Heaters; Preheaters or Condensation Coolers; Reclaimers for recovering heat from waste liquids; Feed Water Heaters and Purifiers; Fuel Oil Heaters; Kelley Hot Water System for Laundries.

Co-operative Engineering Service

Architects place themselves under no obligation by permitting Patterson-Kelley Engineers to submit suggestions regarding heaters required for specified purposes. We offer such service without charge and, when an installation is made in accordance with our recommendation, we positively guarantee that it will furnish *all of the hot water required, as hot as required and when required.*

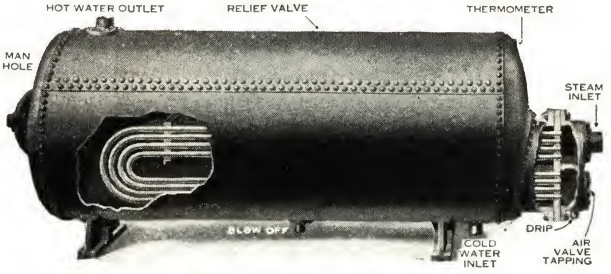
General Construction

The tubes in all Patterson Hot Water Heaters, Types A, B, C, D, E, F, G and L, are of heavy gauge, seamless drawn copper, tested to 1000-lb. hydrostatic pressure per sq. in. All tube heads are forged steel. The shells are either boiler plate or best quality dry sand castings of ample thickness. After assembling, each heater is tested to a hydrostatic pressure 50% greater than the specified working pressure.

Guarantee

We guarantee the materials and workmanship of each heater to be first class in every respect, and any part proving defective within one year from date of shipment will be replaced without charge. We also guarantee each heater to heat its rated capacity of water.

Patterson Combined Hot Water Service and Storage Heaters



Horizontal Heater Type B

Vertical Heater Type L

Both the Type B, horizontal, and Type L, vertical, provide any combination of storage and heating capacities. They require only a small continuous supply of steam to heat and store sufficient water for peak load periods.

The tubes are "U" shaped seamless copper, both ends of each tube being expanded in a forged steel removable tube head.

The shells are of steel and, if desired, may be coated inside with rust resistant or *lined with copper* so that water comes in contact with no metal other than copper, thus combining the strength of steel with the durability of copper.

PATTERSON COMBINED HOT WATER SERVICE AND STORAGE HEATER TYPE B

Storage capacities				Heating capacities 40° F. to 180° F.–steam at atmospheric pressure		
No.	Dimensions, in.	Capacity gal.	Approx. wt., lb.	No.	Gal., per hour	Approx. wt., lb.
1 S	24x 48	94	650	1 H	100	200
2 S	24x 60	118	750	2 H	150	215
3 S	24x 72	141	850	3 H	200	235
4 S	24x 84	164	950	4 H	250	255
5 S	30x 60	180	875	5 H	300	285
6 S	30x 72	215	1000	6 H	400	315
7 S	30x 84	255	1150	7 H	500	350
8 S	30x 96	285	1300	8 H	600	370
9 S	30x120	360	1500	9 H	700	400
10 S	36x 72	310	1250	10 H	800	425
11 S	36x 84	365	1400	11 H	1000	450
12 S	36x 96	415	1550	12 H	1250	500
13 S	36x108	475	1700	13 H	1500	550
14 S	36x120	500	1850	14 H	1750	600
15 S	36x144	640	2100	15 H	2000	700
16 S	42x 72	430	1500	16 H	2500	800
17 S	42x 84	500	1650	17 H	3000	900
18 S	42x 96	575	1800	18 H	3500	1050
19 S	42x108	650	1950	19 H	4000	1200
20 S	42x120	720	2200	20 H	4500	1350
21 S	42x144	860	2450	21 H	5000	1500
22 S	42x168	1000	2800	22 H	6000	1750
23 S	42x192	1155	3100	23 H	7500	2000
24 S	48x 96	750	2600	24 H	10000	3200
25 S	48x120	940	2925	25 H	12500	3800
26 S	48x144	1125	3350	26 H	15000	4500
27 S	48x168	1300	3840	27 H	20000	5100
28 S	48x192	1500	4200	28 H	25000	5800
29 S	54x120	1190	3500			
30 S	54x144	1425	3900			
31 S	54x168	1665	4300			
32 S	54x192	1900	4700			
33 S	60x120	1400	4300			
34 S	60x144	1700	4950			
35 S	60x168	2000	5600			
36 S	60x192	2240	6200			
37 S	72x174	3000	7000			
38 S	84x168	4000	8700			
39 S	96x168	5200	10000			
40 S	96x192	6000	11000			

Note—To specify Type B heaters, combine the numbers of the required storage and heating capacities. For example, "One Patterson Type B heater with No. 22S. and No. 17H." has 1000 gal. storage with 3000 gal. hourly heating capacity.

Suggested Specifications for Type B Heaters—

Furnish and install, where shown on drawing, one Type B Patterson (if Indestructo Copper-lined, so state here) Combined Hot Water Heater and Storage Tank, with No. .... S storage section and No. .... H heating section.

The heating surface to consist of "U" shaped seamless copper tubes, both ends of each tube to be expanded in a forged steel tube head, and to be of sufficient capacity to heat not less than .... gallons of water per hour from an initial temperature of .... degrees to a final temperature of .... degrees when supplied with steam at .... pounds pressure.

The heater to be furnished with manhole, all necessary openings, tappings, and saddles for its support.

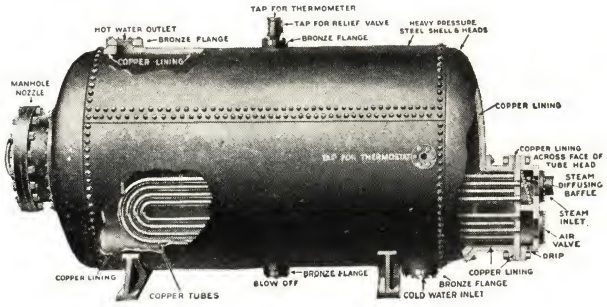
The water space to be tested for a working pressure of .... pounds per square inch and the steam space for a working pressure of .... pounds per square inch.

"Data Book for Architects' and Engineers' Use"

Send for this. It contains accurate capacity tables of the herein described and other types of Patterson Service Heaters and Generators.

Gallons of water per hour are given for each size, at various final temperatures, using steam at different pressures. Detailed dimensions are shown of all sizes; also capacities of Patterson Converters in square feet of radiation, etc.

Patterson Indestructo Copper-Lined Hot Water Service and Storage Heater



The Patterson Indestructo is practically two heaters in one. It is a complete copper heater built inside of, and reinforced by, a heavy steel shell, thus combining the non-corrosive and indestructible qualities of copper with the superior strength of steel. All seams of the lining are brazed, forming solid permanent joints. The copper sheet lining is extended through the openings in the steel shell at the manhole and nozzle, and is flanged over on the outside. The same process is used at all pipe connections, and bronze companion flanges are supplied.

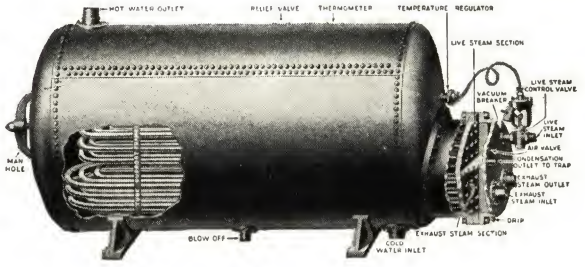
The forged steel tube head, into which the copper tubes of the removable heating section are expanded, is also faced with a sheet of copper, which is spun into the tube holes before the tubes are expanded in them. The overhanging ends of the tubes are held in alignment by a copper tube support.

The Patterson Indestructo Heater is absolutely rustproof, as the water in storage can come in contact with nothing but copper, and we therefore positively guarantee it to heat water without the slightest discoloration from rust

The first copper-lined heaters we made, more than twenty-five years ago, are still giving entirely satisfactory service, which proves the reliability of our copper-lining process.

Any desired combination of storage and heating capacities may be had in these heaters. Dimensions and capacities are the same as given in table for unlined *Steel Shell* Type B Heaters.

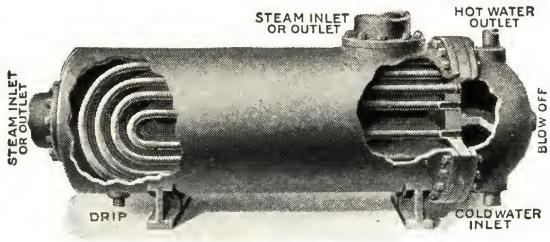
Patterson Combined Hot Water Service and Storage Heater with Two Heating Sections



For installations where there is a limited or insufficient supply of exhaust steam available for heating the required amount of water, the Patterson Combined Hot Water Service and Storage Heater (Type B) is furnished with two separate heating sections. Both sets of tubes may be in the same nozzle, as illustrated, which has the advantage of all the heating surface being placed low in the shell, or separate nozzles may be used.

Just enough live steam—from the boiler, automatically controlled by a thermostatic valve—is used to make up the deficiency in temperature after all the heat is extracted from the exhaust steam.

Patterson Instantaneous Hot Water Service Heater, Type D



This is a water tube heater and is ideal for installations where requirements for hot water are nearly constant—or for use as a hot water converter in heating systems. It is particularly adapted for heating water for swimming pools.

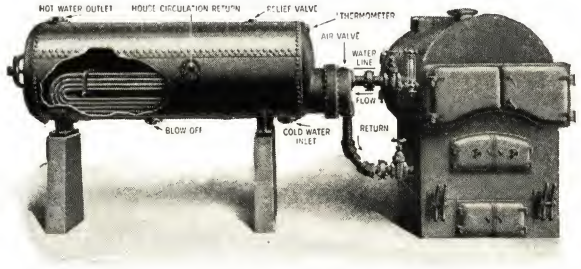
No.	Dimensions, in.	Hourly heating capacity in gallons, 40° F. to 180° F. — steam at atmosphere	Approx. weight, lb.	No.	Dimensions, in.	Hourly heating capacity in gallons, 40° F. to 180° F. — steam at atmosphere	Approx. weight, lb.
00D	12x19	100	200	10D	20x71	1750	1050
0D	12x25	150	240	11D	20x79	2000	1175
1D	14x25	200	285	12D	24x67	2500	1450
2D	14x31	300	310	13D	24x76	3000	1600
3D	14x39	400	360	14D	24x94	4000	1800
4D	14x46	500	400	15D	24x116	5000	1925
5D	16x40	600	450	16D	30x111	7500	2700
6D	16x48	750	520	17D	30x123	10000	3150
7D	18x52	1000	700	18D	36x144	12500	4400
8D	18x61	1250	785	19D	36x168	15000	5000
9D	20x61	1500	950	20D	42x168	20000	6800

Note: Patterson Preheaters, or Condensation Coolers, are similar in construction to Type D heaters, with such modifications as especially fit them for this duty.

Patterson Instantaneous Hot Water Service Heater

This is a water tube heater, with only nominal storage capacity. It is recommended for use where the hot water demand is practically continuous or as a hot water generator for circulating systems.

Patterson Lo-Flo Hot Water Heater



An indirect method of heating water for apartment houses and private homes, where there are definite peak demands.

In the bottom of the heater is a nest of "U" shaped copper tubes through which is circulated, *from below the waterline of the boiler,* a minimum supply of hot boiler water, transferring its heat to the large body of water stored in the heater.

Low Installation Cost—No excavation is necessary to lower the boiler where there is low headroom, as must be done if the hot water supply is to be secured through heating the water by a steam coil. No additional height of boiler room is required. In summer an abundant supply of hot water is furnished with a slow fire, generating no steam.

TACO HEATERS, INCORPORATED

342 Madison Avenue, NEW YORK, N. Y.

TACO HEATERS

Taco Heaters are made in various types and sizes for different capacities and purposes. They may be attached to any type of steam, vapor or vacuum system boiler whether coal or oil fired, and they may also be attached to hot water heating boilers if oil fired. On coal fired hot water boilers an auxiliary "booster" is required. Taco Heaters are equally adaptable to small capacity use for residences, etc., up to the largest requirements for apartments, hotels, clubs, office buildings, factories, etc.

TACO (Trade Mark, Reg. U.S. Pat. Off.)

Taco Heaters are carried in stock and are distributed nationally to plumbing and heating contractors by boiler and radiator manufacturers and wholesalers of plumbing and heating materials. Stocks are found in all principal cities in the country.

Engineering information concerning the selection and installation of Taco Heaters is furnished by our Engineering Sales Department, 342 Madison Ave., New York, N. Y. See page 16.

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Taco Converter	105	F-15	6
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FACTORS WHICH DETERMINE THE PROPER SELECTION AND INSTALLATION OF TACO HEATERS

1—Size of Storage Tank

Apartments having three to five rooms and the usual private residences require a storage capacity for domestic hot water of 30 gallons for each family or bath.

Tank size must be increased to provide for kitchen and laundry use and waste when there are a number of servants. For such an installation, whether in detached houses or apartments, 50 or more gallons storage capacity should be allowed per bath with a minimum storage of 100 gallons.

When considering the rated capacity of Taco heaters, whether operated under the standard conditions with coal-fired boilers or under intermittent firing conditions as with an oil burner and Taco-Abbott System, it should be understood that the rated capacities, as stated, were obtained from tests when operating under favorable conditions. This means with heater properly piped, the storage tank favorably located, and, in the case of coal-fired ratings, with the boiler steaming.

It is good practice to allow a margin when selecting Tacos of the proper size, to provide for loss of efficiency due to fouling. Future increased demands for hot water and unusual requirements demanded by guests, should also be considered. A larger size Taco is always a good investment, particularly in mild weather when the boiler fires may be banked for hours at a time.

Allowance should also be made where there is an extensive circulating system in connection with the domestic hot water supply, or towel racks or other apparatus which are heated with domestic hot water.

2—Location of Storage Tank

The storage tank should be placed as high as possible.

Vertical storage tanks will prove satisfactory in sizes up to about 66 gallons capacity, provided they are properly installed with the top of the tank 6 feet 6 inches to 7 feet above the floor level and the piping connections properly made. (See Fig. F-1, page 3.)

Horizontal storage tanks are preferable for all medium sized installations, and absolutely essential on larger-sized jobs. For medium-sized installations they should be installed with the top of the tank at least 3 feet above the water line of the boiler, and as much higher as conditions will permit. In large installations in apartment houses, etc., the storage tank should be installed with the bottom of the tank at or above the water level of the boiler. (See Fig. F-2, page 3, and Fig. F-21, page 8.)

Horizontal storage tanks smaller than 18 or 20 inches in diameter, are not recommended because of the difficulty of preventing the hot and cold water from mixing, especially when large quantities of hot water are being drawn.

3—Pipe Sizes

Pipe sizes should be the full size of Taco openings. This is particularly important in the piping between the Taco and the boiler. Brass pipe is recommended for domestic water connections and where used it may usually be one size smaller than Taco tappings. See tables in this catalogue for correct sizes. With the Taco-Abbott System special pipe sizes are permissible. (See page 10, Table J.)

4—Valves and Drains

The installation of the valves and drains shown is necessary to permit flushing out the shell and coil of the heater at regular intervals.

5—Losses by Radiation

Radiation losses should be kept at a minimum and proper insulation of the Taco and its piping connections and the storage tank is urged. This is particularly important in connection with the Taco-Abbott System where the heating boiler is operated during the summer months for domestic hot water supply only.

6—Location of Taco

The location of the Taco, relative to the water line of the boiler, is important. See the various cuts in this catalogue for typical methods of connecting the Taco to the boiler.

In general, the boiler should be tapped not lower than 2 to 3 inches below the normal water line, and the Taco connections run straight out therefrom. Extra side tappings are provided on domestic Tacos Nos. 2, 2-A, 3 and 3-A for this purpose.

Super Tacos should be so installed that the top of the Taco is from 2 to 6 inches above the normal water line of the boiler. These heaters are provided with three upper side connections for convenience of installation.

7—Tax on Heating Boiler

The Master Steamfitters' Code of Chicago specifies that where indirect heaters are used, ½ square foot of radiation shall be allowed for each gallon of storage tank capacity. This code also specifies that 4 square feet of radiation shall be allowed where water is heated instantaneously, and 2 square feet if water is heated by means of steam coil placed in the storage tank.

TYPICAL INSTALLATIONS
(For Domestic Hot Water)

Domestic Taco

Fig. F-1—Shows domestic Taco Heater connected below the water line on coal-fired steam or vapor heating boiler. The boiler water, which is always at high temperature even if the fire is banked, circulates around the copper coil of the Taco. The domestic water circulates through the copper coil thus providing a constant supply of domestic hot water at all times.

Combustion is not interfered with and domestic water cannot overheat causing pounding in the tank and steaming at the faucet.

Pipe full size of Taco openings and install valves and drains as shown. Brass pipe is recommended between storage tank and Taco.

There are hundreds of thousands of these installations in successful operation.

See table of ratings, for coal-fired boilers (Column B, Table A) on following page.

See Taco-Abbott System, page 9, for use with oil-fired boilers.

For sizes, capacities, etc., see following page, Table A, Column C.

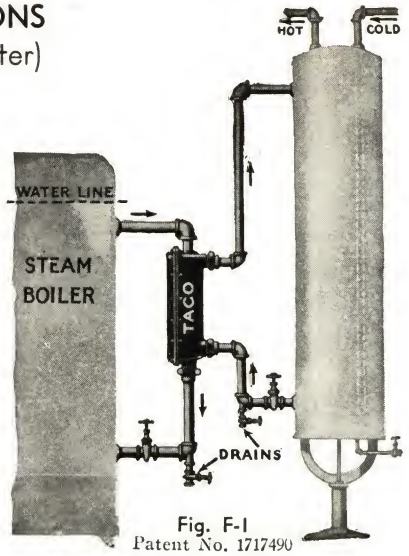


Fig. F-1
Patent No. 1717490

Super Taco

Fig. F-2—The Super Taco employs the heating principles hereinbefore described. The hot water flows from the boiler to the Taco and transmits heat through the copper tubes to the domestic water.

Super Tacos are installed vertically which assists the circulation of the heated domestic water to the hot water tank. Super Tacos are usually installed below the water line of the heating boiler but they may be installed partly above and partly below the water line.

The accompanying illustration shows a Super Taco connected to a steel heating boiler. The liberal boiler connections of the Super Taco, permitting the free circulation of the boiler water, make Taco Heaters especially suitable for larger installations. Connections can be quickly welded to the boiler to suit the Taco tappings.

Super Taco may also be connected to cast iron sectional boilers in which case a header or manifold for the supply to the Taco is installed below the water line with connections to one or more of the boiler sections.

For all year round domestic water supply with the Super Taco, see Taco-Abbott System, page 10.

For sizes, capacities, etc., see following page, Tables A and B.

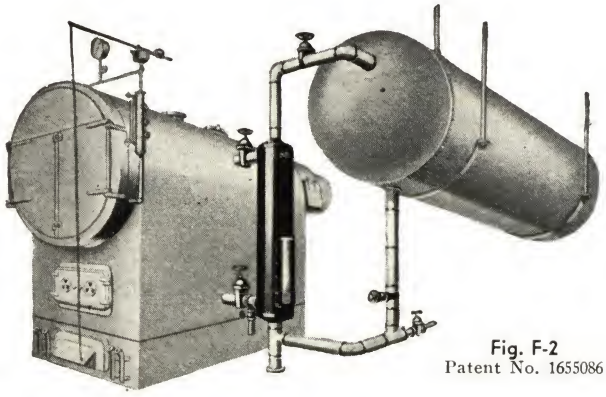


Fig. F-2
Patent No. 1655086

Taco Heaters Nos. 4, 5 and 6

Fig. F-3—The accompanying cut shows a No. 4, 5 or 6 Taco Heater installed entirely below the water line of a steam heating boiler using boiler water as the heating medium. This method of installation and type of Taco Heater are especially adaptable to low water line boilers.

In connecting this heater to sectional cast iron boilers a header or manifold is used on the supply to the Taco as shown. If the boiler is coal fired and used for winter operation only, one or more sections are tapped for connection to the manifold. If for all year round use or if oil is the fuel, all sections must be tapped. Taps should be made about 2 inches below the water line.

Round cast iron boilers and steel boilers require only one top connection to the Taco. See Figs. F-1 and F-2.

For all year round domestic hot water with Nos. 4, 5 and 6 Tacos see Taco-Abbott System, Fig. F-35, page 10.

For sizes, capacities, etc., see following page.

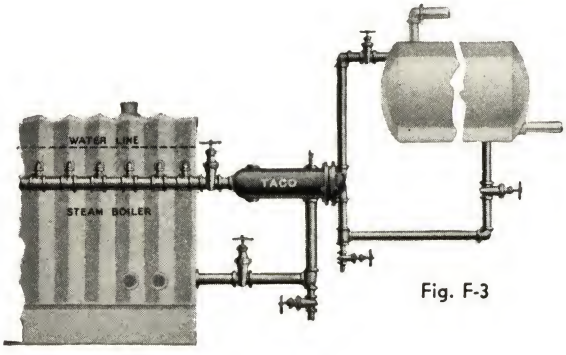


Fig. F-3

SPECIFICATIONS
(Domestic Hot Water)

There shall be installed in complete working order where shown on drawings, one (specify type and size) Taco Heater, for attachment to a (state type) heating boiler, for the purpose of heating water for domestic use.

The installation shall be (the Taco-Abbott system for all year round service) (for service during the heating season only) and shall conform to the manufacturers' instructions and Fig. (specify figure) as appears in the 1932 Edition of SWEET'S ARCHITECTURAL CATALOGUES, page (specify Sweet's page).

Note No. 1: Size and location of Taco and size and location of storage tank, pipe sizes, valves and drains must conform to the requirements of the manufacturer as shown or described in Sweet's Catalogue, page (specify page). Valves must be gate pattern.

Note No. 2: Specifications for the insulation of the storage tank, piping and Taco should be included in the insulation specifications applying to the heating boiler and the piping of the system.

Note No. 3: When Taco-Abbott System is used the heating contractor should furnish and install the Taco Heater and the oil burner dealer should furnish and install temperature control devices so wired as to maintain boiler water at 180° when room thermostat is satisfied. See pages 8, 9, and 10.

Note No. 4: Where a header is required in connection with the Taco Heater on a sectional boiler it is advisable to specify the same. For header see page 11.

DESCRIPTION AND CAPACITIES

Domestic Taco

(Stock No. 101)

The Domestic Taco is a patented indirect water heater consisting of a cast-iron shell containing a copper coil, as shown in Fig. F-4. It is designed primarily for installation below the water line of steam, vapor or vacuum system heating boilers, but has many other uses.

The shell is provided with suitable conveniently located tapped openings to receive the boiler connections. It is split vertically and provided with cleanout cover which permits the heater to be quickly and thoroughly cleaned without breaking any pipe connections. The coil is of copper tubing and is permanently expanded into the shell and tested to 1200 lbs. pressure, making positive assurance against leakage. Unions are provided for the purpose of reducing cost of installation.

Domestic water is in contact with rustless copper or brass only (not iron); this is an important feature. Furnished in sizes Nos. 0, 1, 1-A, 2, 2-A, 3 and 3-A, suitable for installation with storage tanks of from 20 gallons to 250 gallons capacity.

Typical installation of a Domestic Taco is shown on page 3.

See Taco-Abbott System, page 9, for use of Domestic Taco for year round (automatic) hot water supply.

Domestic Taco
Fig. F-4
Pat. No. 1,717,490

Super Taco

(Stock No. 102)

The Super Taco is a patented high grade vertical type domestic water heater made in a wide range of sizes. It consists of a series of copper tubes mounted in a cast-iron shell. Tubes are permanently expanded into the tube plates and provision is made for each tube to contract and expand with variation of water temperature. The shell has a removable clean-out cover, permitting ready access to interior of the heater for cleaning.

The heads are of bronze and may be removed, giving access to the tubes and permitting each and every tube to be cleaned *internally*. This is an exclusive Taco feature which is of especial importance in communities having hard water. Pipe connections are of liberal size and conveniently arranged.

A typical installation with a steel boiler is shown on page 3.

See Fig. F-16, page 7, for installation in connection with hot water heating system and Fig. F-2, page 8, showing Taco-Abbott System.

Super Tacos may be provided with jackets which are of heavy steel and are finished with two coats of baked red enamel with black trimmings. Jackets are thoroughly insulated with asbestocel.

Super Taco
Fig. F-5
Pat. No. 1,655,086

TABLE A

SIZE OF TACO	CAPACITIES Gallons in 3 Hours Heated from 50°F. to 150°F. — Taco Below Water Line: Boiler Water at 212°F.	Taco Below Water Line: Boiler Water at 180°F. * * *	TACO on Steam of 0 lbs. Gauge Pressure	CAPACITIES Square Feet Hot Water Radiation: TACO* below Water Line Boiler at 212°F.	TACO* on Steam of 0 lbs. Gauge Pressure
A	B	C	D	E	F
DOMESTIC TACOS					
0	30		40	15	20
30	30-40		50	20	30
1	40-60		75	30	50
1A	60-80	30-40	115	45	75
2	80-120	40-60	150	60	100
2A	120-160	60-80	225	90	150
3	160-200	80-100	300	120	200
3A	200-240	100-120	370	150	250
TACOS No. 4, 5, 6					
4	320	160	600	250	400
5	640	320	1200	500	800
6	960	480	1800	800	1200
SUPER TACOS					
7	160	80	240	120	180
8	220	110	330	150	250
9	320	160	480	230	350
10	450	225	675	300	450
12	600	300	900	420	600
15	800	400	1200	500	800
20	1000	500	1500	640	1000
25	1250	625	1875	800	1250
35	1750	875	2625	1100	1750
50	2500	1250	3750	1600	2500
75	3750	1875	5625	2400	3750
100	5000	2500	7500	3200	5000

*Based on 120 °F. Inlet Temp. to heater and 160° F. Outlet Temp.

**Based on 140°F. Inlet Temp. to heater and 180°F. Outlet Temp.

***Taco-Abbott System.

Taco Heaters Nos. 4, 5 and 6

(Stock No. 103)

These heaters consist of a cast-iron shell containing a series of U-tubes of copper permanently expanded into a tube plate. Suitable and convenient piping connections are provided to permit the installation of these heaters under widely varying conditions. They are especially well adapted to use with low water line boilers.

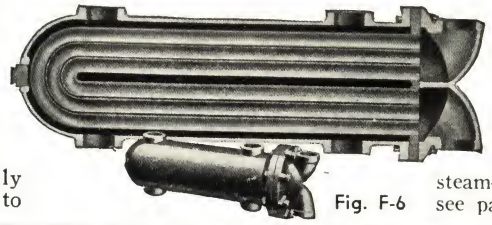
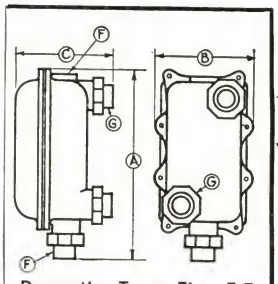


Fig. F-6

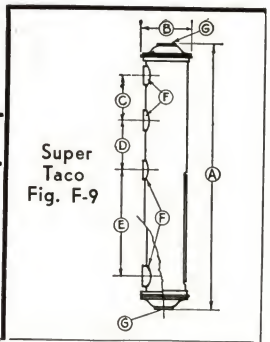
A typical installation is shown on preceding page.

See Fig. F-35, page 10, for Taco-Abbott System.

For use with high pressure steam—other uses, see pages 5 and 6.



Domestic Taco Fig. F-7



Super Taco
Fig. F-9

TABLE B—DIMENSIONS, SHIPPING WEIGHT AND LIST PRICES

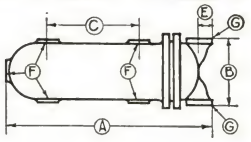


Fig. F-8

Taco Heaters Nos. 4, 5 and 6

TYPE		DOMESTIC TACOS								TACOS 4,5,6			SUPER TACOS										
SIZE		0	30	1	1A	2	2A	3	3A	4	5	6	7	8	9	10	12	15	20	25	35	50	75	100
BOILER CONN.—IN.	F	1	1	1	1¼	1¼	1½	2	2	2	2½	3	2	2	2½	2½	3	3	4	4	4	5	5	6
TANK CONN.—IN.	G	¾	¾	¾	1	1	1	1¼	1¼	2	2½	3	1½	1½	2	2	2	2	2½	2½	4	4	5	6
DIMENSIONS	A	8½	11	13	14	16½	19	21½	26	28½	41	43¾	34½	42½	36	44	45	54	45	54	55	77	81	84
	B	5½	5½	5½	7½	7½	9	9	9	10	12	13½	6¼	6¼	7½	7½	9¼	9¼	11¾	11¾	14¼	14¼	19	21
	C	6	6	6	7½	7½	8¾	9¼	9¼	14¾	25	29¼	8	10	8	10	10	12	7½	8½	8½	12	12	12
	D									7½	8	10	5½	7½	5	7	6½	9	8	11½	11½	18	18	18
	E									1¾	2	2½	13½	17½	13	17	16½	21	15½	20	20	30	30	29
SHIPPING WEIGHT lbs.	H	10	12	14	22	25	50	65	80	100	190	280	70	80	100	120	160	200	280	350	500	685	1050	1250
LIST PRICE $	I	10	15	20	25	30	40	50	60	100	200	300	55	70	90	110	150	190	270	330	470	670	1000	1300

HEATING WATER WITH LIVE STEAM

For Use Where Steam Is Constantly Available at Two to Fifteen Pounds Pressure

Domestic Hot Water Supply with Separate Steam Boiler

Fig. F-10 shows a Taco connected above the water line of steam heating boiler, which boiler is installed for heating the domestic water supply exclusively. This type of installation does not discolor the domestic water with rust and relieves the boiler of any possible excessive water pressure. Many installations of this kind have been made in the place of direct fired tank heaters. The damper regulator on the steam boiler provides automatic regulation by limiting the steam pressure. Overheating of the domestic water is impossible. See Tables C and D for capacities.

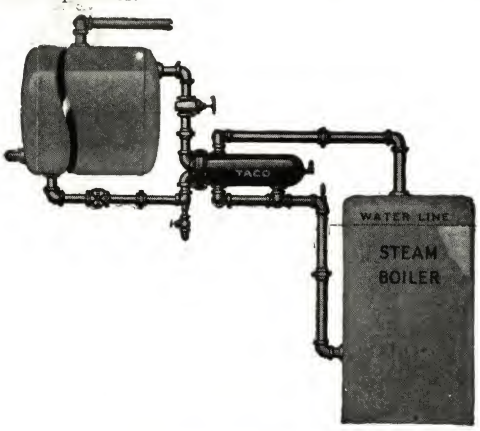


Fig. F-10

Domestic Hot Water Supply with Street Steam

The arrangements shown in Figs. F-11 and F-12 are recommended for domestic hot water supply wherever low pressure or street steam is constantly available. Steam is connected to the upper part of the shell of the Taco. The drains should be connected to a suitable trap. It is very important for satisfactory operation that these heaters be properly vented of air. Be sure the Taco is located below the storage tank and properly piped thereto, installing valves and drains as shown. Automatic temperature control is usually required for installations of this type.

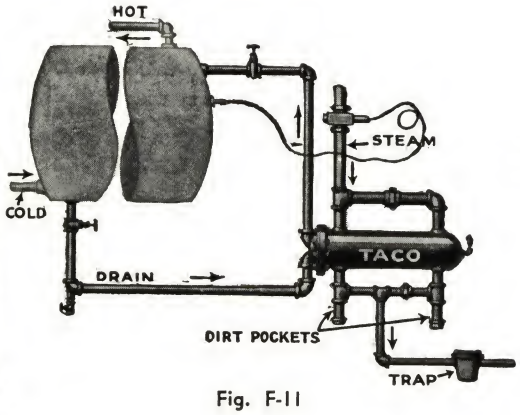


Fig. F-11

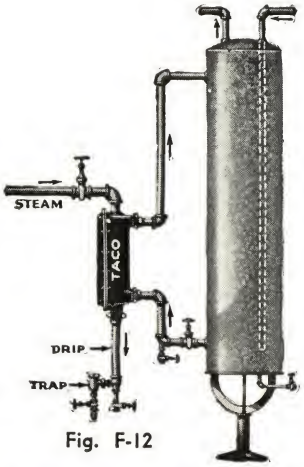


Fig. F-12

Instantaneous Hot Water

Fig. F-13 shows installation for use where live steam is constantly available and a storage tank is not installed.

Instant Taco is of four-pass construction, i.e., the water makes four complete passes through the heater as contrasted with the two-pass construction used in Nos. 4, 5 and 6 Tacos. Heating surface is of copper tubing and heads and tube plates are of bronze.

Automatic temperature control is essential.

This type heater cannot be used in connection with low pressure heating plant where steam supply is not constant.

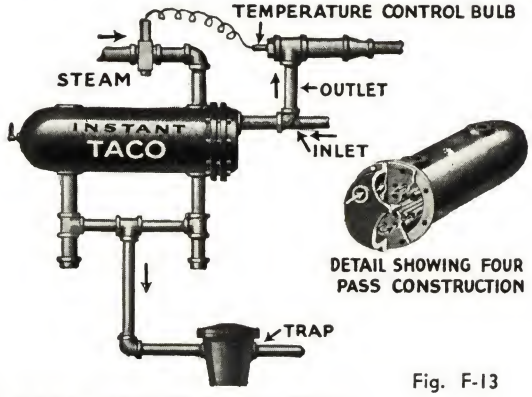


Fig. F-13

TABLE C—CAPACITY OF TACO HEATERS WITH STEAM (GRAVITY CIRCULATION)

Size	Domestic Tacos							Tacos Nos. 4, 5 and 6			Instant Tacos		
	30	1	1A	2	2A	3	3A	4	5	6	4	5	6
Capacity in gallons heated from 50°-150°F. in 3 hours with steam at atmos. press.	50	75	115	150	225	300	350	600	1200	1800	800	1600	2400
											40-120°F. in one hour		
Fig. No.	Fig. F-12							F-10, F-11			Fig. F-13		

For pipe sizes and dimensions see Table B.

TABLE D—CAPACITY OF TACO CONVERTERS WITH STEAM AND BELOW WATER LINE (GRAVITY CIRCULATION)

	U Type Taco (See Taco Converters for Construction details, Fig. F-15 and Table F)												
Size, Fig. F-11 2-pass Construction *	UC-4-36	UC-4-48	UC-7-36	UC-7-48	UC-7-60	UC-10-36	UC-10-48	UC-10-60	UC-10-72	UC-14-48	UC-14-60	UC-14-72	UC-14-84
Capacity**	335	450	1000	1350	1690	1880	2475	3150	3800	6000	7500	9000	10500
With boiler water at 212° F.	180	240	540	720	900	1000	1320	1680	2050	3200	4000	4800	5600
With boiler water at 180° F.	90	120	270	360	450	500	660	840	1025	1600	2000	2400	2800

* Taco Converters of 4-pass construction can be furnished for instantaneous water heating. Capacities and details furnished on request.

** Capacity in gallons heated from 50° to 150° F. in 3 hrs. Factors for capacities when used with high pressure steam are given in Table R, page 13.

Size No. indicates shell diameter and length respectively—Head connections No. 4—2 in., No. 7—3 in., No. 10—4 in., No. 14—6 in. Special heaters built to order for large installations and higher pressures.

For dimensions and description, see Table F, page 6.

TACOS FOR HEATING HOT WATER RADIATION

Connected Below or Above Water Line

Garage Heating

Taco Heaters are used for heating detached garages, conservatories, etc., as illustrated in Fig. F-14. They operate on the same principle as when used for domestic hot water supply. Water from the steam boiler circulates around the copper coil in the Taco imparting its heat to the radiators located in the garage or elsewhere.

Be sure and install valve on return from Taco to heating boiler which valve may be regulated to control the system in mild weather, if desired. City water at moderate pressure can be connected to the radiator system or an expansion tank may be installed as shown or in the garage itself.

Recommended Capacities:
Taco No. 2.....60 sq. ft. radiation—Small one-car garage.

Taco No. 2-A, 90 sq. ft. radiation — Small one-car garage.

Taco No. 3, 120 sq. ft. radiation—Small two-car garage.

For larger capacities, see Table A, Column E, page 4.

TABLE E

Size of Taco	Square feet of radiation	Used in
2	60	Small one-car garage
2A	90	
3	120	Small two-car garage
3A	150	
4	250	Larger garages
5	500	
6	800	

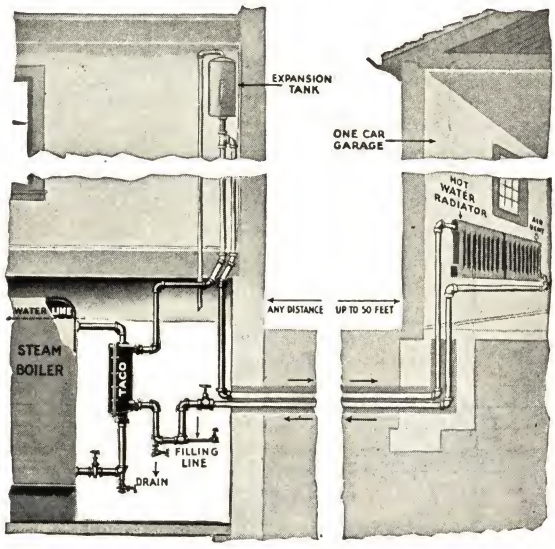


Fig. F-14

TACO CONVERTERS

(Stock No. 105)

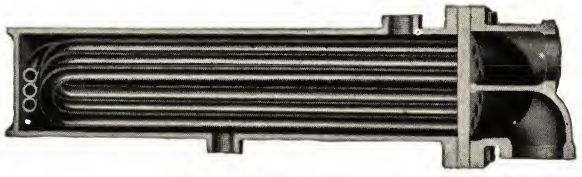


Fig. F-15—Taco Converter

Taco Converters consist of a steel shell containing a series of U tubes of copper permanently expanded into a tube plate. Shell and tube section are tested to 300 pounds pressure.

Taco Converters are designed primarily for use in heating hot water radiators.

Steam admitted to the tube section is the usual heating medium, although these converters may be connected entirely below the water line of steam boilers, using the boiler water as the heating medium.

Taco Converters are also suitable for heating domestic water when high pressure steam is used. See Table D, page 5.

TABLE F

Type of Converter	CAPACITIES OF CONVERTERS IN SQUARE FEET HOT WATER RADIATION								Pipe Conn's		Dimensions, inches***			Shipping Weight, lbs.	List Prices
	Heater below * water line with boiler steaming at 212° F	HEATER ON STEAM** STEAM PRESSURE LBS. GAUGE							Head	Shell or as specified	Diam. of Flange	Diam. of Shell	Length Over All		
		0	2	5	10	15	20	50							
A B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R
UC-4-24	96	150	180	225	285	315	375	570	2	1	7	4	31	80	$ 85.00
UC-4-36	144	225	275	335	430	470	560	850	2	1	7	4	43	90	91.00
UC-4-48	192	300	360	450	570	630	750	1140	2	1	7	4	55	100	97.00
UC-4-60	240	375	450	560	710	790	940	1430	2	1	7	4	67	110	103.00
UC-4-72	288	450	540	675	855	950	1120	1710	2	1	7	4	79	120	109.00
UC-7-24	280	450	500	670	850	940	1120	1700	3	2	11	7	36	170	156.00
UC-7-36	430	675	810	1000	1280	1420	1700	2570	3	2	11	7	48	190	170.00
UC-7-48	575	900	1080	1350	1710	1890	2250	3420	3	2	11	7	69	210	184.00
UC-7-60	720	1125	1350	1690	2140	2370	2830	4300	3	2	11	7	72	240	198.00
UC-7-72	865	1350	1630	2020	2570	2840	3400	5140	3	2	11	7	84	250	212.00
UC-10 36	800	1270	1500	1900	2400	2680	3200	4850	4	2	15	10	48	320	260.00
UC-10 48	1050	1650	1980	2470	3130	3480	4140	6300	4	2	15	10	60	350	284.00
UC-10-60	1340	2100	2500	3150	4000	4400	5250	8000	4	2	15	10	72	380	318 00
UC-10-72	1630	2550	3050	3800	4850	5360	6400	9700	4	2	15	10	84	410	352.00
UC-10-84	1920	3000	3600	4500	5700	6300	7500	11400	4	2	15	10	96	440	386.00
UC-14-36	1900	3000	3600	4500	5700	6300	7500	11400	6	3	19½	14	51	480	505.00
UC-14-48	2550	4000	4800	6000	7600	8400	10000	15200	6	3	19½	14	63	560	560.00
UC-14-60	3200	5000	6000	7500	9500	10500	12500	19000	6	3	19½	14	75	640	615.00
UC-14-72	3800	6000	7200	9000	11400	12600	15000	22800	6	3	19½	14	87	720	690.00
UC-14-84	4500	7000	8400	10500	13300	14700	17500	26600	6	3	19½	14	99	800	770.00
UC-14-96	5100	8000	9600	12000	15200	16800	20000	30400	6	3	19½	14	111	900	850.00

* Based on 145° F. inlet temp. to converter and 175° F. outlet temp. (average radiator temp. 160° F.).

** Based on 140° F. inlet temp. to converter and 180° F. outlet temp. (average radiator temp. 160° F.).

*** For dimensions of head, see Table P, page 13.

TACO HEATERS WITH HOT WATER HEATING SYSTEM

Domestic Hot Water Supply from Oil-fired Hot Water Heating Boiler

With this system as illustrated on Fig. F-16 the boiler water is maintained automatically at about 180° and allowed to circulate to the radiators as the room temperature requires. A valve is required in the main to control the water to the radiators. The cut shows a Super Taco installed for the domestic hot water supply. Tacos Nos. 4, 5 and 6 are also suitable for this service. Domestic Tacos may be used for the smaller installations. The top of the storage tank must be located at least 3 feet above the top of the heating boiler. The Taco should also be located as high as possible, but below the storage tank as shown. Use horizontal tanks only.

Taco may be used as a preheater in combination with a hot water heating boiler and either automatic instantaneous or storage type gas water heaters, as shown by Fig. F-17.

Because of the widely fluctuating temperature in a hot water heating system only partial heating of the domestic water can be secured therefrom, especially in mild weather.

By the use of an intermediate storage tank with Taco, the domestic water is preheated before going to the gas water heater. This results in a greatly reduced gas consumption. Be sure and pipe full size of Taco openings.

Capacities:

No. 1-A.....20-30 gals. No. 2-A..... 40 gals.
No. 2 ..... 30 gals. No. 3..... 50 gals.
No. 3-A.....66 gals.

If the intermediate storage tank is omitted, install a No. 3 Taco for a 30-gallon tank. No. 4 Instant Taco for 40-60 gallon, etc.

This type of installation will frequently pay for itself in one winter.

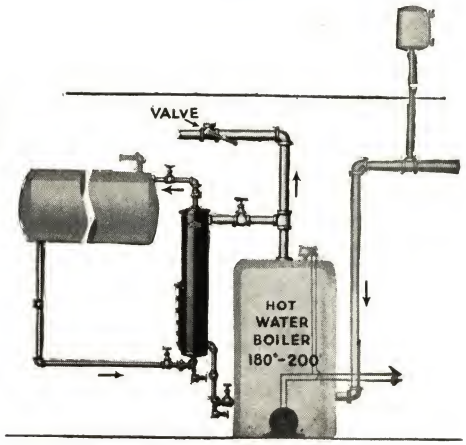


Fig. F-16

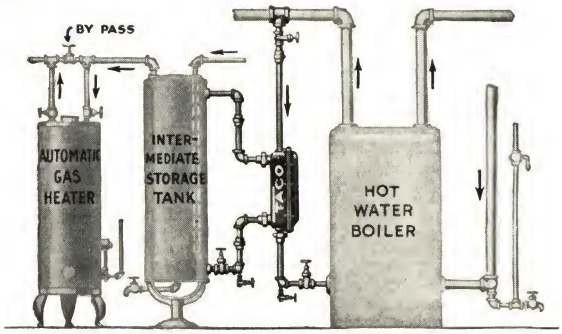


Fig. F-17

TABLE G

No. of Taco	1A	2	2A	3 or 7	3A	9 or 4	10	12	15 or 5	20	25 or 6	35	50
Tank capacity and capacity of Taco in gallon 100°F. temp. rise with boiler water at 180°F.	30-40	40-60	60-80	80-100	100-120	160	225	300	400	500	625	875	1250
Boiler conn's., inches	1¼	1¼	1½	2	2	2	2	2½	2½	3	3	4	4
Tank of conn's., inches	¾	¾	1	1	1¼	1¼	1½	1½	1½	2	2½	3	3
No. of bathrooms or small families	1	1	1-2	2-3	4	4-5	5-7	8-10	10-13	13-15	16-20	22-29	30-40

FIRE POT HEATERS

(Stock No. 106)

Universal Taco

The Universal Taco is a domestic water heater for installation in the fire pot of any round heating boiler or furnace. It operates on the same principle as the ordinary "waterback" in a range boiler or laundry stove. It is made in malleable iron and brass and in two sizes—30 gallons and 60 gallons.

The Universal Taco is a quality heater carefully designed to give the most efficient results.

Fig. F-18
Universal Taco

When installed the Universal Taco is connected with cored openings provided in the heating boiler, thus eliminating any exposed screwed connections. In the fire pot the heater projects a distance equal to the width of the heater as shown in accompanying table. There are no fins or projections nor any loops or pockets to catch coal or hold clinkers or ashes as is so frequently the case with pipe coils and loops to the serious interference with the fire.

Taco Fire Pot Generators, Nos. 121 and 122

The No. 121 and No. 122 Taco Generators are similar in principle to the Universal Taco. They are made in capacities of 30 gallons and 40 gallons in cast iron, brass and galvanized iron. They are constructed to meet the requirements of low priced installations.

These heaters should be set in a vertical position in the fire pot of hot air furnace or round heating boiler.

Four tappings are provided which enable these generators to be adapted to various center dimensions of furnaces and boilers. Cleanout opening is provided.

Fig. F-19 No. 121
All outlets ¾ in.

Fig. F-20 No. 122
All outlets 1 in.

TABLE H

Size	6-9-30	6-9-60	121	122
Capacity, gallons	30	60	30	40
Height, inches	10½	10½	7½	8
Width, inches	6	11½	3¼	4
Shipping weight, lbs.	10	17	4	7
List price; Cast iron	$6.40	$11.20	$2.50	$4.00
Galvanized	..	..	3.50	5.50
Bronze	22.00	38.50	6.00	9.50

TACO-ABBOTT SYSTEM

Pat. No. 1,654,396

A patented system for use with oil-fired boilers for all year round supply of domestic hot water

Taco-Abbott System provides for automatic year round domestic hot water from an oil-fired steam heating boiler. This system offers many advantages to the home owner in service the year round. The boiler and oil burner are always in perfect condition. The slight heat radiated from the equipment keeps the cellar dry. No other water heater is needed and the cost of summer operation is so small as to be negligible. *There are no valves or switches to be operated.*

This system can be installed in connection with a cast-iron sectional boiler with each section tapped and headed together just below the water line. Tapping the boiler in this manner not only permits the free circulation of the boiler water to the Taco from all sections of the boiler, but *prevents the boiler from steaming during the summer months* when heat is not required in the radiators. With steel boilers and round cast-iron boilers no header as above described is required.

A boiler water temperature control is set to automatically maintain a minimum water temperature in the boiler at all times of about 160° to 180° F. Domestic water temperature 130° to 140° F.

This patented system is offered exclusively by TACO HEATERS, INCORPORATED.

Due to the intermittent operation of the oil burner and the fact that the boiler water is maintained at only 170° to 180° during mild weather and during the summer months, larger Tacos are required then when the boiler is coal-fired and used during the heating season only.

In addition to the larger size Tacos required for the Taco-Abbott System there are certain other essentials that must be followed in making installations that differ from the usual coal-fired job. Connections to the boiler must be made as close to the water line as possible and the Taco Heaters must be connected as high on the side of the boiler as the piping to these connections will permit.

In the case of cast-iron sectional boilers, connection must be made to all of the sections. If the boiler is of the split section type, connections must be made to all sections on both sides of the boiler (see Fig. F-57, page 16).

In the case of sectional boilers which have waterways extending above the normal water line, it is necessary during the summer that the water be kept sufficiently high in the boiler to cover these waterways. See Fig. F-57, page 16.

The use of valves and drains for cleaning have the same importance in the case of oil-fired as with coal-fired boilers. The valves between the heater and boiler have the added importance of furnishing means of controlling the temperature of the domestic water during the winter time if desired. No automatic valve is ordinarily necessary as by partly closing a valve between the heater and boiler the tank temperature becomes reduced.

Selecting liberal sized Taco Heaters for this use permits of the operation of the boiler at a low temperature in summer with a consequent reduction in the consumption of oil.

Proper insulation of the tank, heater and piping will result in reduced oil consumption during the summer months.

For capacities see Table J, page 10.

Where specifications are so written that the work of installation is divided into separate contracts between the plumbing, heating and oil burner contractors it is desirable to apportion certain important items to the work of each contract.

The heating contractor supplies the Taco Heater and makes the necessary connections to the boiler.

The plumbing contractor supplies the storage tank and makes connections between the Taco Heater and the tank.

The oil burner contractor furnishes and installs the aquastat and should be responsible for the operation of the burner in such manner as to maintain a boiler water temperature of 180° F. when no heat is required in building.

The two succeeding pages are devoted to illustrations of several different adaptations of Taco Heaters to the Taco-Abbott System.

Taco-Abbott System has gained wide acceptance.
Many thousand successful installations are now in use.

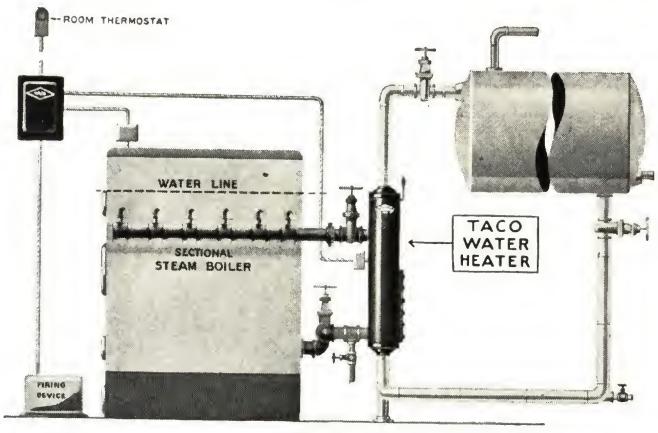


Fig. 21

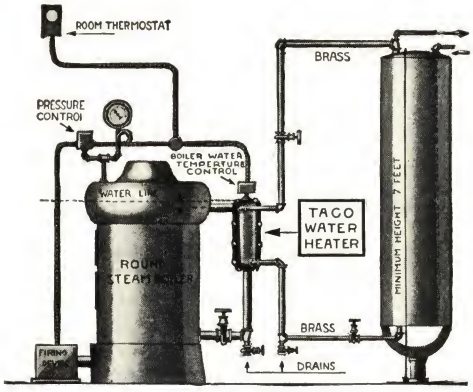


Fig. 21-A

TWO TYPICAL TACO INSTALLATIONS
YEAR ROUND DOMESTIC HOT WATER SUPPLY, TACO-ABBOTT SYSTEM

For Detail Installations see Following Pages

Patent No. 1654396

FIG. F-22 RESIDENCE OR APARTMENT—TWO OR THREE BATHS

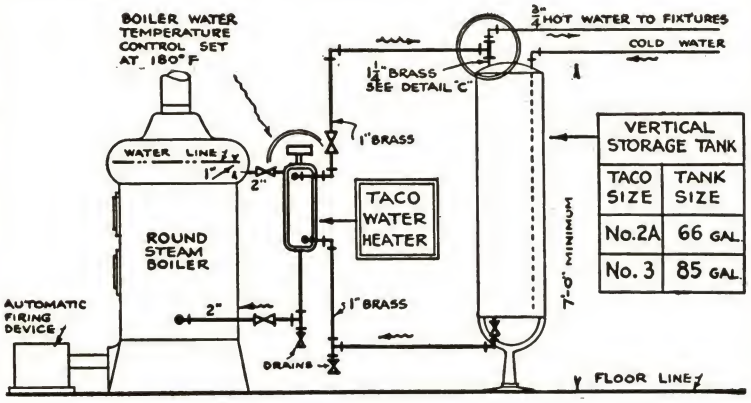


FIG. F-23 ONE SMALL TO MEDIUM SIZE FAMILY

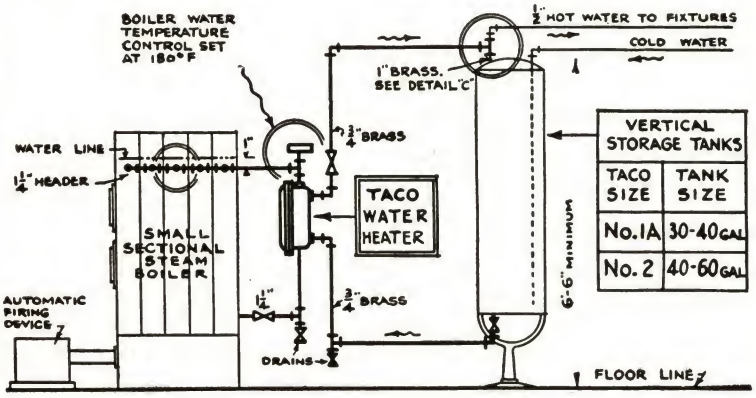


FIG. F-24 ONE SMALL TO MEDIUM SIZE FAMILY

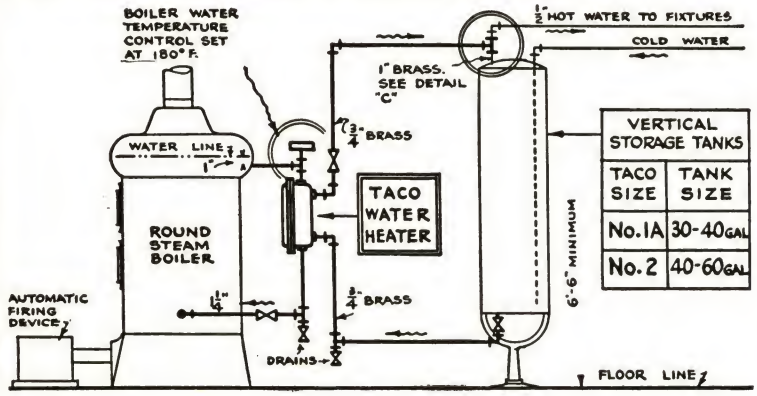
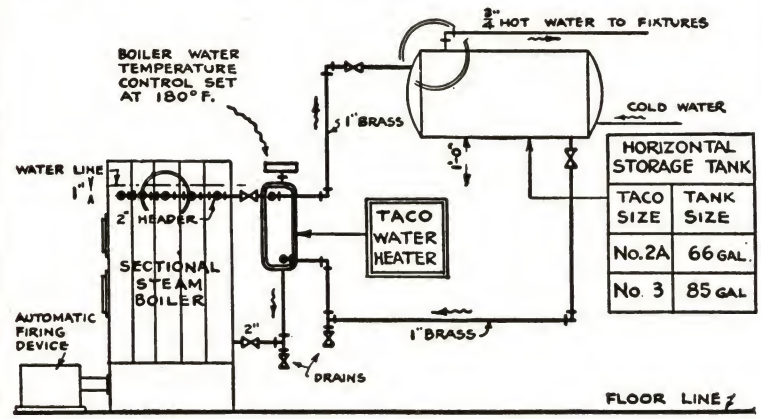


FIG. F-25 RESIDENCE OR APARTMENT—TWO OR THREE BATHS



TACO-ABBOTT SYSTEM (Cont'd)

Installation Diagrams and Details—Sheet No. 1

Special Note

The oil burner contractor must furnish and install temperature controlling devices so wired as to maintain boiler water temperature at 180° F. when room thermostat is satisfied. Storage tank piping and Taco Heater to be well insulated. Use gate valves only.

The above applies to all Taco-Abbott installations.

Details of Connections to Steam, Vapor or Vacuum Heating Boilers

Connection to be made as close to water line as possible.

In the case of steel boilers and round cast-iron boilers only one connection is required.

In the case of cast-iron sectional boilers connection to all sections is required and if such boilers have divided (split) sections, connections must be made to all sections on both sides of the boiler.

The usual method of making these connections is indicated on Fig. F-26 and Fig. F-27. Fig. F-26 is preferred.

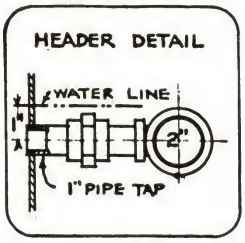


Fig. F-26

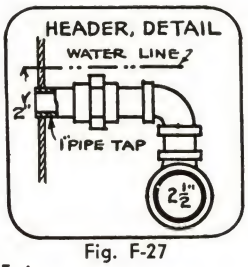


Fig. F-27

TABLE I
Tappings Giving Equalization of Pipe Areas

Tappings in sections of boiler, in.	1	1¼	1½
2-in. header	4	3	2
2½-in. header	6	4	3
3-in. header	9	5	4
4-in. header	15	10	7

Note—Smaller tappings than 1 inch are not practical.

Details of Connections to Range Boilers

Top of tank should be 6 ft. 6 in. to 7 ft. above floor level.

For details of Taco connections to vertical ranger boilers see Fig. F-28.

This connection is made by means of a close nipple and tee in the hot water outlet from the range boiler.

See pipe sizes, Table J on following page.

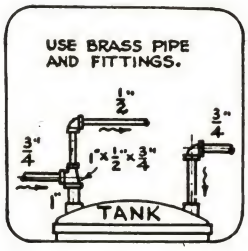


Fig. F-28

Details of Taco Connection to Horizontal Storage Tank

Fig. F-29 shows the Taco connection made to opening provided in the top of the head.

This connection should not be made into the center of the head.

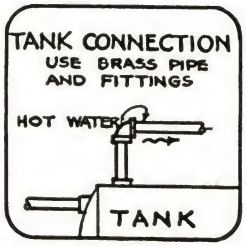


Fig. F-29

TACO-ABBOTT SYSTEM (Cont'd)
Installation Diagrams and Details

Sheet No. 2

Fig. F-30 shows the Taco connection made by means of a close nipple and tee into the hot water outlet from the tank.

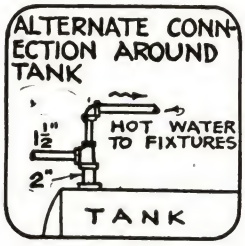


Fig. F-30

Location of Aquastat

See diagrams for proper location of aquastat. When aquastat is located in piping connection to Taco, care must be exercised not to restrict boiler water circulation.

Connections to Hot Water Heating Plants

Taco connection is taken off main close to the top of the boiler. See Fig. F-34 on this page and Fig. F-16, page 7. Location of Taco is as close to the top of the boiler as is practicable. Storage tank is in all cases to be horizontal and as high as basement ceiling will permit with the bottom of the tank not lower than the top of the boiler.

Valves and drains shown are required in all cases. Tank heater and piping should be well insulated.

TABLE J

TANKS, GALLONS CAPACITY	CONNECTIONS. BOILER	CONNECTIONS. TANK	TACO SIZE	NUMBER OF FAMILIES
30-40	1¼"	¾"	NO.1A	1
40-60	1¼"	¾"	NO. 2	1
66	1½"	1"	NO.2A	1-2
85	2"	1"	NO.3 or NO.7	2-3
100	2"	1¼"	NO.3 or NO.7	3
120	2"	1¼"	NO.3A	4
140	2"	1¼"	NO.9 or NO.4	4-5
150	2"	1¼"	NO.9 or NO.4	4-5
180	2"	1½"	NO.10 or NO.4	5-6
220	2"	1½"	NO.10	7
250	2½"	1½"	NO.12 or NO.5	8
295	2½"	1½"	NO.12 or NO.5	9-10
365	3"	2"	NO.20	12
420	3"	2"	NO.20	14
450	3"	2"	NO.20	15
500	3"	2"	NO.25 or NO.6	16
525	3"	2"	NO.25 or NO.6	17
575	3"	2"	NO.25	19
720	4"	3"	NO.35	24
865	4"	3"	NO.35	27
1000	4"	3"	NO.50	40

FIG. F-32 RESIDENCE OR APARTMENT—FOUR OR FIVE FAMILIES

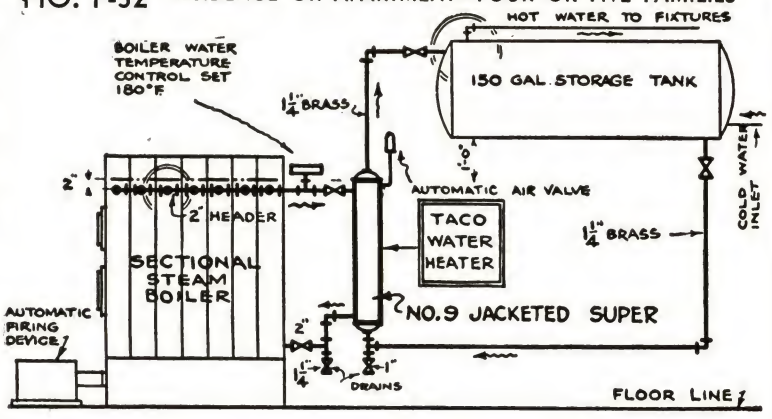


FIG. F-33 LARGE RESIDENCE OR APARTMENT UP TO 10 FAMILIES

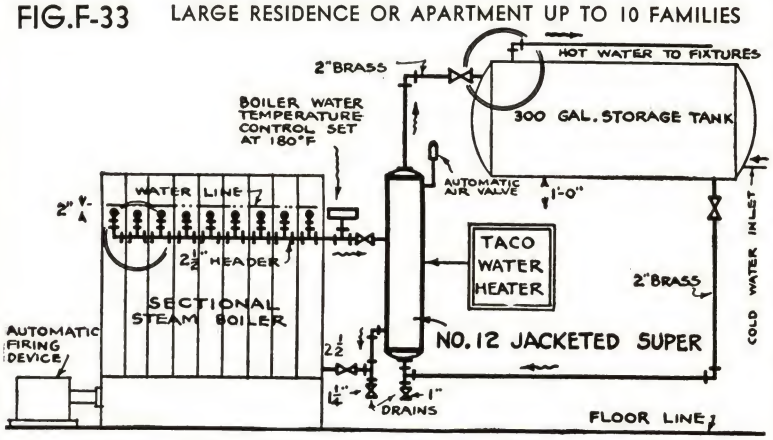


FIG. F-34 YEAR ROUND DOMESTIC HOT WATER SUPPLY FROM HOT WATER HEATING SYSTEM

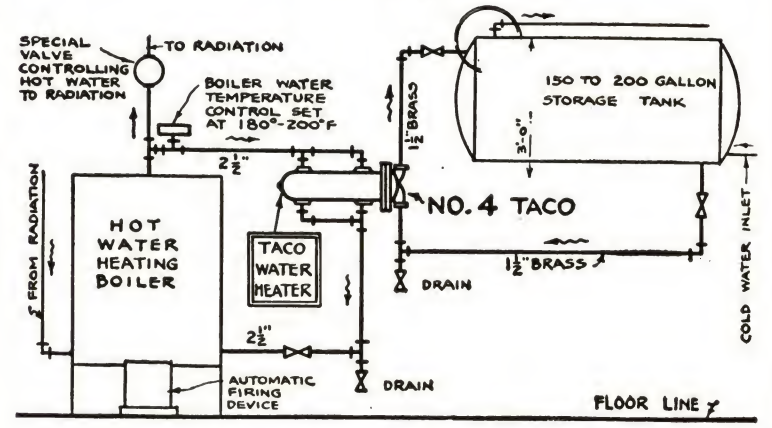
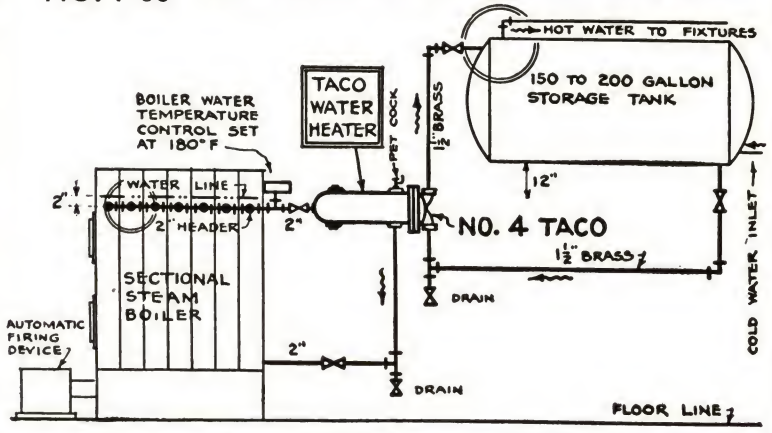


FIG. F-35 LARGE RESIDENCE OR FOUR TO FIVE APARTMENTS

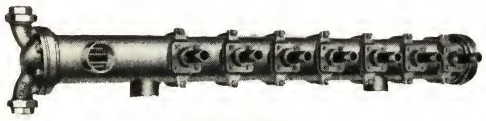


HEADER TACO
(Stock No. 107)

The Header Taco is used with medium and larger size sectional boilers. It consists of a series of U bend copper tubes expanded into a bronze tube plate, inserted in pipe header for attachment to each section of a sectional boiler just below the water line.

This permits the circulation of boiler water out of each section of the boiler around the U bend copper tubes, through which the domestic water circulates. Boiler water circulates out of each section through the header and back into the return connection as shown.

There are convenient adjustable flange connections which not only make easy connection to all sections of the boiler, but which also allow for a slight expansion between sections. The use of the Header Taco makes unnecessary the building of a separate header as the header and heater are combined.



Header Taco

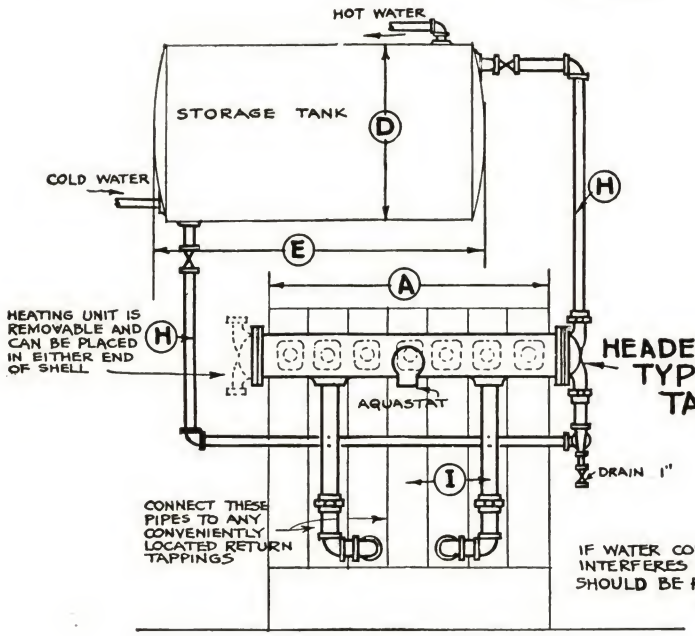
Header Taco Coil
Fig. F-36

Where a split section boiler is used, the Header Taco should be installed on one side of the boiler and a Taco Header on the other side connected to all sections.

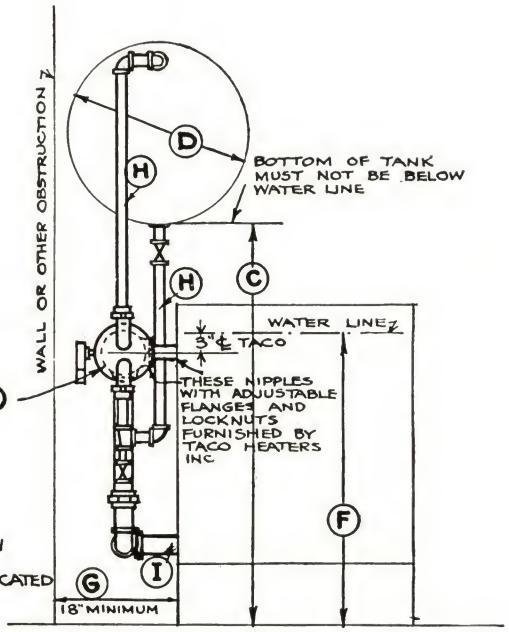
It will be found desirable to use a Header Taco on jobs having a large number of sections, and requiring a 200-gallon storage tank or larger. The Header Taco insures a correct installation throughout.

The storage tank should be as high as the basement ceiling will permit but in no case with the bottom of the tank below the water line of the boiler. Use horizontal tank only. Specify all sections to be tapped 3 inches below the normal water line. Where a divided boiler is required, specify all sections to be tapped on both sides, the Header Taco being located on one side and connected to a Taco Manifold located on the other side.

For divided boiler installation see Fig. F-57, page 16.



SIDE VIEW
Fig. F-37



FRONT VIEW
Fig. F-38

TABLE K—SELECTION OF TACO FROM LENGTH OF BOILER

Length of boiler, in. A	36			48			60			72			84		96
Maximum capacity N	100	180	320	135	240	420	165	300	520	200	360	620	420	710	820
Taco HT. M	436	536	636	448	548	648	460	560	660	472	572	672	584	684	696

TABLE L

Header Taco	Capacity 50°-150°F. in 3 hours, boiler water temp. 180°F.	Length of boiler, inches	Flange dia., inches	Tappings in boiler sections, inches	Number and size, inches, return boiler tappings	Size of unions on head of Taco, in.	Pipe size for tank conn's. in.	Ship'g weight, lbs.	List price
M	N	A	P	Q	R	S	H	V	W
HT 436	100	36	6½	1	1-1½	1½	1¼	85	$220
HT 448	135	48	6½	1	2-1½	1½	1½	115	250
HT 460	165	60	6½	1	2-1½	1½	1½	145	280
HT 472	200	72	6½	1	3-1½	1½	1½	180	310
HT 536	180	36	7½	1¼	1-2	1½	1½	150	350
HT 548	240	48	7½	1¼	2-2	1½	1½	195	385
HT 560	300	60	7½	1¼	2-2	1½	1½	240	420
HT 572	360	72	7½	1¼	3-2	1½	2	285	455
HT 584	420	84	7½	1¼	3-2	1½	2	330	490
HT 636	320	36	9	1½	1-2½	2	2	195	450
HT 648	420	48	9	1½	2-2½	2	2	245	495
HT 660	520	60	9	1½	2-2½	2	2	295	540
HT 672	620	72	9	1½	3-2½	2	2	345	585
HT 684	720	84	9	1½	3-2½	2	2½	410	630
HT 696	820	96	9	1½	4-2½	2	2½	470	675

Notes:

Storage tank should be as high as possible, but bottom of tank should not be lower than water line.

Tap boiler 3 in. below water line.

Locate aquastat in tapping provided in header.

When ordering Taco specify whether heater has to be installed on right or left side facing front of boiler and if tank connections have to be located in front or back of boiler.

Provide enough space to remove units for cleaning.

Split section boiler requires a header in addition to Header Taco for connection to both sides of the boiler. The following list prices apply only to the header.

HEADER ONLY (Stock No. 108)

Type of Header (HO)	2	2½	3
List price for 6 sections	$69.00	81.00	91.00
Each additional section more	$8.00	9.00	10.00

TACO OIL PREHEATERS

General Adaptation

The three types of oil preheaters described below meet the majority of conditions where the preheating of fuel oil is necessary. For conditions not covered by types shown on this page we are prepared to furnish special heaters.

Type C

(Stock No. 109)

Coil is of seamless steel tubing and is tested to 1500 pounds pressure. Only steel tubing is suitable to withstand the chemical action of sulphur in many fuel oils. On special order, it can be cadmium plated on the outside to protect it from corrosion.

Coil connections are on the cover. This makes the coil accessible without disconnecting the boiler piping.

Body is of heavy construction, and closely bolted. It may be safely used with steam up to 25 pounds pressure.

Oil connections are 1 inch. Steam connections are 2 inches. A 3-inch tapping is provided in lower end of heater to insert heating element if required.

Coil connections are first expanded into the body and then belled out as shown in Fig. F-39. The male end of the union is of heavy malleable iron of special design. It is important to make a tight joint between the coil and the body on this class of service to prevent any possibility of leakage of oil into the boiler water. This method has no internal connections and conforms to the most rigid State laws covering oil heaters used with domestic heating boilers. All coil connections are tested to 1500 pounds pressure, this test being with the entire coil exposed and visible.

No. C-3
One Size Only

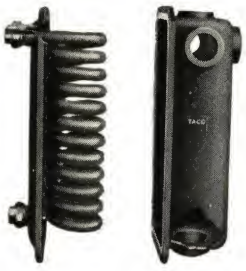


TABLE M (No. C-3)

Temp. rise of	Capacity in gallons per hour
90-150	Below water line with boiler steaming at 212° F. 15 gals.
90-140	on 2 lbs. steam 30 gals.
90-170	on 2 lbs. steam 15 gals.
90-190	on 25 lbs. steam 25 gals.

List price $70.00
Shipping weight 60 lbs.

Type U

(Stock No. 110)

Type U Taco Oil Preheaters are of four-pass U-bend construction. They are so designed that the heating unit may be removed from the shell without breaking the steam connections.

This heater has a wide variety of uses. While usually installed in a horizontal position, it may be installed vertically, where space conditions require it.

Tubes are seamless drawn mild steel, ⅝ inch outside diameter, No. 18 B.W.G. Heads are close grained cast iron. Gaskets are treated asbestos, or, on special order, may be of sheet lead. Workmanship and materials are of the highest grade throughout.

The Taco oil preheaters U4, U5 and U6 are available for low pressure steam (up to 25 pounds) with cast-iron shell at moderate prices. They are also made with heavy cast-iron shell for use up to 125 pounds working pressure for which an additional 10% in price is charged.

All other heaters shown on Table N are subjected to a test pressure of 500 pounds per square inch on the steam side as well as the oil side.

Particulars will be furnished on application.

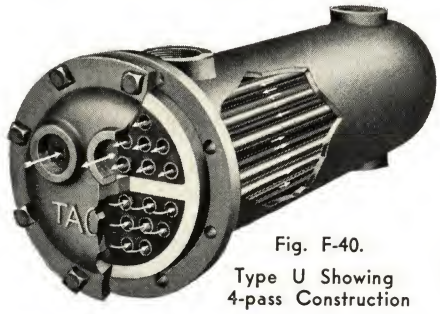


Fig. F-40.
Type U Showing 4-pass Construction

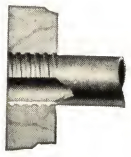


Fig. F-41
Detail of Expanded Joint. Tubes permanently Expanded into Tube Plate

Type S

(Stock No. 111)

Type S Taco Oil Preheaters are of straight tube, cleanable construction, to facilitate removal of any gummed oil on the inside of the tubes.

Built for operating at steam and oil pressures up to 250 pounds per square inch, and are tested to 500 pounds pressure.

Tubes permanently expanded into grooved holes in forged steel tube sheets. Each tube is spiraled slightly, and is free to contract and expand independently with temperature changes (patented feature).

Four-pass design with a multiple of small tubes in each pass provides exceptional heating effectiveness and overload capacity.

Tubes—Seamless drawn mild steel, outside diameter ⅝ in., wall thickness No. 18 B.W.G.

Shell—Wrought steel pipe.

Flanges and Tube Plates—Forged steel to which shell is welded. Grooved tube holes and bolt holes drilled from the solid.

Fig. F-42
Patent No. 1655086

Heads—Close grained cast-iron.

Gaskets—Treated asbestos or sheet lead. Extra heavy bolting.

TABLE N—DATA ON TACO OIL PREHEATERS, TYPE U AND TYPE S

Type of Taco Oil Preheater	CAPACITIES IN GALLONS PER HOUR: Before Water Line Boiler Steaming	Heater on Steam with Guage Pressure of 2 lbs.	25 lbs.	50 lbs.	100 lbs.	150 lbs.	200 lbs.	Temperature Rise in Degrees Fahrenheit 90° 150° F	80 to 180° F	80 to 180° F	100 to 200° F	100 to 250° F	100 to 250° F	100 to 250° F	DIMENSIONS: Flange Dia.	Shell Dia.	Over All Length	PIPE CONN'S: Shell, Steam and Drain	Head, Oil	APR. SHIP. WEIGHT	LIST PRICE
															inch	inch	inch	inch	inch	lbs.	$
A	B		C	D	E	F	G	H	I		K	L	M	N	O	P					
U-4	25	25	42	60	50	Built for *Maximum Operating Pressure of 125 lbs. only			10		7	27	2	1	96	116.00					
U-5	50	50	85	120	100				12		9	39	2½	1¼	192	233.00					
U-6	75	75	136	190	160				13½		11	41	3	1½	265	350.00					
U-8-36	75	75	136	190	160	217	280		13½		8	45	2	1½	330	378.00					
U-8-48	100	100	182	250	215	290	380		13½		8	57	2	1½	450	420.00					
U-8-60	125	125	225	315	265	360	470		13½		8	69	2	1½	530	462.00					
U-8-72	150	150	275	380	320	435	565		13½		8	81	2	1½	620	504.00					
U-10-36	125	125	225	315	265	360	470		16		10	46	2½	2	560	567.00					
U-10-48	170	170	300	420	355	480	625		16		10	58	2½	2	650	630.00					
U-10-60	210	210	375	520	450	600	780		16		10	70	2½	2	740	693.00					
U-10-72	250	250	450	630	530	720	935		16		10	82	2½	2	830	756.00					
U-12-48	250	250	450	630	530	720	930		19		12	59	3	2½	850	875.00					
U-12-60	315	315	565	780	665	900	1170		19		12	71	3	2½	950	967.00					
U-12-72	375	375	680	940	800	1080	1400		19		12	83	3	2½	1050	1060.00					
U-12-84	440	440	790	1100	930	1260	1640		19		12	95	3	2½	1150	1160.00					
S-6-48	45	45	80	115	95	130	170		10		6	53	1½	1¼	240	344.00					
S-6-60	58	58	100	145	120	165	215		10		6	65	1½	1¼	280	391.00					
S-6-72	70	70	125	175	150	200	260		10		6	77	1½	1¼	320	443.00					
S-8-48	90	90	160	225	190	260	340		12½		8	54	2	1½	480	548.00					
S-8-60	115	115	200	280	240	320	415		12½		8	66	2	1½	550	618.00					
S-8-72	140	140	250	350	300	400	520		12½		8	78	2	1½	610	694.00					
S-10-48	154	154	275	380	325	440	570		15		10	55	2½	2	650	816.00					
S-10-60	192	192	345	480	480	550	715		15		10	67	2½	2	720	898.00					
S-10-72	230	230	415	575	500	660	860		15		10	79	2½	2	800	980.00					
S-10-84	268	268	485	670	570	770	1000		15		10	91	2½	2	880	1060.00					

TACO TANK HEATING UNIT

(Stock No. 112)

Taco Tank Heating Units are primarily intended to be installed in storage tanks by the tank manufacturer. Where conditions require they can be welded into existing tanks. Steam or hot water may be used as the heating medium.

A conventional use is with low pressure steam at atmospheric pressure. When so used, ratings are given in Table Q, Columns C, D and E. With steam at higher pressures refer to Table R, which gives conversion factors for pressures up to 100 pounds.

When installed below the water line of a steam boiler, using the boiler water as the heating medium, ratings are given in Table Q, Columns F and H. See Figures F-49 and F-50, page 14. With automatically controlled hot water heating systems, ratings are given in Column H, see Figure F-48.

Storage tanks may be galvanized steel, black steel or copper.

Taco Tank Heating Units are recommended wherever a steam coil would ordinarily be placed in a storage tank. These units are installed on a new or existing job by welding the collar into the end of the tank, which collar supports the head and heating unit.

When steam is used the bottom of the storage tank should be at least 24 inches above the water line of the boiler.

When the boiler water is used, the bottom of the tank should be sufficiently below the water line to permit suitable circulating pipe connections to be made to the boiler.

When used on a hot water heating system the bottom of the tank should be about at the top of the boiler. See Fig. F-48.

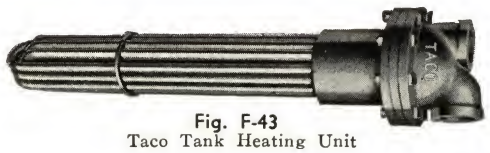


Fig. F-43
Taco Tank Heating Unit

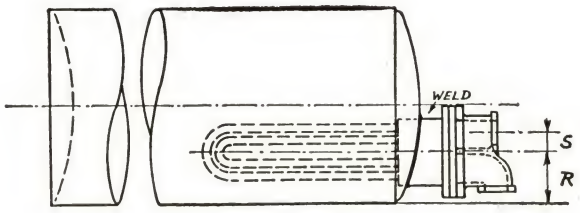


Fig. F-44
Assembled Taco Tank Heating Unit in Storage Tank

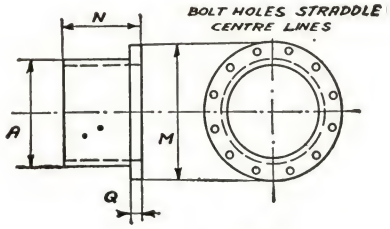


Fig. F-45

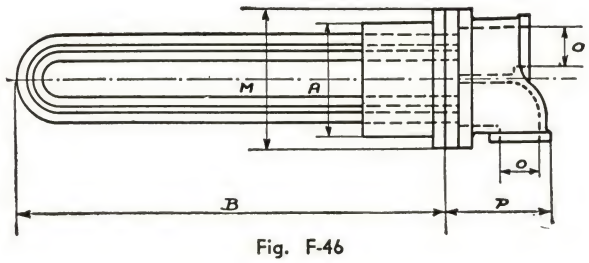


Fig. F-46

TABLE O—DIMENSIONS OF STEEL COLLAR ONLY

A	4″	7″	10″	14″
R	4″	6″	8″	11″
S	1⅝″	2″	2⅞″	3½″
N	6″	6″	6″	8″
Q	¾″	¾″	¾″	1″

TABLE P—DIMENSIONS OF TACO TANK HEATING UNIT

A Size	4″	7″	10″	14″
M	7″	11″	15″	19½″
N	6″	6″	6″	8″
Pipe conn's O	2″	3″	4″	6″
P	5½″	7⅝″	9″	12½″
Q	¾″	¾″	¾″	1″
Weight of steel collar, lbs.	10	22	54	80

TABLE Q—DATA TACO HEATING UNITS

Taco Size	Capacity using live steam at 0 lbs. pressure			Capacity below water line of steam boiler. Gals. heated 50° to 150° per hr.				Shipp. weight	List prices
	Gals. heated 50° to 180° per hr.	Usual size of storage tank heated in		Boiler water maintained at not less than 212°. Boiler steaming	Usual size of storage tank heated in 3 hrs.	Summer operation boiler water maintained at 180°	Usual size of storage tank heated in 3 hrs.	Heating unit with complete, Lbs.	Heating unit with head and steel collar
		One hour	Three hours						
A-B	C	D	E	F	G	H	I	K	L
4-24	60	60	180	40	120	20	60	50	$75
4-36	90	90	270	60	180	30	90	55	81
4-48	120	120	360	80	240	40	120	60	87
4-60	150	150	450	100	300	50	150	65	93
4-72	180	180	540	120	360	60	180	70	99
4-84	210	210	630	140	420	70	210	75	105
7-36	270	270	810	180	540	90	270	115	155
7-48	360	360	1080	240	720	120	360	125	167
7-60	450	450	1350	300	900	150	450	135	179
7-72	540	540	1620	360	1080	180	540	145	191
7-84	630	630	1890	420	1260	210	630	155	203
10-48	660	660	1980	440	1320	220	660	220	260
10-60	840	840	2520	560	1680	280	840	245	290
10-72	1020	1020	3060	680	2040	340	1020	265	320
10-84	1200	1200	3600	800	2400	400	1200	285	350
10-96	1380	1380	4140	920	2760	460	1380	310	380
14-48	1600	1600	4800	1060	3200	530	1600	530	510
14-60	2000	2000	6000	1330	4000	670	2000	570	560
14-72	2400	2400	7200	1600	4800	800	2400	610	630
14-84	2800	2800	8400	1860	5600	930	2800	650	700
14-96	3200	3200	9600	2140	6400	1070	3200	690	770

TABLE R

CONVERSION FACTORS

Steam press. lbs.	2	5	10	15	20	25	30	40	50	75	100
Factor	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.2	2.4

Note: To find capacity at higher steam pressures multiply capacity in Col. C of Table Q by the factors given above.

TACO TANKS

(Stock No. 113)

Taco Tanks illustrate the combination of the Taco Tank Heating Unit and the storage tank combined for all year round domestic hot water supply, Taco-Abbott System (Pat. No. 1654396) and are furnished complete by TACO HEATERS, INCORPORATED, or by tank manufacturers.

Taco Tanks are carried in stock in four sizes suitable for the usual requirements. These are extra heavy galvanized steel, riveted and welded. Other sizes may be had on special order. See table of stock sizes below. For other sizes, select the desired Taco Tank Heating Unit from table on previous page, with the size storage tank required.

Fig. F-47
Taco Tank

Copper tanks can be furnished when required. Taco Tank can be used on steam (see page 13).

Taco Tank Specifications

Tanks of extra heavy galvanized steel construction and tested to 250 pounds pressure. All seams riveted and welded.

Removable heating Unit of U-bend seamless copper tubing. Head is of close grained cast iron. Area of boiler connections is liberal to insure free circulation of boiler water.

Note: When installing Taco Tanks, as shown in Figs. F-48, F-49 and F-50, it is important to specify that the end of the tank where the heating unit is inserted must be slightly higher than the opposite end so that the unit pitches up toward the head to provide proper venting.

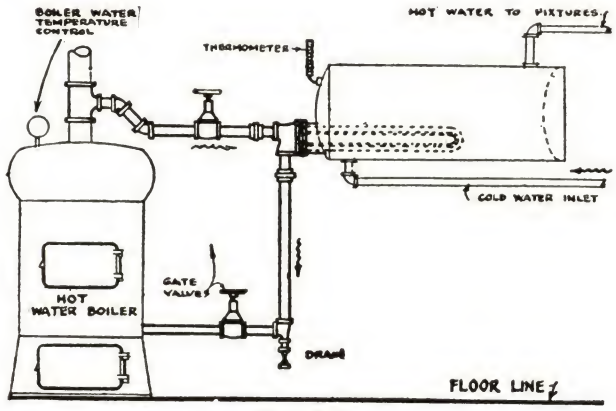


Fig. F-48
Installation Diagram Showing Method of Piping in Combination with Hot Water Heating Boiler
Valve required in main (not shown on cut)

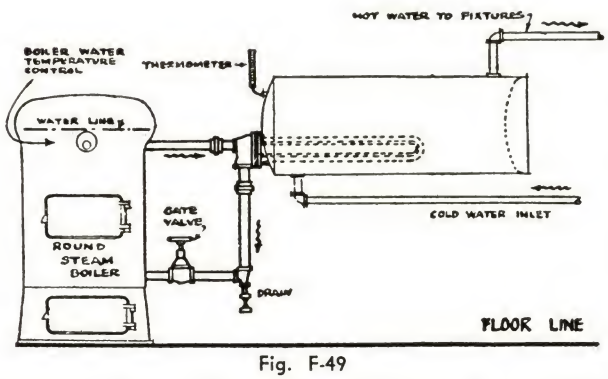


Fig. F-49
Installation Diagram Showing Method of Piping in Combination with Round Steam Boiler

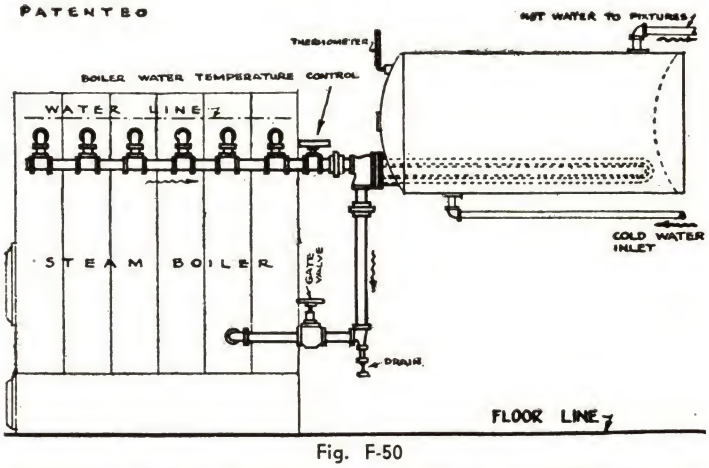


Fig. F-50
Installation Diagram Showing Method of Piping in Combination with Sectional Steam Boiler

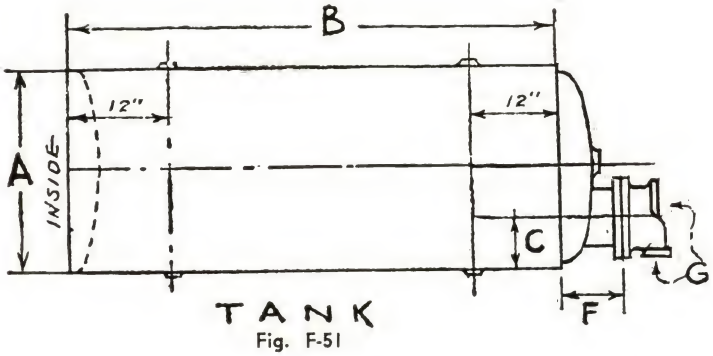


Fig. F-51

TABLE S

Tank size gallon cap.	A	B	C	F	G Boiler con.	Tank con.	Shipping weight, lbs.	List price
36	16″	42″	3½″	4″	2″	1¼″	160	$112.00
85	20″	60″	4″	4″	2″	1½″	290	168.00
140	24″	72″	5″	4″	2″	1½″	425	224.00
220	30″	72″	6″	6½″	3″	2″	725	336.00

Notes—Heating capacity 100° rise in 3 hours, with boiler water maintained at 180°.

The four sizes listed are carried in stock. Other sizes are made to order.

BILTIN TACO

(Stock No. 114)

The Biltin Taco consists of a group of copper U tubes permanently expanded into a bronze head of special design having suitable openings for domestic water pipe connections. Details of construction are shown in figures F-52 and F-53. As the name implies, these heaters are built into steel heating boilers, usually by the boiler manufacturer. They are of the highest type of construction throughout. Biltin Tacos are installed just below the water line of the boiler, and in this position do not in any way interfere with the free, normal circulation of the boiler water.

These units are regularly screwed into couplings welded into the front head of the boiler. The largest size only clamps against the face of the boiler. Circulation of the domestic water is by gravity from the storage tank through the lower half of the tubes in the Biltin Taco, the heated water passing through the upper tubes and rising through suitable piping to the storage tank.

Ratings and dimensions are given in Table T.

When selecting a steel boiler, specify the required size and number of Biltin Tacos to be installed in the boiler by the manufacturer. This assures a correct installation and avoids all cutting or interference with the boiler after delivery.

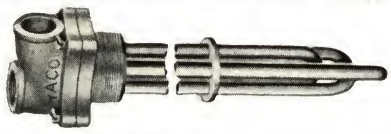


Fig. F-52 Series A and D

Fig. F-53 Series G

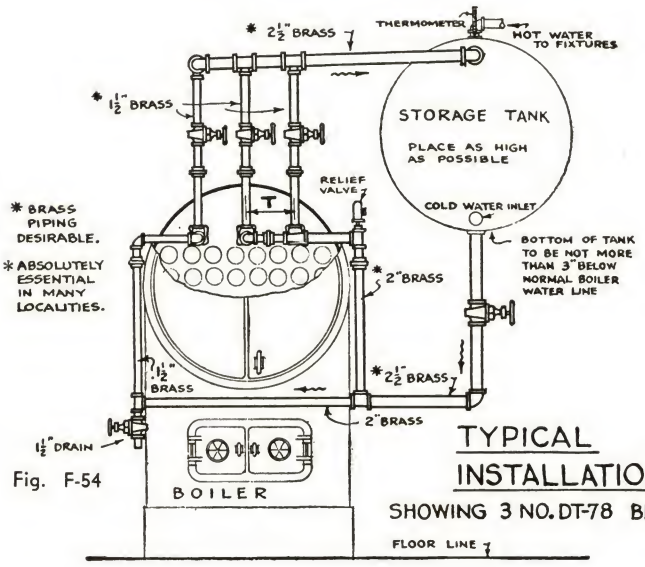
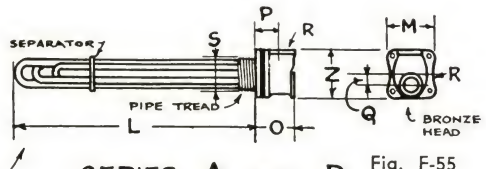
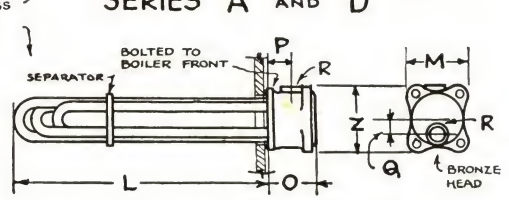


Fig. F-54



SERIES A AND D

Fig. F-55



SERIES G

Fig. F-56

TABLE T—RATINGS AND DIMENSIONS OF BILTIN TACO HEATERS

TACO SIZE	CAPACITY* Gals. Heated 50° to 150° in 3 hours		TANK CONNECTIONS INCHES						DIMENSIONS INCHES									LIST PRICES	SHIPPING WEIGHT LBS.
	FIRING		Number of Units						Lgth. unit	HEAD									
	Intermittent	Continuous	1	2	3	4	5	6		width	hgth.	lgth.			pipe size	pipe tread	min. cen. dist. units		
A	B	C	D	E	F	G	H	K	L	M	N	O	P	Q	R	S	T	U	V
AT-30	80	125	1¼	1½	1½				30									61.00	19
AT-42	115	175	1¼	1½	2				42									67.00	22
AT-54	140	215	1¼	1½	2				54	4⅛	3⅞	4½	1⅞	1	1¼	2½	4½	73.00	25
AT-66	160	240	1½	2	2				66									79.00	28
DT-30	100	150	1½	1½	1½				30									64.00	27
DT-42	140	210	1½	1½	2	2			42									70.00	31
DT-54	180	270	1½	2	2½	2½	2½	3	54	4⅝	4⅝	5¼	2⅛	1⅛	1½	3	5¼	76.00	35
DT-66	220	330	1½	2	2½	2½	3	3	66									84.00	39
DT-78	260	390	1½	2	2½	3	3	3	78									92.00	43
DT-90	280	420	1½	2	2½	3	3	4	90									100.00	47
GT-54	225	345	1½	2	2½	3	3	3	54									85.00	43
GT-66	275	415	1½	2	2½	3	3	4	66									95.00	48
GT-78	320	485	1½	2½	3	3	4	4	78	5¾	6¼	4¼	2⅝	1⅝	1½	4-⅝" bolts	6½	105.00	53
GT-90	365	555	2	2½	3	4	4	4	90									115.00	58
GT-104	405	615	2	3	3	4	4	5	104									125.00	63
GT-114	440	665	2	3	4	4	4	5	114									135.00	68

*CAPACITY—Figures for continuous firing to be used only when steam pressure is maintained constantly. Figures for intermittent firing to be used in all installations where boilers steam intermittently, including oilburner and stoker installations, and hand fired year-round installations.

STORAGE TANK SIZE—Furnish heaters at least equal in combined capacity to size of storage tank. Apartments having 3 to 5 rooms and the usual private residences require a storage capacity for domestic hot water of 30 gallons for each family or bath. Top of storage tank should be as high as practical and never less than 42 inches above TACO Heaters. In no case should the bottom of the tank be below the water line of the boiler.

TAX ON HEATING BOILER—Master Steamfitters Code of Chicago specifies that where indirect heaters are used, one-half square foot of radiation shall be allowed for each gallon of storage tank capacity.

GENERAL NOTES—Units must be entirely submerged for summer firing. Test pressure 300 lbs.

ENGINEERING SALES DEPARTMENT SERVICE

TACO HEATERS, INC., maintain an Engineering Department for the purpose of supplying correct information in regard to the selection and proper methods of installation of their products. The descriptions and illustrations contained in this catalogue cover all essential points regarding the most common forms of installations.

If there is any doubt as to the correct heater to be used or the method of making the installation, it is hoped that inquiry will be made to this department. Prompt attention will be given to any such inquiries.

In making requests for information the following particulars should be stated: (1) Kind of boiler and whether steam or hot water. (2) Kind of fuel. (3) Number of baths or families. (4) State if hot water is used *liberally*. (5) Size of storage tank. (6) Height of bottom of tank. (7) Height of water line of boiler. (8) Will Taco be required for winter only or all year round use?

Example of Our Engineering Service

Wherever the nature of the problem requires, we will furnish specifications and make detail drawings of which the illustration below is an example.

Figure No. F-57 illustrates the use of a Super Taco connected below the water line of a split section boiler. Connections are made to all sections on both sides of the boiler by means of two headers as described on page 11.

Fig. F-57-A illustrates a type of boiler having flue construction which necessitates varying the height of the water line in summer so as to cover the top of the verticle flues which extend above the normal water line.

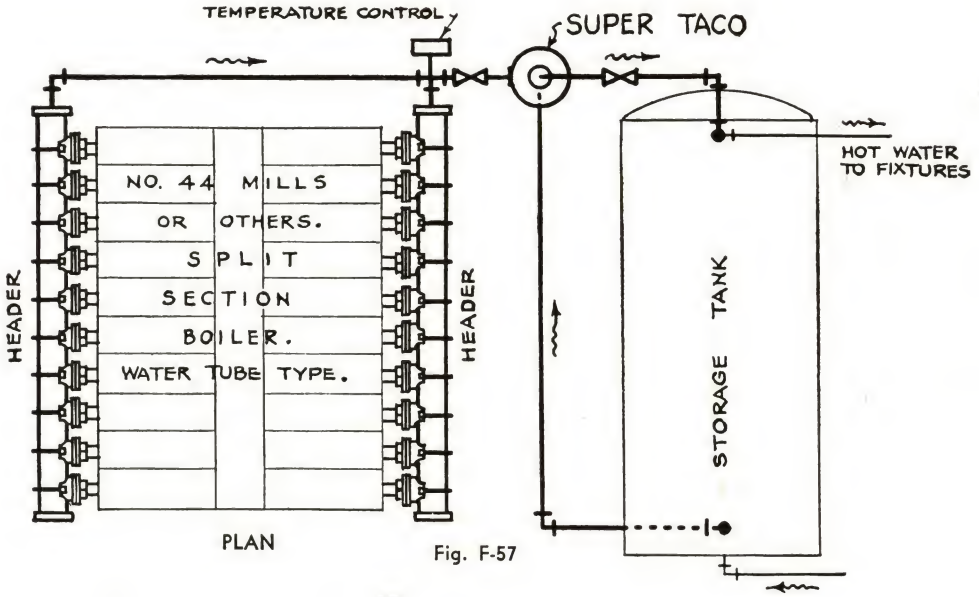


Fig. F-57

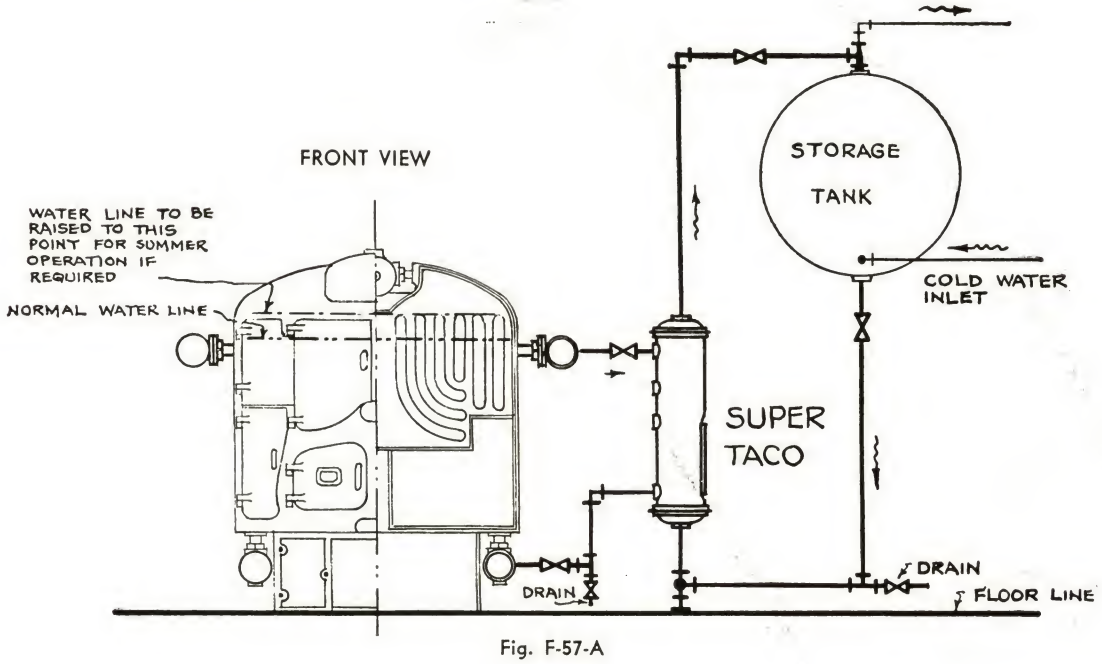


Fig. F-57-A

EDISON GENERAL ELECTRIC APPLIANCE CO., INC.

5600 West Taylor Street, CHICAGO, ILL.

For Branches and Service Stations, see our pages on Commercial Cooking Equipment

Product

HOTPOINT ELECTRIC WATER HEATERS.

Also manufacturers of Hotpoint Electric Household Appliances. Architects' handbook on request.

For Edison Electric Commercial Cooking and Baking Equipment, Hotpoint Electric Air Heaters and Electric Ranges, see Manufacturers' Index.

A GENERAL ELECTRIC ORGANIZATION

Hotpoint

Accelerator or Circulation Tube Models

Deliver hot water to the top of tank as heated, insuring *quick hot water.* Made in three sizes: 18-gallon, No. W41; 30-gallon, No. W43; 50-gallon, No. W44.

Each model provided with automatic temperature control (thermostat) giving uniform temperature hot water. An externally operated switch is also a part of each heater.

Heaters of this type deliver a maximum hot water service for a given tank capacity.

Obtainable in wattage rating up to 5 kw.

Plain Storage Models

These models raise the tank temperature uniformly. Made in three sizes: 30-gallon, No. W49; 50-gallon, No. W50 and 80 gallon, No. W80.

May be obtained in 500 to 5000-watt capacity.

Wiring, etc.

All wiring in both models is enclosed in a readily accessible wiring channel inside the heater case, and a standard outlet box is fixed to the top rear of the heater, easily accessible for the wiring connections. This outlet box and the hot and cold water pipe connections are offset so that vertical lines may be run parallel without interference. Automatic temperature control. Thermostat controls the unit current direct without external relays or contactor.

Finish and Insulation

The two-tone Alabaster white and French gray trim glyptal baked enamel provides a finish that is highly attractive, easily cleaned and retains a permanent high gloss.

Balsam wool is used to insulate these heaters. It is highly efficient, light in weight and odorless.

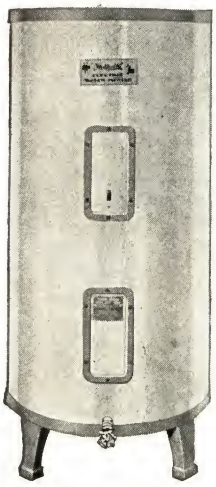
Tanks are extra heavy and built for 250 lb. test pressure.

Voltage

Standard voltage 230 a-c. carried in jobbers' stocks. Special voltages of 115, 125, 200, 250, obtainable on factory orders. All 5 kw. units are supplied in 230-250 volts only.

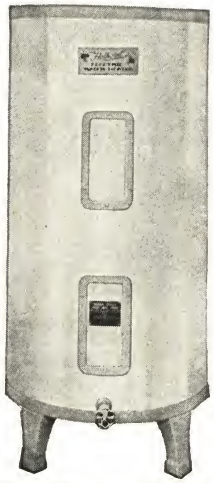
Address nearest district office for specific recommendations to meet requirements of clients.

Style No.	Capacity gal.	Over-all dimensions, in.		Wattage		Shipping weight, lbs.
		Height	Diameter	Upper Unit	Lower unit	
W41	18	52½	20⅜	.....	1500—3000—5000	300
W43	30	52½	24⅜	.....	1700—3000—5000	400
W43	30	52½	24⅜	1000—1500	500—600	400
W44	50	52½	28⅜	.....	1700—3000—5000	500
W44	50	52½	28⅜	1000—2000	500—1000	500
W49	30	49¾	22⅜	.....	1000—1500	315
W49	30	49¾	22⅜	1000—1500—1500	500—500—750	325
W50	50	60⅜	24⅜	.....	1000—1500	385
W50	50	60⅜	24⅜	1000—1500—1500	500—500—750	400
W80	80	74¼	26⅜	.....	2500	500
W80	80	74¼	26⅜	2500	1500	500
W5	15	30½	17¾	.....	1000	142



Accelerator Tube Models

W41—18-gallon
W43—30-gallon
W44—50-gallon



Plain Storage Models

W49—30-gallon
W50—50-gallon

Also obtainable in 80-gallon size. Particularly suited to "off peak heating"

Side Arm Circulation Heaters

Automatic or non-automatic side arm heaters may be connected to any well insulated hot water tank. Obtainable in 2000, 3000, 5000 watts.

W5—The Idaho Non-pressure Farm Heater

W23 Non-automatic W24 Automatic

Side Arm Circulation Heaters

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue
For References to Other Products, see Index to Manufacturers

ELECTRIC WATER HEATERS

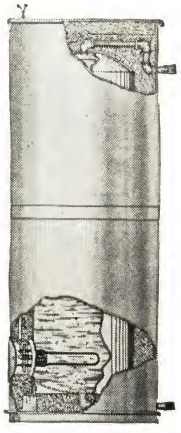
Wide Range of Types

These heaters have been designed to meet the requirements of the central station and the home owner. They are made in a wide range of types to meet different wattage requirements, methods of operation and to provide ease of installation and servicing. The automatic types are controlled by the Spencer thermostat, especially adapted for water heater service.

The corox heating element, which is used in all but the Strap-on Heaters, is a special Westinghouse development designed particularly to meet the requirements of water heating service. It operates at a temperature only a few degrees above the surrounding water and has a slight expansion and contraction in operation, which tends to flake off scale and adds considerably to the life of the element.

The Adapt-o-matic—This leader of the Westinghouse line is a complete, insulated tank, with immersion type elements automatically controlled. Made in 30, 52, 80, and 100-gal. sizes and can be operated at various wattages by simply changing the terminal connections on the elements. The tank is thoroughly insulated with the highest grade balsam wool. The thermostat is set to maintain a water temperature of approximately 160° F.

The Adjust-o-matic—Another complete tank installation with a single heating element controlled by a three-heat snap switch, and regulated within temperature limits by the Spencer thermostat. With switch turned to "low" a water temperature of approximately 135° F. is maintained, on "medium" approximately 155° F., and on "high" approximately 180° F. Once the switch is set, the Spencer thermostat keeps the water temperature within predetermined limits without further regulation. The Adjust-o-matic is made only in the 18-gal. size.



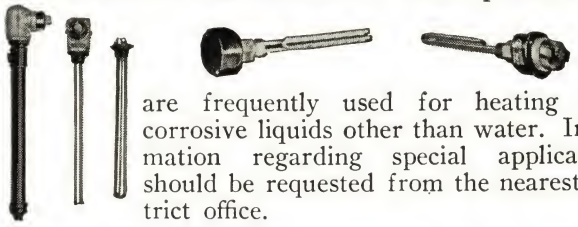
The Aut-o-matic—A complete tank heater with one heating element, at the bottom of the tank, controlled by a Spencer disc thermostat. In the 18-gal. size the Aut-o-matic is constructed with a circulation tube and the heating element installed from the bottom. In the larger sizes no circulation tube is used in the tank and the heating element is inserted from the side near the bottom. The 10, 30 and 52-gal. sizes are carried in stock. Shipments of the 80 and 100-gal. sizes can be made with but a few days delay.

Strap-on Heaters—Designed for installation on existing water tanks and are applicable for any tank of 12-in. diameter. The

complete installation of this type consists of two heating units, with automatic thermostatic control, and an asbestos tank cover, properly cut to receive the heaters. "On-and-off" switch is mounted integrally with each heating unit in such a way that the switch projects through the tank covering, providing easy manual control of the heater.

Side Arm or Circulation Heaters—The Type CA is a full-automatic circulation heater, equipped with Spencer thermostatic control, and regulated by a three-temperature snap switch. The thermostat and switch are mounted at the head of the heater effecting easy manual control and heating element protection. A drain plug at the bottom of the unit permits easy removal of sediment. Threaded pipe connections in the outer shell take the standard ¾-in. pipe.

Immersion Heaters—The Types CX and CA heaters can be obtained without casing for direct immersion applications. In the smaller sizes we have the DX heaters which are non-automatic and can be furnished with or without single heat snap switch. The DX heater is designed to fit a 1-in. pipe thread. CA, CX and DX heaters will stand 25 lb. steam pressure and



are frequently used for heating non-corrosive liquids other than water. Information regarding special applications should be requested from the nearest district office.

Current Limiting Switch

This device is used to limit the combined load of water heater and electric range. It is a magnetically operated switch of the enclosed mercury tube type, non-radio interfering and unaffected by temperature changes. The switch is enclosed in a heavy box equipped with knockouts for easy wiring. A flexible adjustment is provided.

For specifications see Water Heater Catalogue 282

B-LINE BOILER CO.

CLEVELAND, OHIO

For B-Line Gas Boilers, see Manufacturers' Index

B-LINE BOILERS FOR HOT WATER STORAGE

Where large volumes of hot water are required, B-Line gas boilers will be found admirably suited to all requirements. They are especially designed for the use of gas at high efficiency, of a sectional construction which permits them to be furnished in any range of sizes required for heating water in apartments, hotels, offices, hospitals, schools or factories.

B-Line boilers for water heating may be used either as direct circulators to the storage tanks, or in indirect systems. Where the water supply contains any appreciable amount of solids, or is subject to liming conditions, the indirect system is recommended. In this system the boiler is used to generate steam which in turn is passed through heating coils immersed in the storage tank, or through an instantaneous steam heater with circulators connected to the tank. In this system little water is added to the boiler and consequently lime and solid deposits are eliminated, resulting in maintained high efficiency over a long period of years.

While it is impossible to detail exactly for all cases the figures to be employed in selecting the proper size B-Line for water heating, the following data are offered as a guide for average conditions. They are based on daily use of hot water. Both heater capacity and tank size should be selected with the idea of obtaining sufficient hot water to meet the peak demand which extends over periods of a few hours.

With indirect systems care should be taken to insure coil or instantaneous heater capacity equal to the output of the boiler.

MAXIMUM DAILY REQUIREMENTS FOR HOT WATER, GALLONS FOR 24 HOURS

Apartments and Private Dwellings Including Laundry

Rooms per suite	Number of bathrooms				
	1	2	3	4	5
1	60	.....	.....	.....	.....
2	70	.....	.....	.....	.....
3	80	.....	.....	.....	.....
4	90	120	.....	.....	.....
5	100	140	.....	.....	.....
6	120	160	200	.....	.....
7	140	180	220	.....	.....
8	160	200	240	250	.....
9	180	220	260	275	.....
10	200	240	280	300	.....
11	.....	260	300	340	.....
12	.....	280	325	380	450
13	.....	300	350	420	500
14	.....	.....	375	460	550
15	.....	.....	400	500	600
16	.....	.....	.....	540	650
17	.....	.....	.....	580	700
18	.....	.....	.....	620	750
19	.....	.....	.....	.....	800
20	.....	.....	.....	.....	850

Hotels

Room, with basin	10 gals. per day
Room, with bath	
Transient	40 gals. per day
Resident (bachelor)	40 gals. per day
Resident (women)	70 gals. per day
Resident (mixed)	60 gals. per day
Two rooms and bath	80 gals. per day
Three rooms and bath	100 gals. per day
Public bath	150 gals. per day
Public shower	200 gals. per day
Public basin	150 gals. per day
Slop sink for cleaning	30 gals. per day

MAXIMUM DAILY REQUIREMENTS FOR HOT WATER, GALLONS FOR 24 HOURS (Continued)

Restaurants

Average price of meal	Consumption for hand dishwashing	Consumption for machine dishwashing
$0.50	1.0 gals. per meal	1.5 gals. per meal
1.00	1.5 " " "	2.5 " " "
1.50	2.0 " " "	4.5 " " "

Lofts and Offices

Office help, per person	2 gals. per day
Factory help, per person	5 gals. per day
Cleaning, per 10,000 sq. ft.	30 gals. per day

Peak Demands

In apartments and private dwellings the daily peak is approximately one-tenth of the daily volume. The peak demand may continue over a period of 4 hours.

The maximum duration of the peak demand in office buildings is 2 hours, the load being about one-seventh of the daily consumption.

Restaurants of the all-day type have a relatively small peak load. Restaurants which serve one meal per day have a peak hourly demand of one-fifth the daily consumption, for a 2-hour period.

Factory peak demands depend upon the nature of the work. Peak demand should be considered as about one-third the daily consumption, and of 1 hour duration.

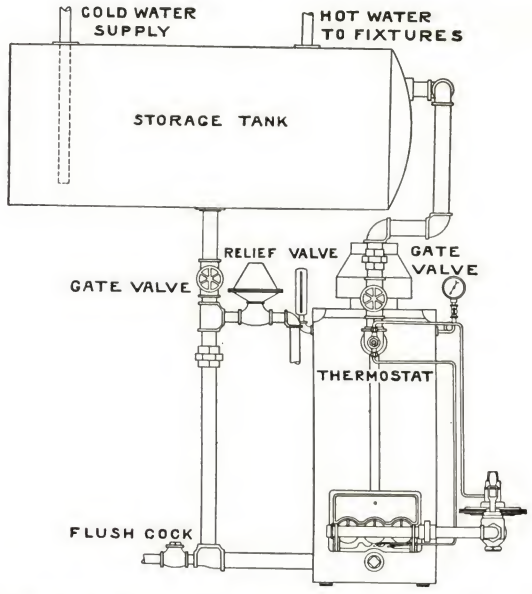
Capacity of Storage Tanks

Private dwellings, apartments and two-meal restaurants require storage capacity equal to one-fifth the daily volume of water used.

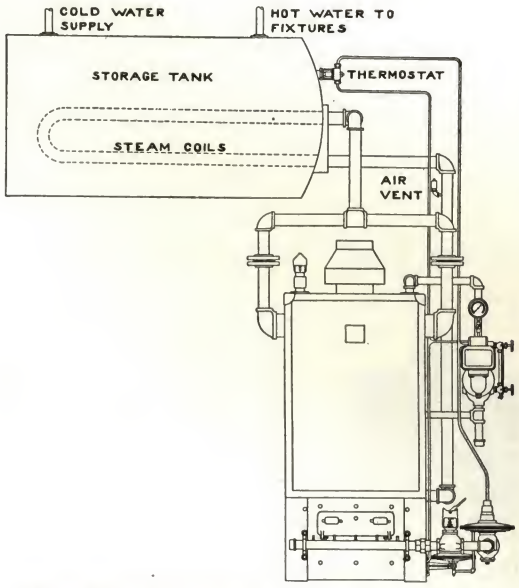
Hotels and all-day restaurants require storage of about one-tenth the daily demand.

Office building storage capacity should be one-sixth the total daily consumption.

For one-meal restaurants and factory help the storage capacity required is about 45% of the daily volume.



B-Line Boiler Connected in Direct Circulating Storage System



B-Line Boiler Connected in Indirect Storage System

EQUIPMENT FURNISHED WITH B-LINE STORAGE WATER HEATERS

Type A-A

For Direct Circulation

Gas pressure regulator
Snap action gas control valve
Water temperature thermostat
Non-throttling hand control valve
Thermostatic pilots
Diaphragm relief valve
Water pressure gauge
Thermometer
Drain cock
Draft hoods
Metal jacketed covering
Circulation openings as listed in table.

Type S-I-A

For Indirect Systems

Gas pressure regulator
Snap action gas control valve
Water temperature thermostat
Non-throttling hand control valve
Thermostatic pilots
Combination steam pressure and low water control
Pop safety valve set at 15 lbs. per sq. in.
Water gauge and try cocks
Steam pressure gauge
Drain cock
Draft hoods
Metal jacketed covering

HEATING CAPACITIES OF B-LINE BOILERS

Temperature Rise, Gallons per Hour, and Available Btu

Boiler No.	Hourly available Btu	Gallons per hour at temp. rise of			Size circulators, I.P.S.	Boiler No.	Hourly available Btu	Gallons per hour at temp. rise of			Size circulators, I.P.S.
		80°	100°	120°				80°	100°	120°	
M-23	76,800	115	92	77	One 2-in.	K-1514	739,200	1,110	888	739	One 4-in.
M-24	115,200	173	138	115	One 2-in.	K-1615	792,000	1,188	950	792	One 4-in.
M-25	153,600	230	184	154	One 2-in.						
M-26	192,000	288	230	192	One 2-in.	K-1716	844,800	1,267	1,014	845	One 4-in.
M-27	230,400	346	277	230	One 2½-in.	K-1918	950,400	1,426	1,161	950	One 4-in.
						K-2019	1,003,300	1,505	1,204	1,003	One 4-in.
K-43	158,400	238	190	158	One 2-in.	K-2120	1,056,000	1,584	1,267	1,056	One 4-in.
K-54	211,200	316	253	211	One 2-in.						
K-65	264,000	396	316	264	One 2½-in.	K-2322	1,161,600	1,742	1,394	1,162	Two 4-in.
						K-2524	1,267,200	1,901	1,521	1,267	Two 4-in.
K-76	316,800	475	380	317	One 2½-in.	K-2726	1,372,800	2,069	1,655	1,373	Two 4-in.
K-87	369,600	554	443	370	One 2½-in.	K-2928	1,478,400	2,218	1,774	1,478	Two 4-in.
K-98	422,400	634	507	422	One 2½-in.	K-3130	1,584,000	2,376	1,901	1,584	Two 4-in.
K-109	475,200	713	570	475	One 3-in.						
K-1110	528,000	792	634	528	One 3-in.	K-3332	1,689,600	2,534	2,027	1,690	Two 4-in.
						K-3534	1,795,200	2,693	2,154	1,795	Two 4-in.
K-1211	580,800	871	697	581	One 3-in.	K-3736	1,900,800	2,851	2,281	1,901	Two 4-in.
K-1312	633,600	950	760	634	One 3-in.	K-3938	2,006,400	3,010	2,408	2,006	Two 4-in.
K-1413	686,400	1,031	825	686	One 4-in.	K-4140	2,112,000	3,163	2,530	2,112	Two 4-in.

CRANE CO.

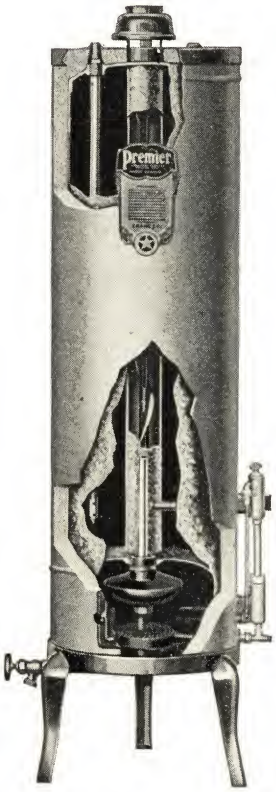
PREMIER HEATER DIVISION, LA PORTE, IND.

Automatic and Manual Storage Gas Water Heaters

836 South Michigan Avenue, CHICAGO, ILL.

For Branch Offices, see our Plumbing Section

For our pages on Water Softeners, Water Supply Systems, Plumbing Fixtures and Gas Fired Boilers, see Manufacturers' Index



Premier Features

Prem-O-Stat safety pilot control
Quick removable brass heating element
Heat seal rock wool insulation
Blue flame bunsen burner
Double extra heavy tank
Instant action thermostat
Gas line, drain line and interior fittings all brass or copper
Superheat deflector
Draft hood
Galvanized steel outer drum
Citrus yellow enamel finish with green trim

The Premier
INSULATED AUTOMATIC STORAGE GAS WATER HEATER

The Keystone
INSULATED AUTOMATIC STORAGE GAS WATER HEATER

How They Operate

The tank consists of two compartments, the upper containing the stored water—the lower encasing the heating element, burner and pilot. Sturdily constructed throughout, there are no delicate parts to give trouble.

When the heater is first lighted, the storage supply is quickly heated to the temperature at which the control is set. This is usually 135° F., but can be adjusted from 80° F. to 190° F. Instantly the set temperature is reached, the thermo-valve, with instant-action, shuts off the gas supply to the main burner, and there is a tank full of hot water ready for *instant service.*

The automatic action is extremely simple. When hot water is drawn from the storage, cold water from the city mains enters at the top (left-hand side) and is discharged near the bottom of the tank. The cold water chills the thermo-rod which causes the control to automatically open and the heating process begins at once. Thus the storage supply of hot water is constantly maintained.

Simplicity is also marked in the circulatory movement of the water once the heating process begins. Cold water enters the heating element at the top and is carried through the arms directly to the bottom compartment. Here it travels in a flowing stream directly over the hottest portion of the burner flame, absorbing practically every heat unit of gas used. As the water is heated, it rises rapidly through the central circulating pipe to the top of the tank.

This method insures quick circulation, greater efficiency and economy of operation.

This Laboratory Approval Seal is a guaranty of compliance with basic national requirements for safety

Keystone Features

Quick removable heating element
Instant action thermostat
Heavily constructed tank
Heat seal rock wool insulation
Keystone patented blue flame burner
Interior fittings brass and copper
Superheat deflector
Draft hood
Galvanized outer drum
Two-tone green enamel finish
Gas pressure regulator

PREMIER AND KEYSTONE DIMENSIONS

Heater No.	Capacity, gal.	Cold water inlet	Hot water outlet	Gas connections	*Headroom reg'd	Width reg'd over all
2	20	¾ in.	¾ in.	½ in.	75 in.	22 in.
3	35	¾ in.	¾ in.	½ in.	75 in.	26 in.
4	50	1 in.	1 in.	½ in.	80 in.	29 in.

*Includes 10 in. for flue elbow connection.

Other Crane Water Heaters

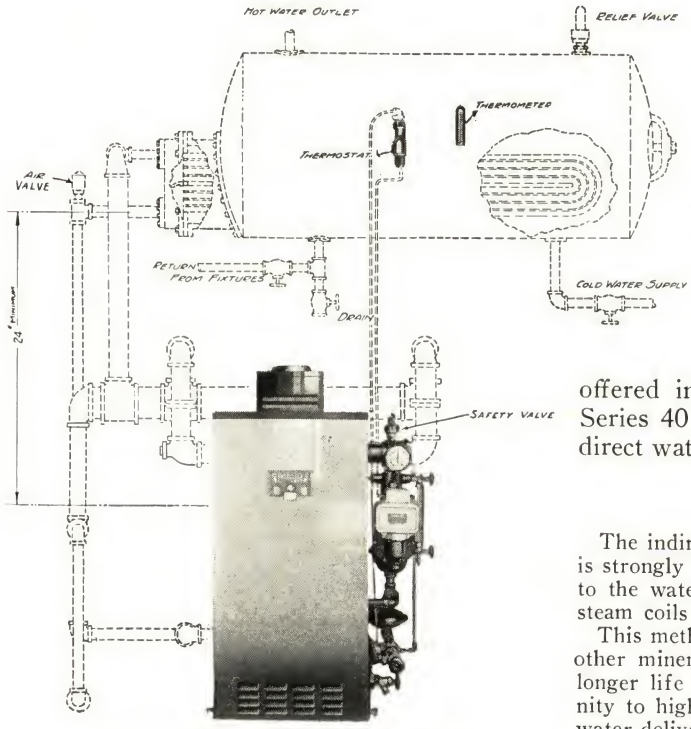
In addition to the Premier and Keystone Gas Water Heaters, the Crane Royal Heater is available in larger sizes suitable for larger homes, small apartment buildings, and restaurants.

The Crane Marvel Non-automatic Water Heater is available in five sizes, ranging from 12 to 50 gal. capacity.

For heavy-duty water heating beyond the capacity of the above heaters, the Basmor Gas-fired Boiler, shown on the following page, is recommended.

Consult your nearest Crane Branch or write to Premier Heater Division of Crane Co., LaPorte, Indiana, for an A. I. A. file folder descriptive of the entire line.

BASMOR GAS-FIRED BOILERS
FOR LARGE VOLUME WATER HEATING IN LARGE HOMES, APARTMENTS, HOTELS, RESTAURANTS, OFFICE BUILDINGS, ETC.



Indirect Water Heating Installation Plan

Where hot water in larger volume is needed than the Crane Premier, Keystone, Royal, and other ordinary-sized water heaters can supply, the Basmor Gas-fired Boiler installed as a water heater offers many distinct advantages. Their definite economy of operation as well as their cleanly, convenient, unfailing performance and their long life is especially attractive. Their wholly automatic operation avoids trouble and expense of caretaking.

Thermostatic and other safeguards assure a constant supply of automatic instant hot water with low fuel consumption and perfect safety.

Basmor Gas-fired Boilers for water heating are offered in two types: Series 25 for smaller installations and Series 40 for larger. They are available for either indirect or direct water heating.

WATER HEATING CAPACITIES FOR DOMESTIC HOT WATER SUPPLY

Gallons of Water per Hour Raise Degrees F.

Boiler Size	Available B.t.u.	H.p.	40°	60°	80°	100°	120°	140°
WIM-WDM Series 25			Gals.	Gals.	Gals.	Gals.	Gals.	Gals.
*2 Sec.	26,400	.8	80	53	40	32	26	23
3 "	52,800	1.5	158	106	79	64	53	45
4 "	79,200	2.4	238	158	119	95	79	68
5 "	105,600	3.2	317	211	158	127	106	90
6 "	132,000	3.9	396	265	199	158	132	113
7 "	158,400	4.7	475	317	238	190	158	136
8 "	184,800	5.5	555	370	278	222	185	158
9 "	211,200	6.3	634	423	317	253	211	181
10 "	237,600	7.1	713	475	356	285	238	204
11 "	264,000	7.9	792	528	397	317	264	226
Series 40								
6 Sec.	280,000	8.4	840	560	420	335	280	240
7 "	336,000	10.0	1010	675	500	405	335	290
8 "	392,000	11.7	1175	785	585	470	390	335
9 "	448,000	13.4	1345	895	670	540	450	385
10 "	504,000	15.1	1515	1010	755	605	505	430
11 "	560,000	16.7	1680	1120	835	670	560	480
12 "	616,000	18.4	1850	1235	920	740	615	530
13 "	672,000	20.1	2015	1345	1005	805	675	575
14 "	728,000	21.7	2185	1455	1090	875	730	625
15 "	784,000	23.4	2355	1570	1175	940	785	675
16 "	840,000	25.1	2520	1680	1255	1010	840	720
17 "	896,000	26.8	2690	1795	1340	1075	895	770
18 "	952,000	28.4	2860	1905	1425	1140	950	815
19 "	1,008,000	30.1	3025	2015	1510	1210	1010	865
20 "	1,064,000	31.8	3195	2130	1595	1275	1065	910
21 "	1,120,000	33.5	3360	2240	1675	1345	1120	960
22 "	1,176,000	35.1	3530	2355	1760	1410	1175	1010
23 "	1,232,000	36.8	3700	2465	1845	1480	1230	1055
24 "	1,288,000	38.5	3865	2575	1930	1545	1290	1105
25 "	1,344,000	40.1	4035	2690	2015	1610	1345	1150
26 "	1,400,000	41.8	4205	2800	2100	1680	1400	1200
27 "	1,456,000	43.5	4370	2915	2180	1745	1455	1250
28 "	1,512,000	45.2	4540	3025	2265	1815	1510	1295
29 "	1,568,000	46.9	4705	3135	2350	1880	1570	1345
30 "	1,624,000	48.5	4875	3250	2435	1950	1625	1390
31 "	1,680,000	50.2	5045	3360	2575	2015	1680	1440
32 "	1,736,000	51.9	5210	3475	2600	2085	1735	1490
33 "	1,792,000	53.5	5380	3585	2685	2150	1790	1535
34 "	1,848,000	55.2	5550	3695	2770	2220	1850	1585
35 "	1,904,000	56.9	5715	3810	2855	2285	1905	1635

*WDM ONLY—WIM AVAILABLE from 3 to 11 sections.

Indirect Method—Type WIM

The indirect method of heating water is by far the most satisfactory and is strongly recommended. Heating is done by transfer of heat from steam to the water by an external heater or coils in the storage tank. Copper steam coils located in the tank are preferred.

This method has the distinct advantage of preventing sediment, lime and other mineral matter being deposited in the boiler sections. This means longer life of the boiler with a maintenance of constant efficiency, immunity to high water pressures and shocks, and no discoloration of the hot water delivered. It is the most practical method of heating large quantities of water yet devised.

Equipment—Basmor Gas-fired Boilers, Type WIM, are furnished with the following equipment:

Housing and Insulating—Enameled exterior jacket complete, heavy air cell asbestos insulation, scientifically designed draft hood.

Controls—Gas pressure regulator, gas operated "instant action" gas valve with throttling type flame regulator, main gas shut-off valve, Basmor thermostat (tank).

Safety Features—Safety gas control, pop safety valve, steam pressure regulator and low water cut-off.

Also steam pressure gauge with water seal, water gauge and try cocks, boiler drain faucets, auxiliary pilot, thermometer (tank). All necessary fittings for front and side manifold. Pilot line and tubing for controls on boiler, but not piping to thermostat in tank.

Direct Method—Type WDM

The direct method if practical where water conditions are satisfactory, especially for small installations. With the direct method water is circulated through the boiler for heating. Boiler sections are of substantial construction to withstand a water working pressure of 60 lb.

Equipment—Basmor Gas-fired Boilers, Type WDM, are furnished with the following equipment:

Housing and Insulation—Enameled exterior jacket complete, heavy air cell asbestos insulation, scientifically designed draft hood.

Controls—Gas pressure regulator, gas operated "instant action" gas valve, main gas shut-off valve, Basmor thermostat (tank).

Safety Features—Safety gas control, relief valve (tank).

Boiler drain faucets, thermometer (tank), auxiliary pilot. All necessary fittings for front and side manifold pilot line and tubing for controls on boiler but not piping to thermostat in tank.

Electrical Operation

Basmor Boilers can be supplied especially equipped to operate electrically and should be used where the storage tank is located more than 35 ft. from the boiler. Low voltage wires are run from the electric thermostat in storage tank to the electrically operated master diaphragm gas valve thereby operating electrically instead of by gas. Electrical equipment will not be furnished unless specified.

HOLYOKE HEATER COMPANY

Kerosene, Gas and Indirect Water Heaters

HOLYOKE, MASS.

Products

"Holyoke" Kerosene Water Heaters.
"Holyoke" Gas Water Heaters.
"Holyoke" Indirect Water Heaters.
Also "Holyoke" Fire Pot Generators.

SLOGAN
"The Heart of the Home"

"HOLYOKE" KEROSENE TANK WATER HEATERS

Hot water is no longer regarded as a city convenience alone—suburban and country homes may also enjoy one of the greatest household necessities—hot water and plenty of it—through the installation of a "Holyoke" Kerosene Water Heater.

The design of the "Holyoke" quadruple patented copper coil makes it an unusually rapid heater. The tubes are of such size that, in the aggregate, they present the greatest practical amount of heating surface to a given volume of water passing through them.

"Holyoke" Kerosene Heaters are intended for attachment to any type of range boiler or tank and are non-automatic in operation, i.e., they are manually lighted and extinguished.

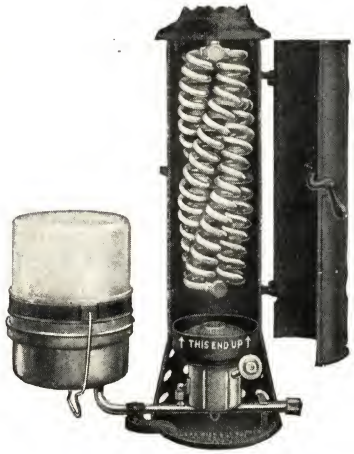
The burner is our new improved blue flame wick type. It is instantly and positively regulated and combustion is practically odorless. All heaters are equipped with the swing burner which simplifies the care and operation of the heater. This is an exclusive "Holyoke" feature, fully protected by patents.

Shell is of cast iron attractively finished in durable black enamel.

The Single Heaters will heat water for toilet and shaving in 4 to 6 minutes, in 15 to 20 minutes for dish-washing, and an ample quantity of water for the bath in about 45 minutes, depending upon the size of the heater. The No. 200 Twin Heater will take care of the above in one-half the time.

One gallon of kerosene (coal oil) is sufficient for 12 to 24 hours of operation per burner, depending upon the height of the flame used. The oil reservoir holds 9 pints.

All kerosene heaters are convertible into gas burning heaters when desired.



Holyoke No. 100

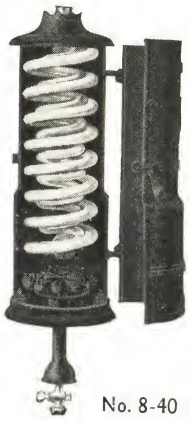
Holyoke No. 80

Holyoke No. 200

SPECIFICATIONS—KEROSENE HEATERS

Heater No.	80	100	200
Capacity ... gal.	30	30–40	52–60
Water connections ... in.	¾	¾	¾
Height ... in.	22¼	26	26
Size of shell ... in.	6 (dia.)	6 (dia.)	6x12
Size of base ... in.	8 (dia.)	8 (dia.)	8x13
Floor space required ... in.	17x9	17x9	22x9
Net weight ... lb.	34	36	67
Shipping weight ... lb.	49	52	85
List price	$22.00	$26.00	$47.00

"HOLYOKE" GAS TANK WATER HEATERS



No. 8-40

"Holyoke" Water Heaters embody the latest scientific principle and are designed to meet the most exacting demands.

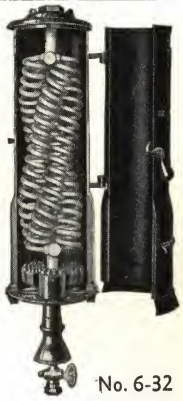
"Holyoke" Heaters operate with the highest degree of efficiency and economy and furnish a maximum amount of hot water at minimum cost. The inconveniences and dangers present in ordinary heaters are eliminated in the "Holyoke." These heaters are sturdily constructed of high grade material that will give many years of highly satisfactory service.

Heaters numbered 8-20 to 8-80, inclusive, have double coils and are furnished with ground joint brass unions for both inlet and outlet water connections. These unions effect a big saving in labor and material costs when installing the heaters.

SPECIFICATIONS—GAS HEATERS

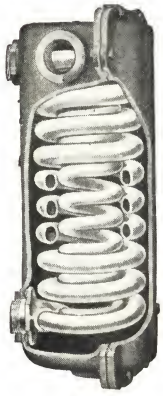
Heater No.	Capacity, gal.	Coil		Height, in.	Diam., in.	Shipping weight, lb.
		Diam., in.	Length, ft. in.			
6–32	30–60	7/16	30 0	24 1/4	8	48
8–20	30	3/4	14 6	19	8	32
8–25	30	3/4	16 6	21 1/2	8 3/4	40
8–40	30–40	3/4	17 6	24	8 3/4	41
8–50	40–52	3/4	20 0	24	8 3/4	42
8–70	40–66	3/4	22 0	25	8 3/4	46
8–80	52–82	3/4	25 0	25	8 3/4	47

The "Holyoke" No. 6-32 Gas Water Heater is equipped with the famous quadruple patented coil which makes it an unusually rapid heater. The shell is of cast iron, the lower part of which has an air jacket or double wall surrounding the heat zone. The air jacket serves as an insulator and minimizes the amount of heat radiated from the shell.



No. 6-32

"HOLYOKE" INDIRECT WATER HEATERS



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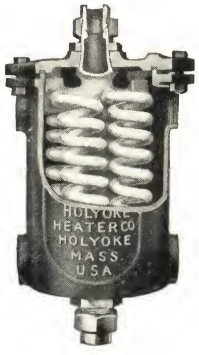

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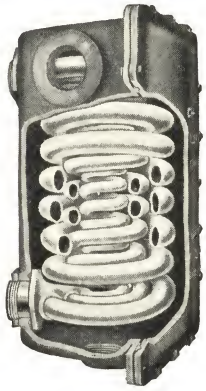


C-14

D-44

"Holyoke" Indirect Heaters connected just below the water line of Steam or Vapor heating boilers utilize the hot water from the boiler to heat water for domestic purposes. This method supplies hot water at practically no additional cost. It is the most efficient and economical way of obtaining a continuous supply of hot water twenty-four hours a day.

"Holyoke" Heaters may also be installed above the water line on pressure boilers, thus using live steam to heat the water.

Frequently occasions arise where additional heating radiation is required. "Holyoke" Indirect Heaters are particularly well adapted for furnishing this additional heat to garages or any room not regularly supplied from the main heating plant.

"Holyoke" Heaters are particularly adapted for preheating oil either below the water line or with steam. The larger sizes are equipped with special tappings which provide for the installation of an electric preheating element.

SPECIFICATIONS—INDIRECT HEATERS

	Single Coil							Double Coil			Triple Coil			Dual Coil			Quadruple Coil		
Heater size	A-4S	A-4	A-5	A-6	A-7	A-8	A-9	B-10	B-11	B-12	C-13	C-14	C-15	D-42	D-44	D-46	A-16	A-24	A-32
Length in.	9 3/4	9 3/4	12 3/4	15 3/4	16 1/4	20 1/8	21 1/4	16 1/4	20 5/8	25	22 3/4	26 7/8	31 1/4	23	27	31	11	15 1/8	19 1/4
Width in.	6 1/4	6 1/4	6 1/4	6 1/2	8 5/8	8 3/4	9 1/4	11 3/4	11 3/4	11 3/4	16 3/4	16 3/4	16 3/4	28 3/4	28 3/4	28 3/4	6 1/4	6 1/4	6 1/4
Depth in.	5 3/8	5 3/8	5 3/8	5 3/8	8	8	8 7/8	10 1/4	10 1/4	10 1/4	14 5/8	14 5/8	14 5/8	14 1/2	14 5/8	14 5/8	6 1/4	6 1/4	6 1/4
Shell openings in.	1	1	1	1	1 1/2	1 1/2	2	2	2	2	3	3	3	4	4	4	1	1 1/4	1 1/2
Coil openings in.	3/4	3/4	3/4	3/4	1	1	1 1/4	1 1/2	1 1/2	1 1/2	2 1/2	2 1/2	2 1/2	3	3	3	3/4	3/4	1
Weight crated lb.	12	13	16	21	50	58	68	95	115	138	195	250	320	500	560	640	34	47	56

HEATING WATER BELOW WATER LINE OF STEAM OR VAPOR BOILER—THREE-HOUR BASIS—TEMPERATURE RISE 100° IN 3 HOURS

Heater size	A-4S	A-4	A-5	A-6	A-7	A-8	A-9	B-10	B-11	B-12	C-13	C-14	C-15	D-42	D-44	D-46	A-16	A-24	A-32
Capacity gal	30	30 40	42 52	66	90 100	120	160	220	300	420	600	800	1000	1200	1600	2000	70	110	140

HEATING WATER WITH LIVE STEAM—THREE-HOUR BASIS—TEMPERATURE RISE 100° IN 3 HOURS AT 5 LBS. PRESSURE

Heater size	A-4S	A-4	A-5	A-6	A-7	A-8	A-9	B-10	B-11	B-12	C-13	C-14	C-15	D-42	D-44	D-46	A-16	A-24	A-32
Capacity gal	45	50	75	100	150	200	250	300	450	600	900	1200	1500	1800	2400	3000	110	172	218

RUUD MANUFACTURING COMPANY

Manufacturers of Gas-Fired Water Heaters

GENERAL OFFICES
PITTSBURGH, PA.

UNITED STATES FACTORIES
PITTSBURGH, PA., 2934-44 Smallman Street
KALAMAZOO, MICH., 501 No. Rose Street

FOREIGN FACTORIES AND SALES OFFICES
CANADA: Ruud Manufacturing Company, 474 Bathurst Street, TORONTO, ONT.
ENGLAND: Ruud Manufacturing Company, Limited, 99 High Holborn, LONDON, W. C. 1
GERMANY: Ruud Heisswasser Apparatebau, 87 Neu Lokstedter Strasse, HAMBURG-LOKSTEDT

BRANCH OFFICES

BALTIMORE, MD., 1109 No. Charles Street
BOSTON, MASS., 172 Cambridge Street
CHICAGO, ILL., 1223 So. Wabash Avenue
CINCINNATI, OHIO, 707 Elm Street
CLEVELAND, OHIO, Builders Exchange Building
COLUMBUS, OHIO, 117 E. Gay Street
DALLAS, TEX., 2018 Jackson Street
DAYTON, OHIO, 414 Warren Street
DENVER, COLO., 1635 Blake Street
DETROIT, MICH., 23 Parsons Street
JACKSONVILLE, FLA., 123 No. Ocean Avenue
LOUISVILLE, KY., 504 So. Third Street
LOS ANGELES, CALIF., 911 So. Grand Avenue
MILWAUKEE, WIS., 112 No. Water Street
MINNEAPOLIS, MINN., 900 No. 4th Street
NEW ORLEANS, LA., 820 Carondelet Street
NEW YORK, N. Y., 274 Madison Avenue
PHILADELPHIA, PA., 1938 Market Street
PITTSBURGH, PA., 444 Oliver Avenue
PORTLAND, ORE., 1201 Public Service Building
ST. LOUIS, MO., 1906 Washington Avenue
SAN FRANCISCO, CALIF., 665 Howard Street
TOLEDO, OHIO, 2101 Adams Street
WASHINGTON, D. C., 713 G Street, N. W.

Ruud Automatic Gas Water Heaters

Ruud Automatic Gas Water Heaters are made in two types—Continuous Flow and Storage—with a wide range of capacities, insuring a suitable size for any given hot water requirement.

(1) The Continuous Flow Type heats water instantly as it flows and burns gas only when the faucet is open. It has no tank.

(2) The Storage Type burns gas at a comparatively slower rate, but for longer periods, storing the heated water in a tank ready for use when needed.

Ruud Water Heaters are divided into seven general classes—the Continuous Flow Type (Nos. 3, 4, 6 and 8); the Cottage Continuous Flow Type (No. 95); the Storage Type (Nos. 100, 200, 350 and 500); the Ruud-Autohot Underfired (outside flue) Storage Type (Nos. 20, 25 and 40); the Ruud-Autohot Underfired (immersion tube) Storage Type (Nos. 7 and 12).

From this large quality line of water heaters, *perfect hot water service* is assured for homes of any size, for apartments, stores, factories, institutions, churches, schools, athletic plants or, in short, for any hot water requirement.

The chart on this page indicates the types and sizes that may be specified for ordinary residence work. For industrial and commercial use, it is recommended that you consult with the nearest Ruud branch or factory, listing all fixtures, lengths and size of hot water pipes, whether direct or return circulation is to be used, approximate hourly requirement, the average number of hot water users and whether the peak load is of one hour's duration a day or whether it is repeated.

Ruud, a Standard of Water Heater Quality

Five factories supply an international demand for Ruud products, and branch offices are located in every population center. These are manned by water heater engineers of long experience and you are invited to call for their assistance at all times.

READY REFERENCE CHART FOR SPECIFICATION WRITER

Type of residences and apartments	Heaters applicable	
	Continuous flow type	Storage type
Small residences		
One family bath and kitchen, small family	Tables Nos. 5 and 7	Table No. 2
One family bath, one servant's bath, kitchen, laundry	Table No. 5	Table No. 2
Two family baths, one servant's bath, kitchen, pantry, laundry and lavatories	Table No. 5	Table No. 2
Three or four family baths, servant's bath, kitchen, pantry, laundry and lavatories	Table No. 5	Tables Nos. 2 and 3
Large residences and apartments		
Four or more family baths, servant's bath, kitchen, pantry, laundry and lavatories	Table No. 5	Table No. 3

FLOW IN GALLONS PER MINUTE DELIVERED BY ORDINARY PLUMBING FIXTURES

Fixture	Fair flow	Good flow	Excellent flow
Kitchen sink bibbs	2	4	6
Pantry sinks:			
High gooseneck bibbs	2	2	3
Large plain bibbs	4	6	8
Laundry tray bibbs	4	6	8
Slop sink bibbs	3	4	6
Lavatory basin bibbs	2	3	4
Bathtub bibbs	3	4	6
Shampoo spray	½	1	2
Shower baths:			
5 -in. rain heads	2	3	4
6½-in. rain heads	2	3	5
8 -in rain heads	4	6	8
8 -in. tubular heads	6	8	10
Needle baths	20	30	40
Manicure tables	1	1½	2

Compiled from tests on 30 lbs. water pressure, and intended merely as a guide.

"Fair Flow" is minimum from which good service could be expected.

"Excellent Flow" is maximum to be obtained without splashing and noise.

"Good Flow" is a stream which combines satisfaction and economy in most cases.

Used with Natural, Manufactured and All Special Fuel Gases

All Ruud units are made in special models adaptable to every kind of fuel gas, including the new liquefied petroleum gases and carburetted butane.

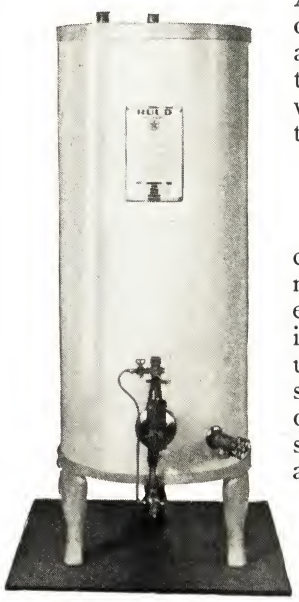
RUUD-AUTOHOT AUTOMATIC UNDERFIRED STORAGE WATER HEATER

Made-to-measure Hot Water Service

The Ruud-Autohot line consists of five underfired, storage type units differing in tank capacities and heat speeds. Each of these machines is designed to provide perfect hot water service for a specific class of dwellings.

Through actual made-to-measure sizing of Ruud-Autohot units, all wasteful overproduction of hot water is eliminated with resultant economy of operation heretofore considered impossible in automatic water heating.

In specifying the proper size (Table 2) it is not to be assumed that the "Hi-Lo" gallons of hot water per day rating sets the actual limits of the Ruud-Autohot unit's capacity. This data, rather, indicates the average daily hot water consumption in the class of homes for which the particular size is intended.



Ruud-Autohot Automatic Underfired Storage Water Heater
(Immersion Tube Type)

General Features

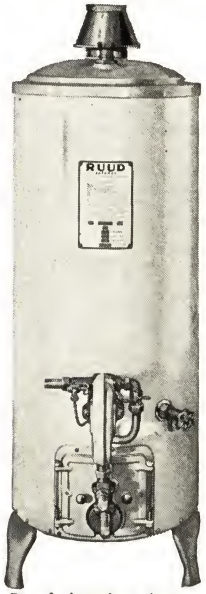
Ruud-Autohot is a self-contained and entirely automatic machine, maintaining an ever-ready supply of hot water in a heavily insulated tank. An underfired type, it needs no separate heater unit and requires but little more floor space for installation than its actual tank diameter.

Gas is controlled by: first, the Ruud Snap-acting Thermostat which permits fuel to burn only when the tank temperature falls to a predetermined point; and, second, by the Ruud Automatic All-gas Cut-off which shuts off the flow of all gas in case the pilot light is extinguished.

The three larger Ruud-Autohot units (Nos. 20, 25 and 40) are of the outside flue type with lead coated flue-liners and interchangeable, removable tanks. All mechanism is directly in front of the heater, permitting installation in any wall offset as large as the diameter of the heater. The entire burner assembly is quickly removable in one piece for ease of cleaning, inspection or repair.

For smaller hot water demands, two immersion tube type Ruud-Autohot units (Nos. 7 and 12) are built. Tank capacities of these sizes are, respectively, the same as those of Nos. 20 and 25 (20 and 30 gal.), but smaller B.t.u. input per hour lowers the heat-speed and the overall 24-hour hot water capacity.

If specified properly, these smaller Ruud-Autohot sizes give perfect hot water service in the small home at unusually low cost.



Ruud Autohot Automatic Underfired Storage Water Heater
(Outside Flue Type)

Ruud-Autohot Construction Details

(1) Smart, trim appearance. Shell in ivory finish with contrasting trim of a terra cotta tone.

(2) Non-breakable pressed steel top, base and legs.

(3) Tank heavily insulated with 1½ in. of mineral wool.

(4) Copper dip pipe.

(5) Ruud draft regulator.

(6) Brass hose-end drain valve.

(7) Copper, brass and malleable iron liberally used throughout.

(8) Pilot lock.

(9) Extra heavy galvanized tank.

TABLE 1—SPECIFICATIONS RUUD-AUTOHOT AUTOMATIC UNDERFIRED STORAGE SYSTEMS

No.	Tank capacity, gal.	Height over all, in.	Heater diameter in.	Size connections, in.			Weight, lb.	
				Flue	Water	Gas	Net	Crated
7	20	49	17½	3	¾	½	195	245
12	30	65	17½	3	¾	½	240	300
20	20	51*	18	4	¾	½	180	225
25	30	65*	18	4	¾	½	215	270
40	45	62*	23	4	1	½	340	440

*Not including draft hood which extends above heater proper in these sizes. For over-all height with draft hood add 5 in. to figures shown.

Shipped as a unit ready to install by making gas, water and flue connections.

Selection of Sizes

The following table sets forth the capacities of the five models and the requirements each is designed to meet.

TABLE 2—RUUD-AUTOHOT STORAGE TYPE

Size	Tank capacities, gal.	B.t.u. input per hour	Hi-Lo hot water per day, gal.
No. 7	20	7,000	40—80
No. 12	30	12,000	80—120
No. 20	20	20,000	100—150
No. 25	30	25,000	125—200
No. 40	45	40,000	200—300

Ruud-Autohot Models for Hard Water

For water supplies containing much lime or other precipitating mineral matter, Ruud-Autohot hard water models are recommended. Nos. 20, 25 and 30 are equipped with a clean-out handhole, over which a cover is fastened by four studs. Removal of this plate permits easy scraping away and removal of any hard water encrustations. Slightly higher prices for handhole equipped models.

Ruud-Autohot units Nos. 7 and 12 are applicable to hard water supply without change, since their construction facilitates cleaning of tank interior and all other submerged parts.

Ruud Copper Tanks If Desired

Ruud-Autohot is also made with copper tanks in all five sizes. In Nos. 20, 25 and 40, copper and galvanized tanks are interchangeable. If at any time the user wishes to change to a copper tank, the operation is simple.

All Ruud-Autohot Copper Systems are furnished with 300-lb. test—127-lb. Massachusetts working pressure copper tanks of sturdy construction with riveted and brazed seams. Tank inside and bottom is tinned.

RUUD MULTI-COIL AUTOMATIC STORAGE WATER HEATER

Description

The Ruud Multi-Coil Automatic Storage System, recently improved, is designed for conditions requiring a large supply of hot water at several faucets at one time. It permits hot water to flow as fast at every hot water faucet as the corresponding flow at every cold water faucet, and is suitable for large residences, apartment houses, small hotels, office buildings, hospitals, bathhouses, schools, gymnasiums, restaurants, factories, etc.

It is often used in apartment houses and institutions having a hot water supply tank heated in winter by steam coils. Used as an auxiliary under such conditions, the Ruud Multi-Coil System with the Ruud Moment Valve adds sufficient heat to keep the tank full of hot water when the heating plant is in partial operation. In summer, when the heating plant is closed down altogether, the Ruud renders perfect hot water service.

The hot water furnished by the heater is stored in a tank. The gas burned is controlled automatically by the temperature of the water in the tank by means of the Ruud All-metal Thermostatic Moment Valve described below. Gas is burned only when the temperature of the water in the tank is below the moment valve setting.

This system is especially adapted to low water pressure conditions, also low pressure gas supply because it burns gas at a relatively slow rate and over longer periods than the instantaneous (continuous flow) type heater.

The complete system consists of heater, tank, moment valve, thermometer, gas regulator, tank supports and magnesia insulation. Supports are not furnished with tanks larger than 500 gal. capacity. The circulator pipes and gate valves between the heater and tank are obtained locally after the system is placed.

Ruud Multi-Coil Automatic Storage Systems are distinguished for flexibility of service, efficiency in operation and for long life.

Features

These, long standard and merit-proved through many years of use, include:

The Ruud Moment Valve—No fuel control of greater reliability, economy and continuous, perfect performance has been discovered. The moment valve is snap-acting, being either "full-on" or "full-off" and gives full pressure and volume at the orifice, permitting a constant air-gas ratio in the mixer, which in turn guarantees a proper flame of even height and uniform characteristics.

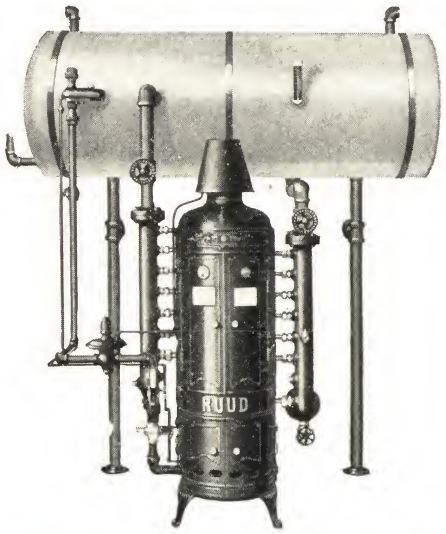
The Ruud Automatic All-gas Cut-off—Its reliability has been firmly established in thousands of units so equipped. It shuts off all gas in case of pilot failure.

Coil Arrangement—By ingenious arrangement all coils are separate and independent. In case one coil must be repaired or replaced, it can be removed from the heater and there will be no interruption in the service.

Burners—Ruud uses a full bunsen burner and with this type a proper flame is easily maintained, making for uniformity of operation and fixed efficiency. The burner is simple in design, easily taken apart for cleaning and uses only a flat brass gauze as flame check.

Ruud Tanks—Tanks vary greatly as to material and workmanship. Ruud tanks are made from flange steel; ordinary tanks are made of plate steel. Ruud weights for tanks are not theoretical. The highest standard known is employed in riveting, both as to size and spacing of rivets.

Ruud can also furnish copper tanks in many multi-coil combinations. Where brass or copper is used to pipe a building only a copper tank should be used for it eliminates all possibility of discolored water.



Ruud Multi-Coil Automatic Storage System

General Design

Ruud Multi-Coil Automatic Storage Systems are designed to give, within their range of sizes and combinations, perfect and continuous hot water service at low, reasonable cost. The object of Ruud engineers has constantly been a harmonious meeting of these two factors, now, through new improvements, accomplished in greater measure than ever before.

Made in 4 sizes and combinations, with steam coils and without, with tanks of copper, black or galvanized iron, singly and in combination, it is entirely reasonable to say that Ruud can meet an overwhelming majority of Volume Water Heating Specifications.

Selection of Sizes

The basis for determining the proper size Ruud Multi-Coil Storage System for any given condition is the *total number of gallons of hot water used during the period of heaviest demand*. Where the conditions are a great deal complicated, the services of our engineering department are always available.

TABLE 3—MULTI-COIL STORAGE TYPE
Sizes of Systems and Their Application to Various Residences

Size heater	Capacity of tank, gal.	Requirements
100	80, 100 or 150	Residences having 3 to 5 bathrooms, bedroom lavatories, large kitchen sink, pantry sink and laundry. Apartment buildings with 6 apartments of 4 or 5 rooms each.
200	150, 200 or 250	Residences having 5 to 8 bathrooms, large kitchen sink, dishwashing machine, large laundry. Apartment buildings having 6 to 12 apartments of 5 or 6 rooms each.
350	250, 300, 365 or 425	Residences having 7 to 10 bathrooms, large kitchen sink, dishwashing machine, large laundry. Apartment buildings having 10 to 18 apartments of 5 or 6 rooms each.
500	425, 500, 600 or 700	Apartment buildings having 20 to 30 apartments of 5, 6, or 7 rooms each. Very large homes. 40 to 60-room hotels.

Note: Larger capacity tanks, while not listed here, are available, and may be used with two or more Ruud Heaters. All tanks in black iron, galvanized or copper.

TABLE 4—SPECIFICATIONS MULTI-COIL STORAGE TYPE

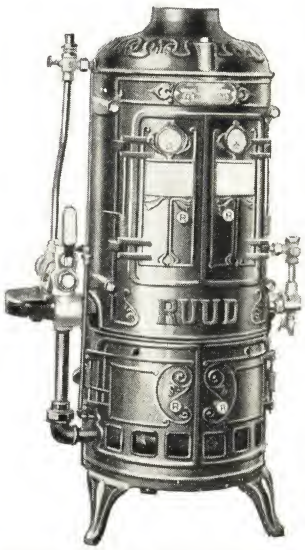
Size heater	*Height over all, in.	Width over all, in.	Size, circulator, in.	Flue, in.	Hourly B.t.u. capacity		Size gas line, in.	Minimum height to bottom of tank, in.
					Nat. gas, cu. ft.	Art. gas, cu. ft.		
No. 100	45	27	1½	5	77,000	80,000	¾	41
No. 200	53⅜	32	2	6	154,000	160,000	1	49
No. 350	61	36½	2½	7	270,000	280,000	1¼	56
No. 500	64⅛	38½	2½	8	385,000	400,000	1½	58

*Not including draft hood.

RUUD AUTOMATIC CONTINUOUS FLOW WATER HEATER

Description

This type, newly improved, combines instant service, an inexhaustible supply with the highest efficiency attainable. The operation is automatic, gas being turned on or off by the flow of water when a faucet is opened or closed with a secondary and independent thermostatic fuel control that proportions the flow of gas to the quantity of water heated. The supply cannot be exhausted. Each size is built to a rated capacity, and as long as the faucet remains open hot water will be delivered at that rate.



Ruud Automatic Continuous Flow Water Heater

This type may be installed in connection with a primary hot water supply from a furnace, boiler, coal range, etc., on the "reheating system," adding the needed heat to the water to bring it to the temperature required.

Its service is ideal for intermittent requirements, as it burns gas only when hot water is being drawn. In addition to the residence field, it is used largely in garages and auto wash stations, athletic plants, drug stores, beauty shops, etc.

Improvements and Construction

Engineering improvements have in general increased efficiency and life of this type unit and reduced in remarkable degree the need for maintenance service.

Of major importance is the change in the lower section of the copper heating surface from a conical to a double basket-type design. Enlargement of the combustion chamber thus made possible, has given the unit much greater flexibility. Combustion under proper conditions of gas flow, is practically complete; even when overgassed with 25% of volume, there is no change in perfection of combustion. General operating efficiency has been raised 82.5—85%. The coil and combustion chamber improvements now decrease shell temperature to a noticeable degree. Burners are held at much lower temperatures, lessening tendency to warp and flash, lengthening life and decreasing maintenance service. Coil life has been added through adoption of No. 17 Stubbs gauge seamless, premium copper tubing as standard.

The requirements of the American Gas Association laboratory are greatly exceeded in all important particulars. Heating efficiency, for instance, is about 20% higher than the laboratory minimum.

Ruud Dual Fuel Control—Gas flow is automatically controlled by two separate and independent gas valves. Water flow operates one valve; water temperature the other. Gas burns in the quantity needed to heat water within exact degree limits.

Ruud Burners—Made in two simple pieces with a perforated flat flame check, easy to dismount and clean.

General Construction—All cast iron parts, shell, doors, top and bottom are heavy, substantial and long-lasting. Castings are of durable gray iron.

Recent price reductions in the residential sizes (Nos. 3 and 4) effect a considerable saving.

Selection of Sizes

Table 5 is a guide for the proper sizing of heaters. The size number corresponds to the capacity of the heater on a basis of raising the temperature of the water 63° F. Special conditions, the number of fixtures and people in the family, whether they use small or large quantities of hot water, should always be considered in using this general table.

TABLE 5—CONTINUOUS FLOW TYPE
Sizes of Heaters—Their Application to Residences

Size heater	*Gal. per min.	Residences having
No. 3	3	1 bathroom and kitchen sink, small family.
No. 4	4	1 family bathroom, 1 servants' bathroom, kitchen and laundry.
No. 6	6	2 family bathrooms, 1 servants' bathroom, kitchen, pantry, laundry and 1 or 2 lavatories.
No. 8	8	3 or 4 family bathrooms, servants' bathroom, kitchen, pantry, laundry and lavatories.

*These figures are approximate, depending on the temperature of the incoming water. The capacity is rated on a temperature rise of 63°.

TABLE 6—SPECIFICATIONS FOR CONTINUOUS FLOW TYPE

Size	Water inlet, in.	Water outlet, in.	Gas line, in.	Vent pipe, in.	Temp. raise, deg.	Hourly B.t.u. capacity		Gas meter	Weight, lb.	
						Nat. gas	Art. gas		Net	Crated
3	½	½	1	6	63	110,000	116,000	30 lgt.	262	335
4	½	½	1¼	6	63	137,500	145,000	45 lgt.	340	405
6	¾	¾	1½	7	63	220,000	232,000	60 lgt.	455	560
8	¾	1	2	8	63	275,000	290,000	80 lgt.	565	670

Note: Standard pressure heaters require water pressure of 25 lb. per sq. in. at the highest faucet. When pressure is lower than this and not less than 5 lb., specify "Low Pressure" heater. No. 3 size is not made in "Low Pressure."

RUUD COTTAGE CONTINUOUS FLOW WATER HEATER

Ruud Cottage Continuous Flow Water Heater

Ruud Royal Blue

The Ruud Royal Blue, a small size continuous flow type water heater, is ideal for cottages, bungalows and, in warmer climates, is suited for average family use.

Recent engineering improvements plus attractive Royal Blue color and low price secured for this unit a ready market in the small home class.

General Features of Construction

Mechanical features differ very little from the larger sizes of Ruud Continuous Flow Water Heaters. The rearrangement of water control and independent thermostatic control has only been made to facilitate installation in the small home.

The shell of this heater is heavy gray iron castings throughout, double-dipped japan in a royal blue color.

The coils are all No. 17 Stubbs gauge premium copper tubing. All copper and brass waterways insure a rustfree hot water service.

TABLE 7—COTTAGE CONTINUOUS FLOW TYPE
Sizes of Heaters—Their Application to Residences

Size heater	*Gal. per min.	Application
No. 95	2½	For small hot water requirements. Ideally meets the needs of the modern small home where fixtures are compact, pipe runs short and where there are but a few people in the family.

*These figures are approximate depending on the temperature of the incoming water. The capacity is rated on a temperature rise of 63°.

TABLE 8—SPECIFICATIONS FOR COTTAGE CONTINUOUS FLOW TYPE

Size	Cap. gal. per min.	Tem. raise, deg.	Water line		Gas inlet, in.	Flue, in.	Gas meter	Hourly B.t.u. capacity		Weight, lb.	
			Inlet, in.	Outlet, in.				Nat. gas	Art. gas	Net	Crated
95	2½	63	½	½	¾	5	10lgt.	92,000	97,000	200	270

Note: A water pressure at highest faucet of at least 25 lb. per sq. in. is required to enable these heaters to deliver their capacity at that point.

ESTABLISHED IN 1841

E. B. BADGER & SONS CO.

Manufacturers of Hot Water Tanks and Pantry Sinks

75 Pitts Street, BOSTON, MASS.

BRANCH OFFICES

ATLANTA, GA., 140 Edgewood Ave.
CHARLOTTE, N. C., 1408 Independence Building
CHICAGO, ILL., 2831 South Parkway
CINCINNATI, OHIO, Union Trust Building
CLEVELAND, OHIO, Guardian Building
DETROIT, MICH., 402 Ford Building
HOUSTON, TEX., 1308 Second National Bank Building
INDIANAPOLIS, IND., 823 Occidental Building
KANSAS CITY, MO., 1336 Oak Street
LOS ANGELES, CAL., 517 Hollingsworth Building
MINNEAPOLIS, MINN., 732 Building Exchange
MONTREAL, QUE., Cement Building
NEW ORLEANS, LA., 419 Maritime Building
NEW YORK, N. Y., 271 Madison Avenue
PHILADELPHIA, PA., 1500 Walnut Street, Room 901
PITTSBURGH, PA., Union Trust Building
SALT LAKE CITY, UTAH, Kearns Building
SAN FRANCISCO, CAL., Sharon Building
SEATTLE, WASH., Smith Tower
ST. LOUIS, MO., 3605 Laclede Avenue

Products

BADGER ALL-COPPER HOT WATER STORAGE TANKS for building and industrial purposes; also domestic tanks and boilers to be used in connection with heating apparatus.

BADGER COPPER and WHITE METAL PANTRY SINKS.

Also Badger Expansion Joints for low and high pressure lines.

All-copper Tanks

Badger All-copper Tanks are made from the best of copper by expert coppersmiths.

Interiors are thoroughly tinned to insure clean water. There is only one longitudinal seam, this being brazed and hard hammered. The heads have the correct radii. They are riveted to the shell with a generous lap. In riveting the copper is first drawset and then the rivets are upset and buttoned. Finally the seam is thoroughly sweated on the inside with solder.

Furnished complete with special size connections, manholes and steam coils, if desired.

Every tank is subjected to a hydrostatic test of at least 200 lbs. Boilers of 250 or 300 lbs. test can be furnished, if required. The working pressure of a tank should never exceed 42½% of its hydrostatic test.

Tank Specifications—to Facilitate Ordering

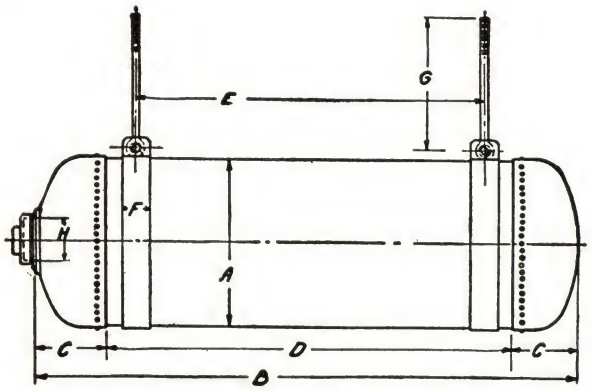
The following is frequently used by architects and found to be very satisfactory:

Furnish ... gal. Badger Copper Tank to be ... diameter x ... long; shell to be made of sheet copper weighing ... lbs. per sq. ft.; to have one longitudinal seam, said seam to be brazed and hard hammered; heads to be made of copper weighing ... lbs. per sq. ft.; said heads to be half-round type, riveted to the shell and thoroughly sweated on the inside with solder; one head to be fitted with ...x... composition manhole and cover; all connections in head to be standard type, brazed to copper. All connections on shell to be standard flanged type riveted on outside.

Material in tank to be tinned on the inside with block tin, and all seams and connections to be heavily backed with solder.

Tank to be tested to ... lbs. hydrostatic pressure.

Note: This company will supply weights for this specification to any architect who will furnish information regarding volume of hot water required and the water pressure.



***DIMENSIONS HORIZONTAL PRESSURE TANK**
Wall brackets may be used instead of hangers

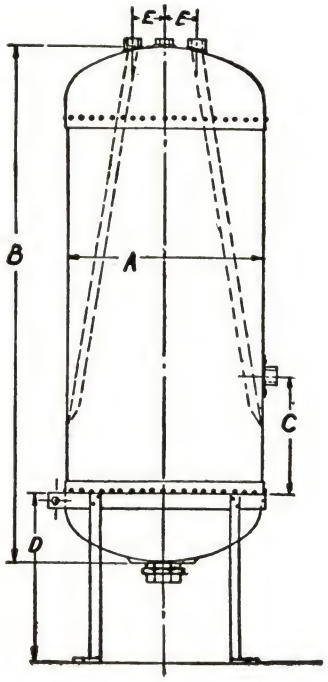
Size, gal.	A	B	C	D	E	F	G	H
30	12	62	5	52	47	3	15	3
40	14	61¾	6	49¾	45	3	15	3
50	16	60½	6½	47½	42	4	15	3
60	17	65	7	51	45	4	15	3
70	18	66½	7	52½	47	4	15	3
80	20	62	8¼	45½	40	4	16½	3
90	20	70	8¼	53½	48	4	16½	3
100	20	78	8¼	61½	56	4	16½	3
125	22	81	9¼	60½	55	4	18½	4½
150	24	80	10	60	54	4	18½	4½
175	28	72	11	50	44	4	18½	6
200	30	72	12	48	42	4	18½	6
225	30	80	12	56	50	4	18½	6
250	30	90	12	66	60	4	18½	6
275	30	97½	12	73½	68	4	18½	6
300	30	106½	12	82½	77	4	18½	6

*All dimensions are in inches.

***DIMENSIONS VERTICAL PRESSURE TANK**

Size, gal.	A	B	C	D	E
125	22	81	24	20	4
150	24	80	24	20	4½
175	28	72	24	20	4½
200	30	72	24	20	5
225	30	80	24	20	5
250	30	90	24	20	5
275	30	97½	24	20	5
300	30	106½	24	20	5

*All dimensions are in inches. The 125-gal. size has bent side and bottom connections. All others as shown.



DAHLQUIST MFG. COMPANY

Coppersmiths and Metal Workers

A, 2nd and 3rd Streets, SOUTH BOSTON, MASS.

Products

Copper Boilers including Heavy Pressure Boilers, Direct or Street Pressure Boilers, Tank Pressure Boilers, Wash Boilers and Pressure Barber Boilers.

Dahlquist Aquatherm Copper Range Boiler (patented), with or without water heater.

Dahlquist Super Aquatherm Copper Automatic Storage Systems; Dahlquist Turbo-Aquatherm (Patented).

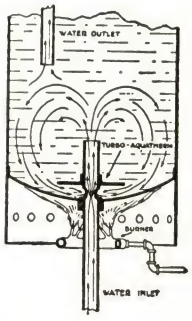
Also Steam Jacketed Copper Kettles, Corrugated Copper Expansion Joints, Metal Spinning of all kinds, Boiler Stands and Gas Water Heaters.

Dahlquist Copper Boilers

Satisfaction is assured. In durability, neat appearance and cleanliness, copper is beyond comparison. Copper resists rust and corrosion as no other tank metal can.

Dahlquist Turbo-Aquatherm (U. S. Pat. No. 1,762,-215, June 10, 1930)

A new invention and great improvement in hot water boiler design. Completely eliminates cause of burnouts in boilers, heating coils and waterbacks.



Hot water boilers and heating units have always suffered from a gradual accumulation of sediment and scale. This accumulation gradually insulates the water from the source of heat and, if allowed to remain, eventually causes a burned-out boiler, heating coil or waterback.

The Turbo-Aquatherm completely prevents this trouble by causing a turbulent circulation of the water in the bottom of the boiler whenever water is drawn from the system. This action is entirely automatic and is accomplished by natural flow of water through inlet pipe.

Automatic Gas Unit with Side Arm

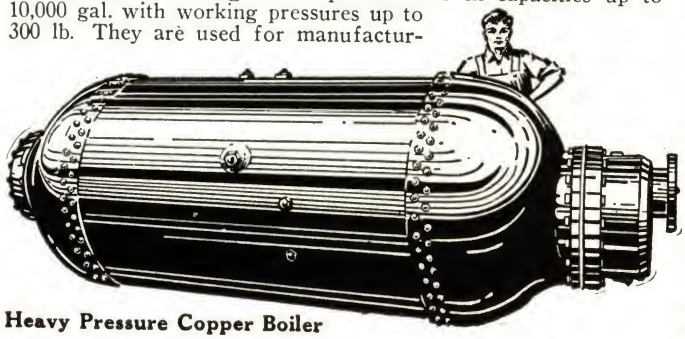
The Turbo-Aquatherm (patented) is a specially designed venturi tube inserted in the inlet pipe adjacent to the bottom of the boiler. When water flows through the inlet pipe and the venturi, it reduces the pressure in the neck of the venturi which therefore draws water through apertures to satisfy this lowered pressure. This water is drawn along the bottom of the boiler with a scouring action and thus carries away any sediment which may have accumulated. Thus no sediment can possibly remain.

Four important things are therefore accomplished by means of this simple device. First, greatly lengthened life due to elimination of burnouts. Second, greatly increased thermal efficiency because of the elimination of the insulating blanket of sediment. Third, fresh hot water because no stale water is allowed to accumulate. Fourth, quicker hot water supply due to circulation system which permits heated water to be drawn off without giving up its heat to colder water in boiler.

Dahlquist Turbo-Aquatherm (patented) may be supplied on any Dahlquist range boiler or automatic storage unit.

Dahlquist Heavy Pressure Copper Boilers for Large Industrial Uses

Dahlquist heavy pressure copper industrial boilers are built to architects' and engineers' specifications in capacities up to 10,000 gal. with working pressures up to 300 lb. They are used for manufacturing establishments, office buildings, hospitals—in fact wherever there is an exceptionally large demand for a constant supply of hot water. They are furnished with or without coils. Material and workmanship is of the highest grade, and each unit is thoroughly inspected and given full pressure tests at factory before delivery.



Heavy Pressure Copper Boiler

The illustration shows one of five 1000-gal. boilers for New York Life Insurance Building, New York, N. Y., Cass Gilbert, architect.

PRICES OF MASSACHUSETTS STANDARD COPPER PRESSURE BOILERS

Capacity, gallons	Test, lb.		
	200	250	300
25	$ 30.00	$ 35.00	$ 45.00
30	36.00	42.00	54.00
40	48.00	56.00	72.00
50	60.00	70.00	90.00
60	72.00	84.00	108.00
70	84.00	98.00	126.00
80	96.00	112.00	144.00
100	120.00	140.00	180.00
125	150.00	175.00	225.00
150	180.00	210.00	270.00
200	240.00	280.00	360.00
250	300.00	350.00	450.00
300	360.00	420.00	540.00
350	420.00	490.00	630.00
400	480.00	560.00	720.00
450	540.00	630.00	810.00
500	600.00	700.00	900.00
600	720.00	840.00	1080.00
700	840.00	980.00	1260.00
800	960.00	1120.00	1440.00
900	1080.00	1260.00	1620.00
1000	1200.00	1400.00	1800.00

Direct or Street Pressure Boiler

Dahlquist Direct or Street Pressure Boilers

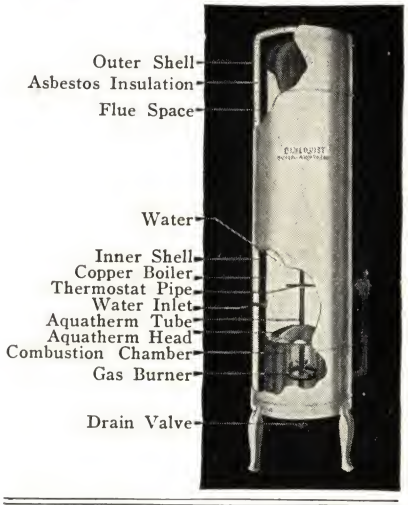
Made in two qualities: (1) Massachusetts Standard with 5-year guarantee, and (2) extra heavy with 25-year guarantee.

Both qualities meet the severe requirements of Massachusetts Range Boiler Law which permits use of boilers on a working pressure not exceeding 42½% of test pressure.

Boilers furnished with either low, "hilow," or universal tap.

Dahlquist Super Aquatherm Copper Automatic Storage Heaters

The Dahlquist Super Aquatherm copper automatic storage heater has been designed to furnish the home owner with a constant, never-failing source of steaming hot water without attention, and at low cost for initial installation, upkeep and fuel.



The boiler is made of copper of 250 lb. Massachusetts standard test. Surrounding the boiler is a heavy protective covering of asbestos insulation. The circulation of water in the boiler is controlled by the patented Aquatherm which gives the utmost in thermal efficiency and prevents the accumulation of sediment in the bottom of the boiler with consequent danger of failure and burnouts.

The heating unit is a powerful gas burner with pilot flame or an efficient electric heater for use where gas is not available.

No.	Capacity, gal.	Heating unit	Price
20	20	Gas burner.....	$110.00
20	20	Electric heater.....	150.00
30	30	Gas burner.....	150.00
30	30	Electric heater.....	175.00
40	40	Gas burner.....	200.00
40	40	Electric heater.....	225.00

Prices of larger sizes on application.

The heating unit is controlled by an automatic thermostat which keeps the temperature of the water at the required degree of heat.

W. E. CALDWELL CO.

INCORPORATED

Manufacturers of Tanks and Tank Towers

2290 Brook Street, LOUISVILLE, KY.

Products

WOOD, STEEL and GALVANIZED TANKS, any shape or size, for any purpose; TUBULAR, ANGLE or CHANNEL COLUMN STEEL and WOOD TOWERS.

Also manufacturers of Railroad Water Stations; Tank Agitators; Steel Standpipes; Tanners' Drums; Power Transmission Machinery which includes: Friction Clutches, Friction Clutch Cut-off Couplings, Cast Iron Pulleys, Shaft Hangers, Safety Set Shaft Collars.

Cypress Tanks

This company specializes in cypress, as it is the best wood for tanks for most purposes. It has great durability with minimum shrinking and swelling, and gives no taste or coloring.

For some acids, yellow pine is recommended. Poplar, white pine, cedar and fir are also used.

Made round, elliptical and rectangular.

Specifications—Lumber to be thoroughly dry, without loose or unsound knots, splits, shakes, pecks, wormholes or other defects; all heart on inside; sound sap on outside, and then not to exceed one-half of the thickness of stave.

Thickness—2 in. for 10,000 gal. or less; 2½ in. up to 20,000 gal.; 3 in. for larger sizes. Finished thicknesses to be ¼ in. less than above.

Standard Inside Diameters of Round Tank—Every 6 in. from 3 to 9 ft.; every foot to 16 ft.; and every 2 ft. above 16 ft.

Standard Inside Depths of Round Tanks—

1 ft. 5 in.	4 ft.	6 ft. 5 in.	15 ft. 4 in.
2 ft.	4 ft. 5 in.	7 ft. 5 in.	17 ft. 4 in.
2 ft. 5 in.	5 ft.	9 ft. 5 in.	19 ft. 4 in.
3 ft.	5 ft. 5 in.	11 ft. 5 in.	21 ft. 4 in.
3 ft. 5 in.	6 ft.	13 ft. 5 in.	23 ft. 4 in.

Finish—Staves to be dressed both sides with edges machine jointed to proper bevel. Bottom to be dressed on top side only with edges machine joined and square and well doweled.

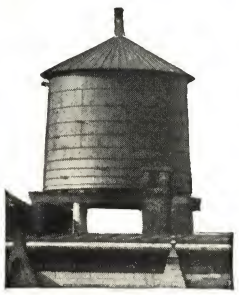
Hoops—Round hoops to be of wrought iron (not steel) with malleable iron draw lugs; sizes and spacing to give a factor of safety of 4 to 1 or greater if required.

We also manufacture rectangular tanks of all dimensions and capacities.

Our Research Department will be glad to go into any special problem with you.

Tank Covers—Standard wood covers are supported by trusses and rafters and covered with 1-in. sheathing and Ruberoid roofing.

Flat wood covers are also furnished for frost protection when specified.



Tank and Foundation, Colonial Hotel, York, Pa.

Tank Foundations

Realizing to what an extent the success of the tank depends on its foundation, we have made a careful study of tank foundations and have developed a series of standard designs which are not only of the proper strength but also use the minimum of material.

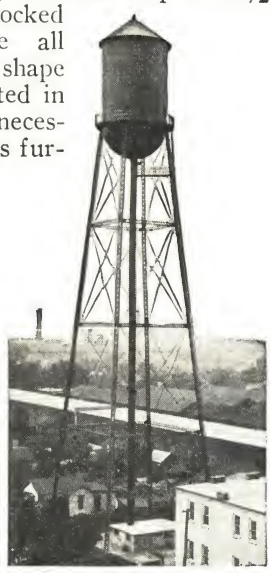
THE TANK WITH A REPUTATION
Caldwell
TANKS AND TOWERS
TRADE-MARK

Cypress Tank

Steel Tanks

Hemispherical bottom steel tanks for elevated water storage are, in the larger sizes, as inexpensive in first cost as wooden tanks. Steel tanks are being extensively used in industrial plants and are the tanks for storage of oils, gasoline, alcohol and certain chemicals.

Caldwell steel tanks are made in every shape and for all purposes. We furnish these tanks all riveted, welded, or riveted-welded as required. Tanks can be shipped completely assembled up to 10½ ft. in diameter. Knocked down tanks are all punched, bent to shape and accurately fitted in our shops, with necessary erecting rivets furnished.



150,000-gal. Tank, 205-ft. Tower, Studebaker Bros. Mfg. Co., South Bend, Ind.

Tank Towers

Standard steel towers are of the following types: tubular column and angle column for flat bottom wood and steel tanks; latticed channel column for wood and hemispherical bottom steel tanks.

Standard Heights—*Tubular*—Every 12 ft. from 15 ft. to 100 ft.

Angle—Every 10 ft. from 12 ft. up.

Latticed—Every 5 ft. from 20 ft. up.

Erected anywhere.

DIMENSIONS AND CAPACITIES OF STANDARD TOWER TANKS

Class towers	Capacity, gal.	Standard wood tanks: Diameter ft.	in.	Depth ft.	in.	Standard steel or galvanized tanks: Diameter ft.	in.	Depth ft.	in.
O tubular	1,000	6	6	4	5	6	0	5	0
or CC angle	1,500	6	6	6	5	6	6	6	6
A tubular	2,800	8	0	7	5				
or FF angle	3,000	8	0	8	5	8	0	8	0
B tubular	5,000	10	0	9	5				
or HH angle	6,000	10	0	11	5	10	0	10	0
C tubular	10,000	12	6	11	5	12	0	12	0
or JJ angle	12,000	12	6	13	5				
D tubular	15,000	14	0	13	5	14	0	14	0
or KK angle or LD latticed	17,000	14	0	15	5				
E tubular	20,000	16	0	13	5	16	0	14	0
or LL angle or LE latticed	22,000	16	0	15	5				
ES tubular or NN angle or LES latticed	25,000	16	0	17	4	16	0	18	0
F tubular	30,000	18	0	15	4	18	0	16	0
or PP angle or LF latticed	33,000	18	0	17	4				
FS tubular or LFS latticed	35,000	18	0	19	4	18	0	20	0
G tubular	36,000	19	6	17	4				
or LG latticed	40,000	19	6	19	4	20	0	18	0
LH latticed	50,000	22	0	17	4	22	0	18	0
	55,000	22	0	19	4	22	0	20	0

Hemispherical bottom steel tanks and towers are regularly made in capacities from 5,000 gal. up. Any of the above towers can be made to suit special conditions.

CHICAGO BRIDGE & IRON WORKS

Designers and Builders of Horton Steel Tanks and Plate Work

OFFICES

BIRMINGHAM, ALA., 1552 No. 50th Street
BOSTON, MASS., 1523 Consolidated Gas Building
BRIDGEBURG, ONT., 160 Janet Street
CHICAGO, ILL., 2120 Old Colony Building
CLEVELAND, OHIO, 2221 Midland Bank Building
DALLAS, TEX., 1212 Burt Building
DETROIT, MICH., 1522 Lafayette Building
HOUSTON, TEX., 1130 Electric Building
LOS ANGELES, CALIF., 1337 Pacific Mutual Building
MONTREAL, QUE., 2125 University Tower
NEW YORK, N. Y., 3122 Hudson Terminal
PHILADELPHIA, PA., 2606 "1616" Walnut Street Building
SAN FRANCISCO, CALIF., 1075 Rialto Building
SEATTLE, WASH., 4308 Smith Tower
TORONTO, ONT., 1425 Northern Ontario Building
TULSA, OKLA., 2428 Exchange Bank Building

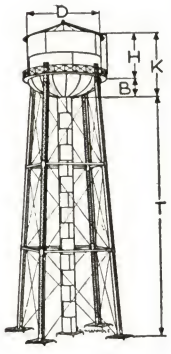
PLANTS: CHICAGO, BIRMINGHAM, GREENVILLE, PA. and BRIDGEBURG, ONT. (Horton Steel Works, Ltd.)

Products

TANKS: Elevated Steel Tanks, Steel Storage Tanks, Cylindrical Tanks (Riveted or Welded), Surge Tanks, Smokestacks, Standpipes, Gasholders, Riveted Pipe and Penstocks; STEEL PLATE WORK: including Bins and Bunkers, Kilns, Dryers. Breechings, Kettles, Ladles and Refinery Plate Work.

Standard Elevated Tanks

Standard capacities and detailed dimensions of ellipsoidal-bottom elevated tanks shown in table below. This type of tank has a relatively large diameter and shallow shell height. These proportions reduce the variation in water pressure between the upper and lower levels of the tank. The average head against which pumps must work to fill the tank is also less than with deeper tanks.



ELLIPSOIDAL-BOTTOM ELEVATED TANKS

Nominal capacity, gal.	Tank dimensions			
	D	H	B	K
15,000	15′6″	8′9 1/2″	3′7″	12′4 1/2″
20,000	15′6″	12′3 1/2″	3′7″	15′10 1/2″
25,000	18′0″	10′9 1/2″	4′5″	15′2 1/2″
30,000	18′0″	13′3 1/2″	4′6″	17′9 1/2″
40,000	20′0″	13′9 1/2″	5′0″	18′9 1/2″
50,000	22′0″	14′0″	5′6″	19′6″
60,000	24′0″	14′0″	6′0″	20′0″
75,000	26′0″	15′0″	6′6″	21′6″
100,000	28′8″	16′0″	7′2″	23′2″
125,000	28′8″	21′2″	7′2″	28′4″
150,000	34′0″	16′6″	8′6″	25′0″
200,000	38′0″	17′6″	9′6″	27′0″
250,000	40′0″	20′0″	10′0″	30′0″
300,000	41′0″	23′9″	10′3″	34′0″
400,000	47′0″	23′2″	11′9″	34′11″
500,000	51′0″	24′3″	12′9″	37′0″
600,000	54′0″	26′3″	13′6″	39′9″
750,000	54′0″	32′0″	18′0″	50′0″
1,000,000	60′0″	34′0″	20′0″	54′0″
2,000,000	80′0″	35′6″	26′0″	61′6″

Height to bottom—any even foot, except for capacities of 30,000 gals. or less, which are furnished in standard story heights. We will quote on nearest standard height to actual requirements.

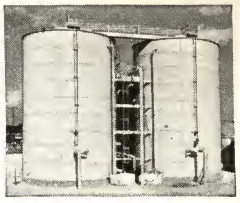
Ellipsoidal-bottom tanks are equipped with large risers made of steel plates and riveted directly to the tank bottom, eliminating the expansion joint. They are large enough to prevent freezing in cold climates and require no wooden frost casing.

We also build hemispherical-bottom and radial-cone bottom tanks.

Information Required for Making Quotations on Elevated Tanks

(1) Type of tank—ellipsoidal or hemispherical bottom. (2) Capacity in gallons. (3) Height of tank to bottom. (4) If tank is used for sprinkler service, state whether stock company, mutual or F.I.A. requirements. (5) Which, if any, of the following accessories are to be furnished: Overflow, Indicator, Tank heater. The accessories not furnished except when expressly specified.

Steel Storage Tanks



Storage Tanks

Field erected storage tanks built in capacities shown below; also in special sizes to meet particular requirements. Erected complete with experienced crews. Installations for petroleum products or other volatile liquids often equipped with floating or breather roofs. When asking quotations, state capacity, location, type of roof and openings required.

We also build spherical and spheroidal tanks for pressure storage.

Horton Standard Storage Tanks

Capacity, gal.	Diam.	Height	Capacity, gal.	Diam.	Height
10,000	12′ 3″	11′ 9″	150,000	30′ 0″	29′ 0″
20,000	17′ 4″	11′ 9″	175,000	32′ 3″	29′ 0″
25,000	16′ 0″	17′ 6″	200,000	34′ 6″	29′ 0″
30,000	17′ 4″	17′ 6″	250,000	38′ 6″	29′ 0″
40,000	20′ 0″	17′ 6″	300,000	42′ 0″	29′ 0″
50,000	22′ 4″	17′ 6″	400,000	49′ 0″	29′ 0″
60,000	21′ 3″	23′ 3″	500,000	54′ 3″	29′ 0″
75,000	23′ 9″	23′ 3″	600,000	60′ 0″	29′ 0″
80,000	24′ 6″	23′ 3″	750,000	66′ 3″	29′ 0″
90,000	26′ 0″	23′ 3″	1,000,000	77′ 0″	29′ 0″
100,000	27′ 4″	23′ 3″	1,500,000	94′ 0″	29′ 0″
125,000	27′ 4″	29′ 0″	2,000,000	108′ 4″	29′ 0″

Cylindrical Tank

Cylindrical Tanks

Shop assembled tanks built in standard or special sizes for ordinary liquid storage or pressure tanks for sprinkler service, butane storage, etc. May be had in either riveted or welded construction. When asking quotations state capacity, pressure if any, location, openings required and type of manhole if any.

Smokestacks

Self-supporting smokestacks erected anywhere with our own forces; guyed stacks furnished only from Birmingham and Bridgeburg, Ont., plants. Use our economical design. State diameter, height, location and breeching openings when asking quotations.

Steel Stack

Steel Plate Construction

Our service includes the design, fabrication and erection of all types of heavy steel plate structures, such as gasholders, steel pipe, steel bins, hoppers, digesters, refuse burners, kilns and dryers, bubble towers and other oil refinery platework.

PITTSBURGH-DES MOINES STEEL COMPANY

Steel Storage Tanks and Structural Steel

3432 Neville Island, PITTSBURGH, PA.

SALES OFFICES

NEW YORK, N. Y., 270 Broadway, Room 931
ATLANTA, GA., 638 Glenn Building
DES MOINES, IOWA, 933 Tuttle Street
CHICAGO, ILL., 1236 First National Bank Building
DALLAS, TEX., 1237 Praetorian Building
SEATTLE, WASH., 3140 L. C. Smith Building
SAN FRANCISCO, CAL., 339 Rialto Building

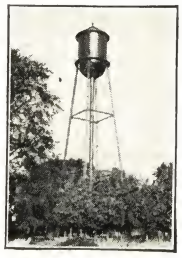
PLANTS: PITTSBURGH, PA. and DES MOINES, IOWA

Products

ELEVATED STEEL TANKS: for water storage and fire protection for buildings, plants, factories, golf clubs, private estates, municipalities and railroads.

Also Standpipes and Steel Reservoirs for water storage; Storage Tanks for oil, acid, gasoline, molasses and other liquids; Surge Tanks, either simple or differential for hydro-electric projects; Steel Stacks; Penstocks and Steel Pipe; Structural Steel and Plate Work.

TRADE-MARK



Homeopathic Hospital, Rochester, N. Y.
50,000 gal., 100 ft. to bottom

Fisher Body Corp., Detroit, Mich.
40,000 gal., 20 ft. to bottom

Oshkosh Country Club, Oshkosh, Wis.
40,000 gal., 75 ft. to bottom

Chesebrough Mfg. Co., McKees Rocks, Pa.
50,000 gal., 100 ft. to bottom

Standard Tanks and Towers

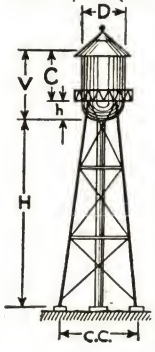
After thirty-eight years' experience, we have standardized the manufacture of our hemispherical bottom elevated tanks.

The designs most generally used are carried in stock, completely fabricated and ready for shipment.

Designs and materials for other standard tanks with capacities from 5,000 to 1,000,000 gallons are on hand, and these structures can be fabricated and shipped very promptly.

See the table below.

Note: Distance center to center of adjacent columns (c.c.) is .707D + .2 (H + ½ D) + 1½ in.



The length of one side of the square plot of ground required may be determined roughly by adding 10 ft. to the above formula.

Boldface type indicates tanks and towers completely fabricated and ready for immediate shipment. Designs and materials for the other sizes are on hand; these structures can be fabricated and shipped very promptly.

DIMENSIONS OF PITTSBURGH-DES MOINES STANDARD TANKS AND TOWERS

| Capacity in U. S. gals. | Range of head (V) ft. | in. | Diameter (D) ft. | H—Heights to bottom capacity line, ft.-in. | | |

CRANE CO.

Manufacturers of Water Supply Systems

836 South Michigan Avenue, CHICAGO, ILL.

For Branch Offices, see our Plumbing Section

Product

CRANE DEEP and SHALLOW WELL PUMPS and WATER SUPPLY SYSTEMS. For our pages on Water Heaters, Water Softeners, Plumbing Fixtures, and Gas Fired boilers, see Manufacturers' Index.

Description

CRANE Co. announces a new and better shallow well water system—*the type "S."* Here are the features which make it smoother running, quieter, more dependable, and more economical in operation.

(A) The power, water, and base ends of the new type "S" pump are cast in a single unit. This—besides giving a neater, more compact appearance—eliminates packing troubles presented by bolting joints together and insures perfect alignment of all working parts as all tapping, reaming, and drilling operations are performed in one jig.

(B) The casting of the air chamber is larger and heavier than in other pumps. This makes for quiet, even operation and permits the holding of 2 inches of water over the discharge valve. Thus the prime is held and suction pick-up is quickened. As the discharge line is connected to the pump instead of the air chamber, the discharge valve may be opened for inspection by removing only one nut.

(C) The vacuum chamber is extra large and bolted to the end of the suction valve deck. The size and design of the vacuum chamber reduces water flow resistance to a minimum and keeps the valves submerged and in prime. The chamber is tapped on either side permitting installation of suction line from either side. On the bottom, a brass drain plug simplifies draining the pump when it is not in use.

(D) Suction valve covers are held firmly in position by a clamp bar. The unscrewing of one nut permits the clamp bar and covers to be removed. No piping connections need be disturbed.

(E) Danger of leakage in valve seats is eliminated by the use of forged brass. Ample, unrestricted port-ways cut friction losses and stop water noises.

(F) The stuffing box, sized to accommodate generous packing, is of leak-proof forged brass.

(G) Split ring packings are easily installed on the piston rod. The packing material is of the best grade flax impregnated with oil and graphite.

(H) Positive, dependable Schraeder air valves are used. These are equipped with automatic air volume control when pressure tank is used.

(I) The cylinder liner is of heavy brass securely held in place. It fits tightly into the pump and extends its entire length. Incoming water does not travel around the liner.

(J) Only specially treated cup-leather of the highest quality is used on the plunger. No tools other than a screw-driver are required to remove the plunger for renewal as it is assembled in one complete unit.

(K) Valve springs are of durable phosphor bronze.

(L) The crank case is oil filled for splash lubrication to crank pin, wrist pin, and cross head. The oil capacity is unusually generous and renewal is simplified by a convenient spring top filler cup. Both spring cover and crank-case end cap are easily removed.

(M) The crank-shaft is of forged steel, machined, hardened, and accurately ground to size. It runs on two oversized felt seal ball bearings packed in special ball bearing grease. It requires hardly any attention, for convenience grease cup is provided on the crank-shaft housing and a large grease reservoir is located between the bearings.

(N) The pulley is constructed so that it functions as a fly wheel causing smoother operation. Its large diameter and the manner in which it is keyed to the shaft insure quiet operation.

(O) All valves, fittings, and working parts are of Crane quality.

General

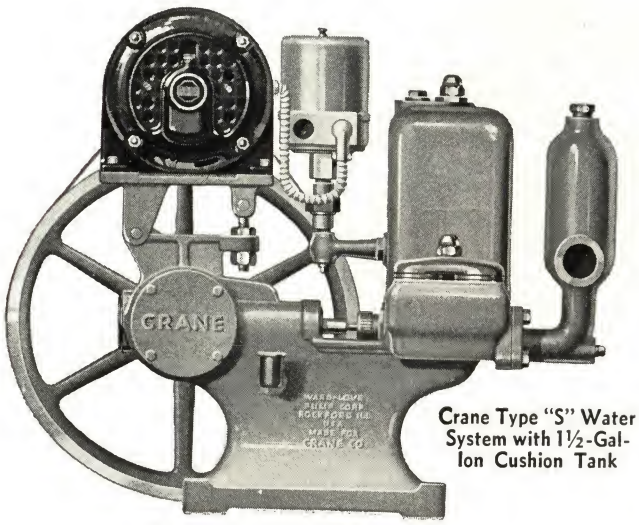
The Crane type "S" system is made in both reciprocating and duplex styles with capacities up to 500 gallons an hour to operate with both electric and gasoline power. Nationally advertised electric motors are standard, from ⅛ to ¾ horsepower; all connections are enclosed in BX flexible conduit.

The "S" system can be had with either a vertical of a horizontal tank. Vertical tanks can be specified in 42-53-82-120 gallon capacities. The horizontal tank is of 30 gallons. In this style, the motor is fixed to the tank, making a rigid unit, saving of head room and pleasing in appearance.

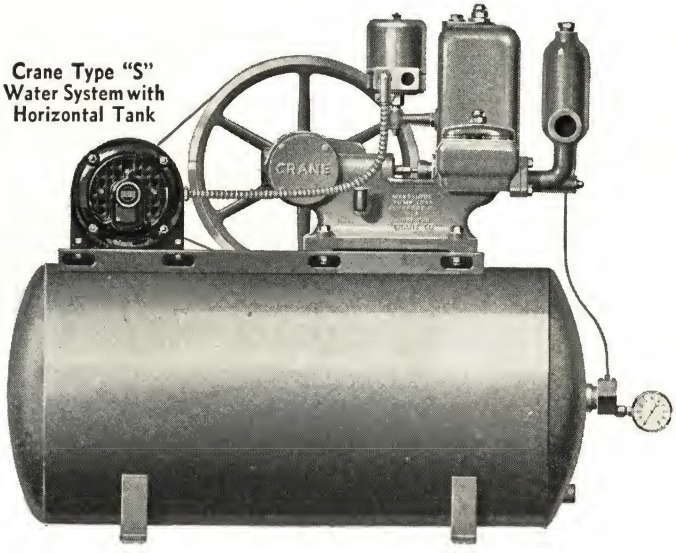
Type "S" Fresh Water Systems can also be had in either of two sizes to care for all ordinary requirements with 1½-gallon cushion tanks.

Deep Water Systems

CRANE Co. makes a complete line of deep water systems in sizes and capacities to meet practically every requirement.



Crane Type "S" Water System with 1½-Gallon Cushion Tank



Crane Type "S" Water System with Horizontal Tank

ESTABLISHED 1880

THE DEMING COMPANY

Manufacturers of Hand and Power Pumps for All Uses

SALEM, OHIO

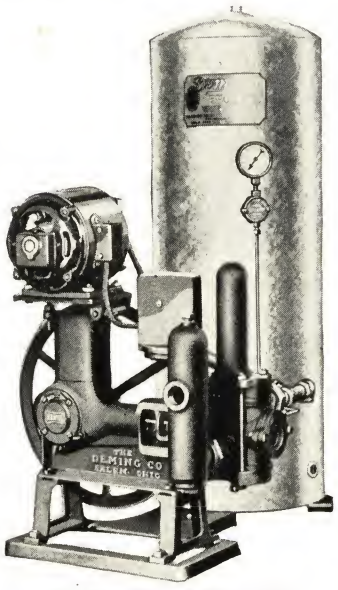
GENERAL AGENCIES IN ALL PRINCIPAL CITIES

Products

DEMING HYDRO-PNEUMATIC SYSTEMS, operated by Hand or Windmill, Gasoline Engine, or Electric Motor.
PUMPING MACHINERY, for operation by any power, including Centrifugal Pumps, Single and Double Acting Triplex Pumps for various services, Deep Well Power Working Heads, Artesian Well Cylinders.

Deming "Marvel" Water Systems

For shallow wells where the vertical suction lift is 25 ft. or less.



Marvel System No. 2095

The Deming "Marvel" Water Systems are entirely automatic in operation. They require little attention and only an occasional replenishment of oil in the crankcase.

The Timken roller bearings on the crank shaft and ball bearings on the crank end of the connecting rod, insure a smooth running, practically noiseless and long-lived pump.

Each "Marvel" Water System includes:

Pump, with electric motor, endless V-belt, air valve, vacuum chamber and double-pole automatic electric switch.

Galvanized steel tank, of capacity as listed in table below.

Pressure gauge.
Automatic air control.
Relief valve.
Pipe fittings to connect between pump and tank, as illustrated.
Cast iron sub-base or floor plate.

For complete information write for Water System Catalog "A."

When ordering, be sure to specify Fig. 2095, adding the size number as in the table below.

FIG. 2095 SIZES, WEIGHTS, ETC.

Size No.	Cap. of pump, gal. per hr.	Cap. of tank, gal.	*Hp. of motor	Max. working pressure, lb.	Ship. weight of system, lb.
1 – 42	265	42	1-6	50	230
1½- 42	360	42	¼	50	240
2 – 42	480	42	1-3	50	275
2 –120	480	120	1-3	50	410
2½-120	600	120	½	50	425

*Regularly furnished for 110-220 volt, 60-cycle, single phase, a-c. When current characteristics differ, be sure to so state, when ordering.

Deming "Oil-Rite" Double Acting Piston Pump

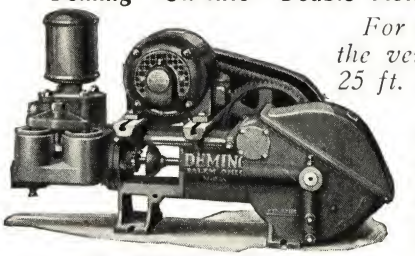


Fig. 1809—Size 2½x3 In.

For shallow wells where the vertical suction lift is 25 ft. or less.

Fig. 1809 is a single cylinder, double acting power piston pump, which is especially adapted for open or pneumatic tank service.

The enclosed type of crankcase is designed to meet an increasing demand for a pump which has as few exposed working parts as possible, thereby securing maximum safety of operation as well as flood lubrication.

This pump is made in five sizes with a capacity range of from 9 to 80 gal. per minute, meeting a great variety of pumping requirements, where the vertical distance to the lowest water level does not exceed 25 ft. and the total combined suction and discharge head does not exceed 100 lb. See table below.

Any one of the five sizes of Fig. 1809 pumps can be mounted together with motor, tank, fittings, etc., to make a complete water system. For detailed information ask for our Water System Catalog "A."

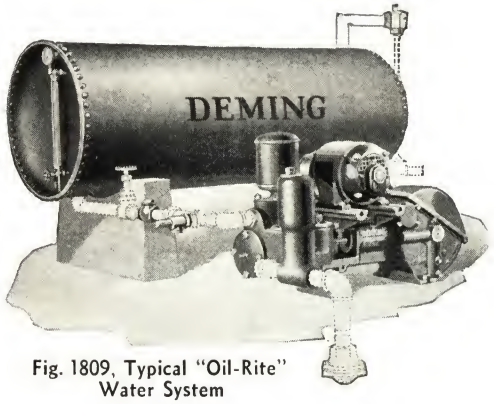


Fig. 1809, Typical "Oil-Rite" Water System

FIG. 1809 SIZES, WEIGHTS, ETC.

Piston		Gal. per min. at max. speed	Maximum working pressure, lb.	Pipe connections, in.		Weight, lb.
Diam., in.	Stroke, in.			Suction	Discharge	
2½	3	9.2	100	1¼	1¼	190
3	3½	15.5	100	1½	1½	320
4	4½	33.5	100	2	2	502
5	5	50.0	100	2½	2½	725
6	6	80.0	100	3	3	1060

Gear ratio, all sizes 5 to 1.

Deming "Oil-Rite" Deep Well Water System

For use in wells where the water level is at a greater depth than 25 ft.

The Deming "Oil-Rite" Water System is especially adapted for pumping water from deep wells, for office buildings, suburban homes, farms, factories, etc. All working parts, with the exception of the pulleys, are fully enclosed assuring maximum safety of operation. Owing to the fact that there are only six principal moving parts, the necessity of replacements due to wear is reduced to a minimum.

The arrangement of this system permits the tank of 42 or 120-gal. capacity to be located at any convenient place.

Furnished with either V-belt drive or silent chain drive.

For larger sized systems or different types of drive, write for Deming Water System Catalogue "A."

Each system shown in the table below includes:

One 6-in. or one 10-in. Fig. 1062 "Oil-Rite" pumping head, with drive as selected, together with air compressor.

Fig. 1062 "Oil-Rite" Water System

42-gal. galvanized tank with 6-in. stroke system.

120-gal. galvanized tank with 10-in. stroke system.

Double-pole automatic pressure switch.

Electric motor of sizes shown in table below.

Brass-lined well cylinder of sizes shown in table below.

Pressure gauge.

Water gauge.

Combination union and check valve.

Gate valve; relief valve.

Piping and wood rod are not included because their lengths vary in each installation; they should be ordered separately to meet the requirements.

Order by system number as given in table below.

Pipe sizes, in.		Size wood rod recommended, in.	Cylinder, brass lined		Gal. per hour	Maximum lift in well, ft., with 40-lb. tank pressure	Hp. *motor furnished	System numbers	
Drop	Discharge		Inside diam., in.	Outside diam. of pipe coupling, in.				With Type TV drive (V belt)	With Type TD drive (silent chain)
6-in. Stroke Head with 42-gal. Galvanized Tank									
1 1/2	1	1 1/8	1 3/8	2 11/32	100	220	1/2	6101	6003
1 1/2	1	1 1/8	1 3/8	2 11/32	100	375	3/4	6111	6013
2	1	1 1/8	1 13/16	2 7/8	180	120	1/2	6121	6023
2	1	1 1/8	1 13/16	2 7/8	180	225	3/4	6131	6033
2	1	1 1/8	1 13/16	2 7/8	180	325	1	6141	6043
2 1/2	1	1 1/8	2 1/4	3 9/32	275	50	1/2	6151	6053
2 1/2	1	1 1/8	2 1/4	3 9/32	275	120	3/4	6161	6063
2 1/2	1	1 1/8	2 1/4	3 9/32	275	170	1	6171	6073
10-in. Stroke Head with 120-gal. Galvanized Tank									
2 1/2	1 1/4	1 3/8	2 1/4	3 9/32	405	160	1 1/2	10101	10003
2 1/2	1 1/4	1 3/8	2 1/4	3 9/32	405	245	2	10111	10013
3	1 1/4	1 3/8	2 3/4	4	610	75	1 1/2	10121	10023
3	1 1/4	1 3/8	2 3/4	4	610	130	2	10131	10033
3 1/2	1 1/2	1 5/8	3 1/4	4 17/32	855	30	1 1/2	10141	10043
3 1/2	1 1/2	1 5/8	3 1/4	4 17/32	855	70	2	10151	10053
4	1 1/2	1 5/8	3 3/4	5 1/16	1140	30	2	10161	10063

*Single phase, 60-cycle, 110-220-volt motor regularly furnished. If current characteristics are different, be sure to specify when ordering. Frostproof set length can be furnished on any of above systems at extra cost. Crank gear ratio 7 to 1 on all sizes.

Deming-Mueller Side Suction Centrifugal Pumps

Equipped with ball bearings.

These pumps have exceptionally high efficiencies, are ruggedly built throughout and designed for economical operation.

The deep groove ball bearings take up the radial and thrust load. The impeller is of the open type and has the non-clogging feature. The inside bearing is a bronze bushing of the oilless type, insuring long life. The casing is of the regular volute type with ample strength to withstand a working pressure of 125 lbs. Motor driven units have base plate with center and side canals located near top instead of at bottom of base.

For complete information write for Centrifugal Bulletins Nos. 4001 and 4100.

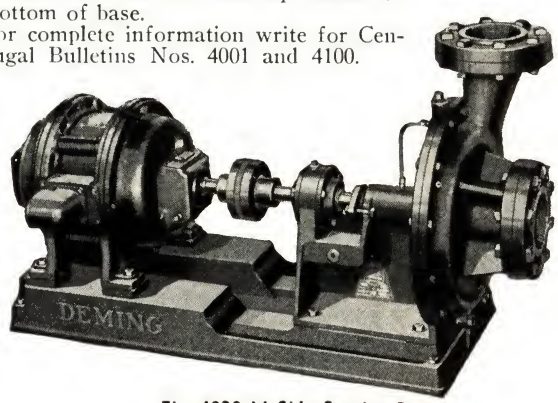


Fig. 4030-M Side Suction Pump

Deming-Mueller Double Suction Centrifugal Pumps

Equipped with ball bearings.

This line of double suction horizontally split casing pumps represents the latest achievement of this Company in design, efficiency and construction.

To insure perfect alignment of the rotating parts the bearing housings are cast integral with the lower half casing. The pumps are fully ball bearing equipped. Impellers are of the double suction enclosed type and are accurately balanced on a dynamic balancing machine. Double water seal connection from the discharge of the volute to the stuffing boxes. Shafts are of high grade alloy steel, turned and ground.

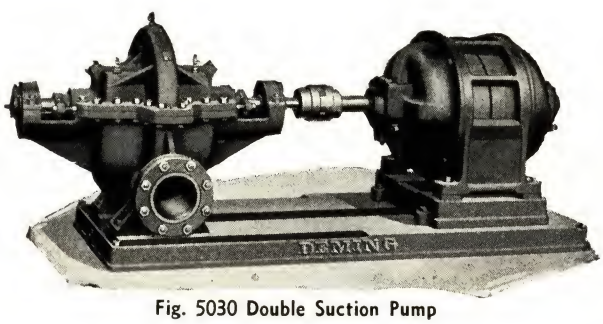


Fig. 5030 Double Suction Pump

THE F. E. MYERS & BRO. COMPANY

Manufacturers of Private Water Supply Systems

ASHLAND, OHIO

For Myers Power Pumps, see Manufacturers' Index

Myers Electric Driven Pneumatic and Open Tank Water Supply Systems

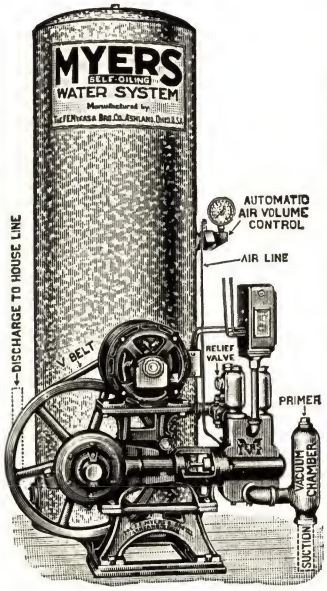


Fig. 2510. Myers Electric Driven Pneumatic Water Supply Outfit

No. 906AT—Capacity, 250 gal. per hour. Outfit consists of Myers electric house pump with vacuum chamber; relief valve, automatic air volume control valve, air valve, pressure controller, endless belt and ⅛ hp., 110-volt, 60-cycle, single-phase a-c. motor or 32, 110 or 220-volt d-c. motor, with 42-gal. galvanized tank, base, pressure gauge and fittings, completely assembled ready to install. Suction and discharge are ¾ in. Floor space, 25x29 in.; height, 52 in.

No. 909AT—Capacity, 340 gal. per hour. Same as No. 906AT, except it is equipped with ¼ hp. motor, and the suction is 1 in., while the discharge is ¾ in.

Myers Self-Oiling Deep Well Water System

This Myers water system is designed for wells over 24 ft. in depth.

It is a complete unit, automatically controlled, being composed of a Myers self-oiling deep well working head, ½ hp. motor and other equipment as listed herewith.

This is a large capacity outfit, the volume of water being governed by the depth of the well and the size of the lower cylinder used.

Myers self-oiling double acting electric house pumps are designed for pumping water from shallow wells, cisterns, springs, lakes or other sources not more than 22 ft. in depth and forcing it into pneumatic tanks or into open gravity tanks. Operate on any electric light or power current. An automatic pressure controller is furnished with pneumatic tank outfits; air chambers eliminate water hammer; relief valve protects pump and motor from excessive pressure; power end has long self-oiling, easily renewable bearings. Automatic control eliminates water-logged tanks.

Simple power transmission; few working parts fully enclosed; runs in oil; water end has liberal and direct waterways; large valves. These features result in high efficiency, long life and large pumping capacity at low current cost.

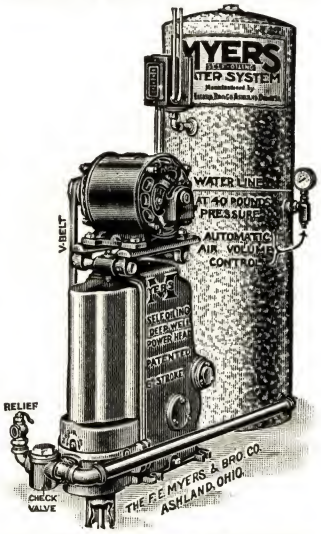


Fig. 2700. Myers Self-Oiling Deep Well Water System

With V-belt or chain drive.

No. V2950AMT, complete as illustrated, with ½ hp. 110-220 volt, 60-cycle, single-phase a-c. motor, automatic control pressure gauge, V-belt, electric switch and 42-gal. galvanized tank

No. V2950AMTS, as above, with 4-ft. anti-freezing set length. Lower cylinder and down or suction pipe not included with above outfits

Myers "Direct from Well" Water Supply System

The Myers direct water system will supply an abundance of fresh water direct from the well. No storage tank is used. The opening of a faucet after discharging 1 gal. of water immediately starts the pump. Current is consumed only when water is drawn. The ordinary leakage of a defective faucet will not start the pump, as there is a gallon of water in reserve to take care of minor defects in the plumbing.

Shallow Well Direct Water Supply Outfit—Fig. 2632 direct water system is suitable for shallow wells not more than 22 ft. in depth. It will furnish 500 gal. of water per hour and has sufficient capacity to supply water for lawn sprinkling.

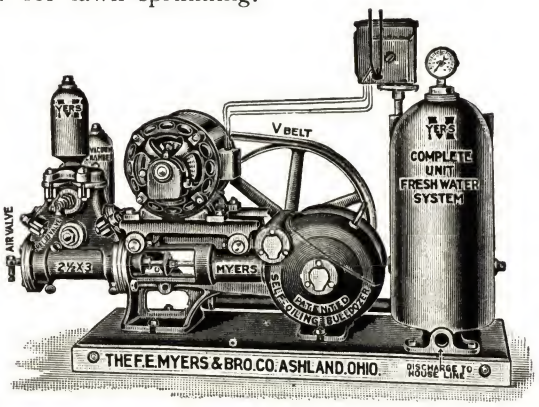


Fig. 2632. Myers Shallow Well Direct Water Supply Outfit

Capacity, 500 gal. per hour. Width, 15 in.; length, 45 in.; height, 25 in. Suction tapped 1¼ in.

With V-belt or silent chain drive.

No. V922AM outfit consists of Myers No. 912AM self-oiling Bulldozer 2½x3-in. power pump, wood base, ½ hp. 110-220 volt 60-cycle single-phase a-c. motor, V-belt, pressure gauge, electric switch and air chamber for discharge

Deep Well Direct Water Supply Outfit—Fig. 2709 direct water supply system is suitable for deep well service where depth is greater than 22 ft. Operates in same manner as Fig. 2632 outfit except that it is fitted with a Myers deep well self-oiling power working head. Will furnish 200 gal. of water per hour with 2-in. cylinder, 300 gal. with 2½-in. cylinder, and 450 gal. with 3-in. cylinder, and has sufficient capacity to supply water for lawn sprinkling at 30 lb. pressure.

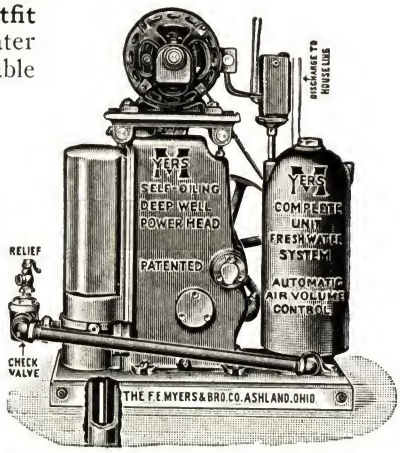


Fig. 2709. Myers Deep Well Direct Water Supply Outfit with Silent Chain Drive

Width, 15 in.; length, 32 in.; height, 35 in. Suction tapped 2½ in. and bushed to 1¼ in. Discharge, 1 in.

No. V2955AM outfit consists of Myers self-oiling power working head, ½ hp., 110-220-volt, 60-cycle single-phase a-c. motor, V-belt, belt tightener, pressure gauge, electric switch, air chamber and wood base

AMERICAN STEAM PUMP COMPANY

Single and Multistage Centrifugal Pumps; Simplex and Duplex Steam Pumps

BATTLE CREEK, MICHIGAN, U. S. A.

NEW YORK OFFICE, 17 Battery Place CHICAGO OFFICE, 926 Monadnock Building
SALES AND SERVICE AGENCIES THROUGHOUT THE WORLD

Products

CENTRIFUGAL and STEAM PUMPING EQUIPMENT of all types, including:

Centrifugal Pumps (Ball Bearing) Single and Two-stage Split Case, Bulletins 61 and 64.

Centrifugal Pumps (Babbitted Bearing), Single Stage, Split Case, Bulletin 38.

Centrifugal Pumps, Multistage, Split Case, Bulletins 44 and 53.

Steam Pumps, Simplex and Duplex, Bulletins 24, 26 and 28.

Automatic Condensation Pumps and Receivers, Bulletins 27 and 32.

Automatic Bilge Pumps and Sewage Ejectors, Bulletin 41.

Also Air Compressors and Jet Condensers.

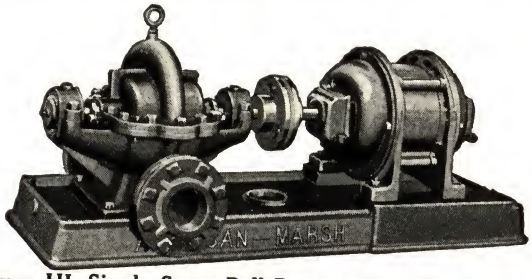
Centrifugal Pumps

Built both single and multistage, a complete line for low, medium and high heads to meet practically all requirements. Furnished split or solid case, single or double suction, with enclosed or open impellers, for direct drive from motor, turbine, gas engine, etc., and for belt drive. Recommended for all classes of pumping. Special pumps can be furnished for special conditions.

New Type HL (low head) ball bearing pump specially designed for 1750 r.p.m. motor drive, offering unusually high efficiency, and a non-overloading characteristic which permits the use of smaller, less expensive motors. Also new Type HS (high head) ball bearing pump for 3450 r.p.m. motor drive, offering same operating advantages. Both pumps are fully bronze fitted.

Type HBM single stage pumps and all of the multistage pumps are equipped with babbitted, ring-oiling bearings. Special balance piston feature eliminates thrust on multistage pumps.

On all American-Marsh centrifugal pumps, impellers are hydraulically and dynamically balanced.



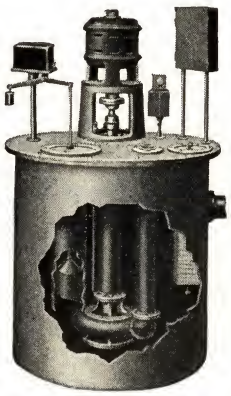
Type HL Single Stage Ball Bearing Centrifugal Pump

Type HBM Centrifugal Pump

Automatic Bilge Pumps and Sewage Ejectors

Designed for elevating sewage and drainage water from points below sewer levels. Electrically driven and entirely automatic in operation—pump runs only as required to keep water below set level in sump basin.

Built in sizes handling 5 to 500 g.p.m., in both single and duplex types. Simple in design and all parts extra heavy for dependable service without attention.

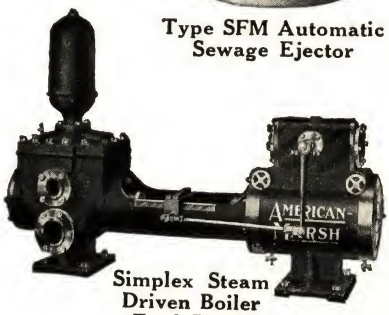


Type SFM Automatic Sewage Ejector

Steam Pumps

As one of the largest builders of steam pumps, this company offers a complete line in both simplex and duplex types with sizes in each type to meet all requirements.

Simplex pumps are fully bronze fitted. Steam valve is of the balanced piston type with semi-rotative disc auxiliary valve—no internal stuffing boxes, no tappets or slide valves. Construction extra heavy, resulting in unusually low upkeep cost.



Simplex Steam Driven Boiler Feed Pump

Duplex pumps have special steam ends that insure maximum economy and quiet operation at high speeds. Built with fittings to meet service conditions.

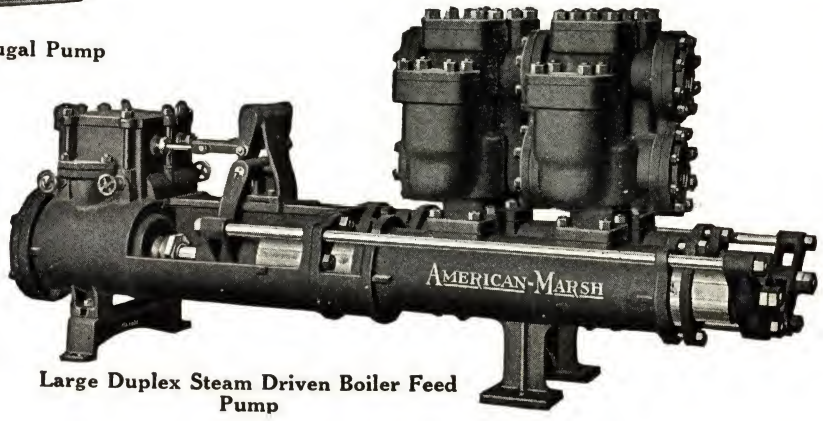
Automatic Condensation Pumps and Receivers

A complete line in both centrifugal and steam driven types with sizes to meet every heating requirement.

Operation entirely automatic, using control equipment which is standard and dependable.

Engineering Service

We welcome inquiries in connection with any pumping problem. Engineering recommendations furnished without obligation. Write for Bulletins.



Large Duplex Steam Driven Boiler Feed Pump

AMES PUMP COMPANY, INC.

DIVISION OF AMERICAN LOCOMOTIVE COMPANY

30 Church Street,

NEW YORK, N. Y.

BRANCH OFFICES IN PRINCIPAL CITIES

The Correct Way to Specify Vacuum Heating Pumps

Vacuum Pump Unit—

Provide and install where shown and noted in the plans a combined return line vacuum and boiler feed pumping unit as herein specified.

( ) Vacuum pump unit of the [single] [duplex] assembled manifold type.

Each pump shall be of the balanced multirotor type fitted with bronze internal parts, bronze split stuffing box glands and rustproof ground steelshaft. Impellers shall be of the enclosed centrifugal type mounted between ball bearings and driven by:

( ) volt, ( ) current, ( ) phase, ( ) cycle, 40° C. ball bearing motor which shall operate *not* in excess of 1800 r.p.m.

Each pump shall have a rated capacity of ( ) sq. ft. of equivalent direct radiating surface and a water capacity, from 3-in. vacuum, of not less than three times the system condensate (based on ¼ lb. per sq. ft. hour) and deliver same against ( ) lbs. at the pump discharge.

Each pump is to normally operate between 3 and 8-in. vacuum in the return line of the heating system and at 3-in. vacuum shall have an air capacity of not less than ½ cu. ft. per minute for each 1000 sq. ft. of equivalent direct radiation.

Each pump, with suction stop valve closed, shall be capable of producing in the accumulator chamber of the unit a vacuum of not less than 26 ins. (referred to 30-in. barometer) at a corresponding condensate temperature. The unit shall also be tight against *air leakage* to the extent that when shut down at 26-in. vacuum, with return inlet blanked, it shall require not less than 5 hours for vacuum in accumulator chamber to recede to 3 ins.

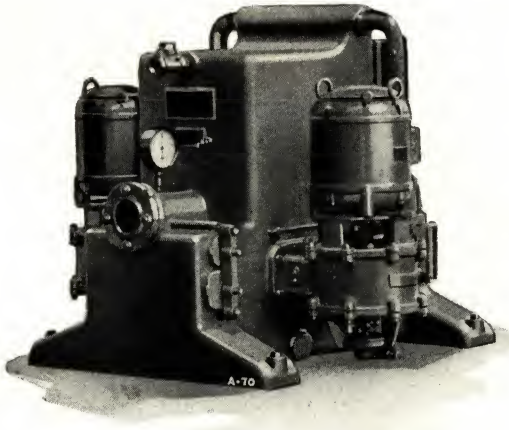
The unit is to be of the assembled manifold type complete with pump (duplex—2 pumps) cast iron air separating and condensate accumulator chambers, suction strainer, compound gauge, water level gauge, thermometer and companion flange for suction and discharge. Vacuum return inlet to float controlled condensate accumulator chamber shall be not more than 18 ins. above top of foundations.

Automatic and manual control shall be included and consists of vacuum regulator with "On" and "Off" switch (duplex—2 vacuum regulators) and seamless bronze float with float switch controlling an automatic motor starter. Each starter shall also be equipped with manual control switch to permit continuous operation. All electrical starting equipment shall be enclosed, wired in metal conduit, and mounted on the unit by the pump manufacturer.

The electric control, piping and wiring shall be so arranged that either pump of the duplex unit can be operated, automatically or manually, independent of the other, or both pumps can be operated together as desired by the operator.

Vacuum heating pump equipment is to be erected and valved in accordance with manufacturer's drawings which must be approved by ( ) before same is ordered by the contractor.

Type "E" Single and Duplex Assembly



Type "E" Duplex

Low Return Units—

6,000, 10,000, 16,000, 26,000, 40,000 sq. ft. equivalent direct radiation.

10, 20, 30, 40, 50 lbs. discharge pressures.

1800 r. p. m. maximum motor speed.

Write for illustrated bulletin No. 600 for details of construction and operation.

Type "F" Single and Duplex Assembly

Type "F" Duplex

Low Return Units—

65,000, 90,000, 120,000, 180,000 sq. ft. equivalent direct radiation.

10, 20, 30, 40, 50 lbs., discharge pressures.

1800 r.p.m. maximum motor speed.

Write for illustrated bulletin No. 700 for details of construction and operation.

A Few Prominent Ames Pump Installations

New York

City Bank, Farmers Trust Bldg., New York
Irving Trust Co. Bldg., New York
New York County Trust Bldg., New York
Rockefeller Institute, New York
London Terrace Apartments, New York
Woodstock Tower, New York
Windsor Tower, New York
New York Trade School, New York
Central Hanover Bank & Trust Co., New York
City Hall, Rochester
Fisher Body Corp., Tarrytown

Massachusetts

New Tower Bldg., Boston
Middlesex County Hospital, Boston
Radcliffe College, Cambridge

Connecticut

Yale University, New Haven
Taft Hotel, New Haven

Pennsylvania

Lincoln-Liberty Bldg., Philadelphia
Pennsylvania R. R. Broad Street Station, Philadelphia
1616 Walnut Street Bldg., Philadelphia
General Steel Castings Corp., Philadelphia
State Office Bldg., Harrisburg
Zembo Temple, Harrisburg
Bell Telephone Bldg., Pittsburgh
American Bridge Co., Pittsburgh

District Columbia

House of Representatives Office Bldg., Washington
Holy Name College, Washington
Roosevelt High School, Washington

Ohio

Ohio Edison Bldg., Youngstown
National Screw Co., Cleveland
White Motor Car Co., Cleveland
Fisher Body Corp., Cleveland
Higbee Department Store, Cleveland
Crosley Radio Co., Cincinnati

Indiana

Marmon Motor Co., Indianapolis

Michigan

Detroit Steel Products Co., Detroit
Fisher Body Corp., Detroit
State Office Bldg., Lansing
Olds Motor Co., Lansing
Reo Motor Co., Lansing
Traverse City Hospital, Traverse City

Illinois

Stevens Bros. Bldg., Chicago
N. Shur Bldg., Chicago
Michigan Garden Apartments, Chicago

Wisconsin

University of Wisconsin, Madison

Minnesota

Northern States Office Bldg., Minneapolis

New Jersey

Convention Hall, Asbury Park

Iowa

Cedar Rapids College, Coe

Maryland

Roland Park School, Baltimore

Maine

Pownal State School, Pownal

Missouri

City Hall, Kansas City
Fisher Body Corp., Kansas City
Curtis Robertson Airplane Co., St. Louis

Washington

Shell Oil Co. Bldg., Seattle
Fisher Body Corp., Seattle

TELEPHONE
Brunswick 4110

CHICAGO PUMP COMPANY

2331 Wolfram Street, CHICAGO, ILL.

Alabama
BIRMINGHAM, Carl P. Leibold, 239 Brown-Marx Building
Arizona
PHOENIX, John W. Ladlow, Box 1784
California
LOS ANGELES, Smith, Booth, Usher Co., 228 Central Avenue
SAN FRANCISCO, Jenison Machinery Co., 58 Fremont Street
Colorado
DENVER, A. Wallace & Co., 3060 W. 32nd Avenue
Connecticut
HARTFORD, Stevens Equipment Co., 252 Asylum Street
District of Columbia
WASHINGTON, Jas. P. Marsh, 2539 Penna. Avenue, N. W.
Florida
COCONUT GROVE, R. H. Magruder Co., Box 186
JACKSONVILLE, G. E. Osgood, 928 Osceola Street
TAMPA, H. G. Carter, 504 E. Lafayette Street
Georgia
ATLANTA, R. J. Welsh, 917 Healy Building
SAVANNAH, Bergen & Peck, 204 Mendel Building
Illinois
PEORIA, C. E. Kallister Co., 1303 Peoria Life Building
ROCKFORD, Chas. C. Trainer, 603 Gas Electric Building
Indiana
ELKHART, F. W. Forward, 520 West Boulevard
EVANSVILLE, Foster Sales & Equipment Co., 2005 E. Mulberry Street
FT. WAYNE, Domestic Sales Co., 2016½ Fairfield Avenue
INDIANAPOLIS, Hoover-Whittington, 311 No. Alabama Street
Iowa
DAVENPORT, Allen R. Boudinot, 904 E. 14th Street
DES MOINES, E. B. Carr, 627 Insurance Exchange Building
Kansas
WICHITA, J. M. O'Connor, 1100 E. Douglas Street
Kentucky
LOUISVILLE, Wallace Hoeing, 1342 Starks Building
Louisiana
NEW ORLEANS, R. K. Rothrock, 2204 Jefferson Avenue
SHREVEPORT, Ace Combustion Engineering Co., 222 Milan Street
Maryland
BALTIMORE, J. J. Smith, 3620 Ednor Road
Massachusetts
BOSTON, Monahan Pump Equipment Co., 10 So. High Street
Michigan
DETROIT, Chicago Pump Co., 3-128 General Motors Building
GRAND RAPIDS, C. H. Alexander, 313 Allen Street, N. W.
SAGINAW, Richard L. Kimble, 302 Gage Street
Minnesota
MINNEAPOLIS, The Cash Co., 603 Washington Avenue, South
Mississippi
JACKSON, H. A. Paine, P. O. Box 13
Missouri
KANSAS CITY, J. M. O'Connor, 3543 Broadway
ST. LOUIS, Foster Mechanical Equipment Co., Chemical Building
SPRINGFIELD, Harry Cooper Supply Co., 223 E. Water Street
Montana
BUTTE, Sullivan Valve & Engineering Co., 910 So. Arizona Street
Nebraska
OMAHA, H. G. Ragan, 356 Brandeis Theatre Building
New Jersey
NEWARK, R. B. Brown, 24 Commerce Street
New York
BUFFALO, W. G. Krueger, 91 Tremont Street, Kenmore
NEW YORK, Chicago Pump Co., 79 Madison Avenue
ROCHESTER, Chas. P. Hery, 244 Cutler Building
SYRACUSE, J. M. McCrea, 153 Oakland Street
North Carolina
CHARLOTTE, F. L. Bunker, P. O. Box 192
GREENSBORO, F. L. Bunker, No. Carolina Building
Ohio
CINCINNATI, Edwin J. Richard, 527 Union Central Building
CLEVELAND, Chicago Pump Co., Plymouth Building, 2036 E. 22nd Street
COLUMBUS, John T. Seiders, 83 So. High Street
DAYTON, Drake Engineering Co., 915 Reibold Building
TOLEDO, M. C. Griffin, 2940 Broadway
Oklahoma
OKLAHOMA CITY, Oklahoma Heating Supply, P. O. Box 31
TULSA, Wm. G. Craig, 244 Kennedy Building
Oregon
PORTLAND, Northwestern Sales Co., Security Building
Pennsylvania
ERIE, Robt. S. Mayer, 1223 W. 8th Street
PHILADELPHIA, Culbert-Whitby Co., 2019 Rittenhouse Street
PITTSBURGH, F. W. Rockstraw Co., Henry W. Oliver Building
Tennessee
CHATTANOOGA, Southern Sales Co., 318 Volunteer Life Building
KNOXVILLE, C. F. Sexton, 705 General Building
MEMPHIS, Southern Sales Co., 242 Madison Avenue
NASHVILLE, Southern Sales Co., 117 Fifth Avenue, No.
Texas
AMARILLO, Clowe & Cowan
DALLAS, Macil Engineering Co., 1405 Young Street
FT. WORTH, Macil Engineering Co., 408 First National Bank Building
HOUSTON, Dalton-Heyne Co., 312 Caroline Street
SAN ANTONIO, Dalton-Heyne Co., 30th Floor, Smith Young Tower
Utah
SALT LAKE CITY, L. Brandenburger, 153 West Second Street, So.
Virginia
RICHMOND, Virginia Equipment & Supply Co., Rockridge and High Point Streets
Washington
SEATTLE, F. W. Carlson, 959 Harrison Street
West Virginia
CHARLESTON, Kanawha Equipment Co., 613 Summers Street
Wisconsin
LA CROSSE, Bernard E. Hovind, 135 So. 19th Street
MILWAUKEE, Allan Engineering Co., 808 No. Market Street
Canada
MONTREAL, P. Q., Plessisville Foundry Co., 336 St. James Street
TORONTO, ONT., Albert G. Hill, 45 Jarvis Street
VANCOUVER, B. C., A. H. Blake & Co., 119 Pender Street
WINNIPEG, MAN., F. S. Murdoch, Canadian News Building
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ST. JOHNS, NEWFOUNDLAND, A. J. Joy, P. O. Box E1274

Products

Complete line of ELECTRIC CENTRIFUGAL PUMPS.
"AUTOMATIC ALTERNATORS" for Duplex Pumps
"FLUSH KLEEN" and "NON-CLOG" SEWAGE EJECTORS; BILGE PUMPS; CELLAR DRAINERS.
CONDENSATION PUMPS, Horizontal and Vertical.
"CONDO-VAC" RETURN LINE VAC. and BOILER FEED PUMPS.
HORIZONTAL SPLIT SHELL CENTRIFUGAL PUMPS for Fire, Booster, Sprinkler-filling, House Circulating, Brine, Sugar House and Various Commercial Services.
PNEUMATIC and TANKLESS WATER SYSTEMS.

Fig. No. 1871

Fig. No. 1870

"Little Giant" Automatic Electric Cellar Drainer

The "Little Giant" is a small bilge pump made primarily to drain cellars. "Little Giant" is complete including cord and plug for connecting to light socket. Fig. 1870 is provided with tripod legs for standing on cellar floor. Fig. 1871 is provided with a floor plate for use with a basin. Either style is portable. Either style will fit in a 3-ft. deep tile, 15 in. in diameter where Fig. 1870 is used, and 12 in. in diameter, when Fig. 1871 is used.

CAPACITIES AND HEADS FOR "LITTLE GIANT"

1750 r.p.m. (d.c. or 60 cycle a.c.)				1450 r.p.m. (25 or 50 cycle a.c.)			
Capacity, g.p.m.	Head, ft.	Capacity, g.p.m.	Head, ft.	Capacity, g.p.m.	Head, ft.	Capacity, g.p.m.	Head, ft.
10	22	35	14	10	17	35	10
20	20	40	12	20	15	40	7
25	18	45	8	25	15		
30	16	50	5	30	12		

"Automatic Alternator" for Duplex Pumps

Fig. C-73

The "Automatic Alternator" is a simple mechanical device which automatically alternates the operation of any duplex set of electric motor driven pumps.

The Alternator automatically transfers the operation from one pump to another, thereby equalizing the wear on both pumps, and increasing the life of both pumps.

It prevents rusting of idle pump, thereby avoiding constant blowing of fuses, and possible burning out of motors and starters.

It keeps both pumps in good running order, thereby maintaining a much higher efficiency, and saving operating expenses and repair bills.

It will allow both pumps to operate simultaneously in the event the returns are in excess of capacity of one pump.

Bulletin 142 gives complete information and specifications.

N-Type Circulating Pumps

N-Type pumps are compact, close coupled, 3-point suspended units, of heavy, substantial construction, for medium and small capacities and heads. N-Type pumps are ideally adapted for use with, and as a part of other equipment requiring a liquid pump. Heavily constructed—200 lbs. pressure can be placed on the suction. **Ask for bulletin 108.**

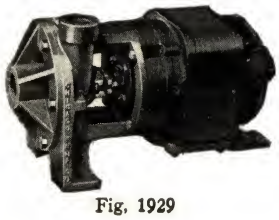


Fig. 1929

"Flush-Kleen" Sewage Ejector with Self-cleaning Strainer

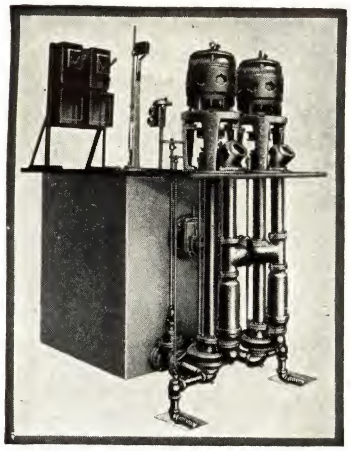


Fig. 2045
Duplex "Flush-Kleen" Ejector, Dry Basin Type

Three Major Claims for "Flush-Kleen" Sewage Ejector—(1) The "Flush-Kleen" Sewage Ejector will discharge larger and heavier materials than other ejectors of similar size and horsepower.

(2) The "Flush-Kleen" Sewage Ejector will pump successfully into the sewer any sewage or foreign material which can run into basin from sanitary waste lines.

(3) The "Flush-Kleen" is equipped with an "Automatic Alternator." This operates first one pump and then the other. It is the only device of its kind, and is manufactured solely by CHICAGO PUMP COMPANY.

Rags, Sticks, Papers, Cannot Clog a "Flush-Kleen"—Sewage Never Touches the Impeller—The "Flush-Kleen" Sewage Ejector eliminates the objectionable work of emptying and cleaning strainer baskets. Sewage is automatically strained as it enters the basin. Strainer is cleaned on each operation of pump by a reversal of flow in the discharge pipe. Sewage may flow into basin continuously whether pumps are idle or operating. When the inflow becomes too great for one pump to handle, the second pump automatically cuts in.

Made with square or round basins, either submerged or dry basin type.

Bulletin 125 gives complete tables, layouts and specifications.

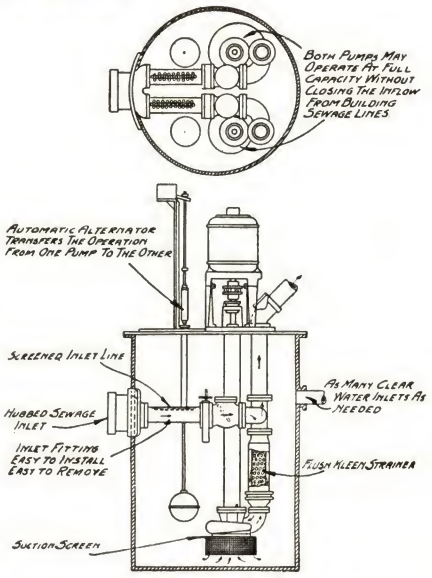


Fig. 2044
Diagram of "Flush-Kleen" Ejector

Duplex Submerged "Flush-Kleen" Sewage Ejector Specifications

Furnish and install where indicated on plans, one duplex set of CHICAGO PUMP COMPANY'S automatic, electric motor driven, Submerged "Flush-Kleen" Type Sewage Ejectors, each ejector to have a capacity of.....gallons per minute when discharging against a head of.....feet. Ejectors to be.....inches heavy duty Sewage Pumps, fitted with individual "Flush-Kleen" strainers employing the flow-reversal principle. Pump shafts shall be fitted with stuffing boxes; also with bronze intermediate bearings if basin depth exceeds 5 ft.

Motors—Pumps to be direct connected by flexible couplings to ..... horsepower, 40 degree, ... volt,.....current, 1140 r.p.m. vertical type electric motors. Motors must be capable of operating continuously without undue heating or sign of overload.

Automatic Control Equipment—Furnish and install near pumps, a.....duplex automatic control panel arranged for floor mounting and having mounted thereon two enclosed fused, main line switches, and two enclosed..... type,..... current automatic starters, providing overload and undervoltage protection. Two cast iron pedestals 40 in. in height will be mounted on basin cover.

Automatic Alternator—Provide a CHICAGO PUMP COMPANY'S Automatic Alternator which will automatically transfer the operation from one pump to the other. This Alternator shall also start the pump not in service in event of failure of the pump first in service to handle the load.

High Water Alarm—Install a complete self-contained high water alarm which will ring a 4-in. bell in event of failure of pumps or electric motors.

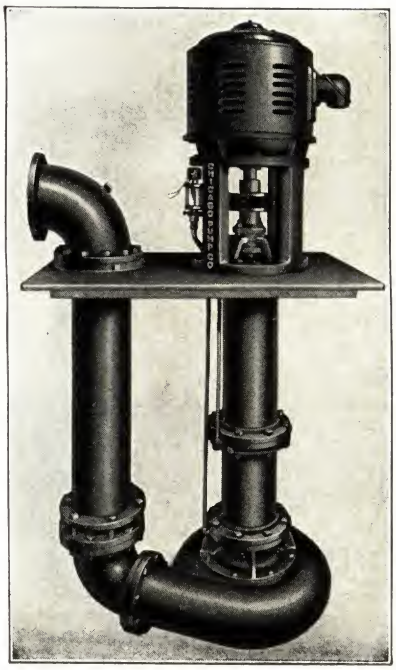
Ejector Basin—Furnish and install a cast iron basin ..... inches in diameter and 48 in. deeper than the lowest inlet entering it. Basin to be provided with a heavy cast iron cover having a 12x18-in. manhole, and necessary openings for pumps, automatic control apparatus, high water alarm and 4-in. vent opening which shall run to stack. All sewage and sanitary waste shall enter the basin through (one) sewage inlet opening.

Pipe Connections—Make connections to discharge fittings of pumps, placing in each discharge line near the pumps, a union, a check valve and a gate valve. The unions to be located nearest the pumps, and the check valves between the unions and the gate valves.

Electrical Wiring and Connecting—The electrical contractor will bring his service to within 10 ft. of pumps and make connections to main line switches. He shall also make electrical connections of the high water alarm transformer which shall be connected with the lighting service of the building, and not with the power service.

"Non-clog" Sewage Ejectors

CHICAGO PUMP COMPANY'S line of ejectors is complete in sizes and styles. There is a line of "Non-clog" Ejectors and another in "Flush-Kleen" Ejectors. Ejectors are made up in single and duplex. Capacities up to 4000 g.p.m.



The "Flush-Kleen" line is recommended wherever possible. Its efficiency, dependability and cleanliness as compared with the old-fashioned strainer basket type make it the first choice of all sewage ejectors. (See description above.)

Tables of capacities and horsepowers in next column are accurate for "Flush-Kleen" Ejectors, but can be used to approximate sizes in "Non-clog" lines.

"Non-clog" Ejectors completely described in Bulletins 126, 128.

"Flush-Kleen" Ejectors completely described in Bulletin 125.

"FLUSH-KLEEN" SEWAGE EJECTOR TABLES OF CAPACITIES AND HEADS AT 1140 R.P.M.

Partial table only

Unit No.	Capacity g.p.m.	Head, ft.	Motor h. p.	Unit No.	Capacity g.p.m.	Head, ft.	Motor h. p.
7075	75	16	1	7132	300	11	2
7077	75	24	2	7133	300	17	3
7079	75	37	5	7135	300	35	7½
7080	75	52	5	7137	300	59	15
7085	100	14	1	7140	400	13	3
7087	100	24	2	7141	400	22	5
7089	100	37	5	7142	400	31	7½
7090	100	48	5	7144	400	66	20
7095	125	13	1	7147	500	12	3
7097	125	23	2	7148	500	19	5
7099	125	37	5	7149	500	26	7½
7100	125	44	5	7150	500	44	20
7105	150	15	1½	7153	750	11	5
7106	150	21	2	7154	750	17	7½
7108	150	37	5	7156	750	35	15
7110	150	59	7½	7157	750	48	20
7115	200	12	1½	7160	1000	8	5
7116	200	17	2	7162	1000	17	10
7118	200	36	5	7164	1000	34	20
7120	200	60	10	7165	1000	46	25
7123	250	12	2				
7124	250	20	3				
7126	250	36	7½				
7128	250	52	10				

Other tables at motor speeds of 1425 and 1720 r.p.m. for "Flush-Kleen" and "Non-clog" Ejectors gladly furnished on request.

"Condo-Vac" Vacuum and Boiler Feed Pump

"Condo-Vac" Features—

(1) Full water capacity 200° F. plus.
(2) 10-in. Vacuum and full air capacity 180° F. plus.
(3) Ample clearance in rotating member means long life.
(4) Single and Duplex units up to 100,000 sq. ft. sizes.
(5) Duplex vacuum pumps are alternated in operation by the "Automatic Alternator."

Ask for Bulletin 137.

Fig. 1981
Duplex "Condo-Vac" Return Line Vacuum and Boiler Feed Pump

"Condo-Vac" Vacuum Pump Specifications

Furnish and install, where indicated on plans, one CHICAGO PUMP COMPANY'S "Condo-Vac" centrifugal return line vacuum pump and receiver complete with all apparatus necessary for automatic vacuum and float switch control. This equipment shall be ..... [single] [duplex] and shall have a capacity of .... sq. ft. of direct radiation and shall be capable of discharging the condensate to the boiler against a pressure of .... lb.

Further complete specifications will be sent on request.

"CONDO-VAC" CAPACITY TABLES
Pumps Rated with Air and Water Temperature at 180° F. 60 Cycle 1720 R.P.M.

Size	Direct radiation, sq. ft.	Motor h. p. at given pressure				Air capacity, c.f.m., per pump*	Water pump capacity, g.p.m. per pump	Dimensions, in.		Receiver capacity, gals. Single	Radiation listed will condense, g.p.m.	Approx. shipping weight, lbs.	
		10 lbs.	20 lbs.	30 lbs.	40 lbs.			Return inlet	Pump discharge			Single	Duplex
T	2,500	½	½			3	5	1¼	1	18	1¼	650	1200
U	5,000	¾	¾			3	10	1½	1	18	2½	750	1400
A	8,000	1	1½	2	3	5	12	2	1¼	30	4	1225	2400
V	10,000	1½	2	2	3	6	15	2	1¼	30	5	1275	2500
B	16,000	1½	2	3	5	9	24	3	1¼	40	8	1400	2800
C	26,000	2	3	5	7½	15	39	3	1½	52	13	1650	3350
D	40,000	3	5	7½	7½	19	60	4	2	70	20	1900	4000
E	65,000	7½	7½	10	10	34	96	4	2	95	32	2250	4550
F	100,000	7½	10	15	15	44	140	6	3	195	50	2700	5300

*10-in. vacuum. Temperature 180° F.

Bilge Pumps

For pumping water out of basements or any basin located below the sewer level.

They are fitted with oil lubricated bronze bearings every 4 ft.; self-aligning ball thrust bearing, flexible couplings, a double carbon contact type float switch and a main line switch. Automatic apparatus is totally enclosed.

Made in all sizes from 15 to 1500 gal. per minute and in single or duplex.

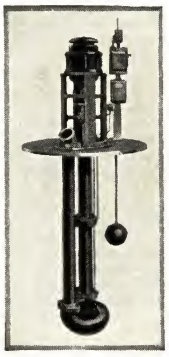


Fig. No. 1957
Automatic Electric Bilge Pump

Duplex Bilge Pump Specifications

Furnish and install where indicated on plans, one duplex set of CHICAGO PUMP COMPANY'S Automatic Electric Bilge Pumps. Each pump to have a capacity of ..... gallons per minute when pumping against a head of ..... feet. Pumps to be fitted with oil lubricated adjustable radial ball thrust bearing contained in a dustproof housing located above floor plate of pump, and intermediate guide bearings every 4 ft. to guide the shaft. Suction of pumps to be fitted with strainer of large area.

***CAPACITIES, HORSEPOWER AND FLOOR SPACE, AUTOMATIC ELECTRIC BILGE PUMPS AT 1720 R.P.M.**

Unit No.	Capacity g. p. m.	Head, ft.	Motor h. p.	Unit No.	Capacity g. p. m.	Head, ft.	Motor h. p.
K150	15	12	¼	K186	125	10	1
K151	15	23	½	K188	125	16	½
K152	30	10	¼	K191	125	23	2
K153	30	21	½	K192	125	33	3
K155	30	39	1	K195	150	10	1
K157	50	7	¼	K197	150	15	1½
K158	50	15	½	K199	150	20	2
K159	50	24	¾	K200	150	28	3
K161	50	48	1½	K201	150	48	5
K163	60	10	½	K204	200	12	2
K165	60	25	1	K207	200	37	5
K166	60	40	1½	K216	300	17	3
K167	60	49	2	K218	300	44	7½
K168	75	8	½	K231	400	22	5
K170	75	18	1	K233	400	45	10
K173	75	30	2	K238	500	19	5
K174	75	48	3	K240	500	38	10
K176	100	11	¾	K245	750	23	10
K178	100	14	1	K247	750	46	20
K180	100	19	1½	K251	1000	17	10
K183	100	36	3	K253	1000	34	20

Units include pump, motor, automatic apparatus. Cast iron basin cover and basin are extra.

All basins should be 36 in. deeper than lowest inlet.

Bilge pumps up to 1500 g.p.m. are also manufactured; write for complete catalogue. Tables for higher heads and other speeds on request.

**Partial list, ask for Bulletin 122.*

Horizontal Condensation Pumps and Receivers

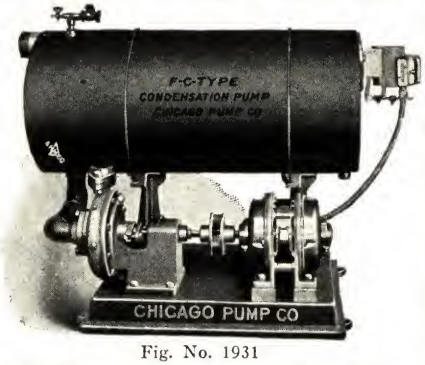


Fig. No. 1931
Condensation Pump and Receiver

These pump the heating returns into boiler from radiation, heating coils, etc., that may be located below boiler level. They are shipped all mounted on one base, connected up ready for final piping and wiring.

Various sizes from 2000 to 150,000 sq. ft. of radiation in single or duplex units (high and low pressures). Ask for Bulletins 129 and 131.

CAPACITIES, HORSEPOWER AND FLOOR SPACE, LOW PRESSURE AUTOMATIC CONDENSATION PUMP AND RECEIVER
Partial tables only

Unit No.	Direct radiation, sq. ft.	Motor h.p.	Lbs. pressure pump discharge	Pump cap., g.p.m.	Receiver cap., gals.	Unit No.	Direct radiation, sq. ft.	Motor h.p.	Lbs. pressure pump discharge	Pump cap., g.p.m.	Receiver cap., gals.
K51575	3000	½	13	5	20	K51617	15000	3	45	21	59
K51600	6000	¾	16	10	20	K51622	25000	2	30	35	59
K51603	6000	2	47	10	20	K51624	25000	5	58	35	59
K51607	10000	¾	16	15	59	K51628	35000	3	25	60	128
K51610	10000	2	46	15	59	K51631	35000	7½	61	60	128
K51614	15000	1	15	21	59	K51637	50000	5	45	75	147

Vertical Condensation Pumps and Receivers

Where the piping arrangement requires a pump pit, no longer is it necessary to allot a great amount of space for a horizontal pump.

The Chicago Vertical Condensation Pump is ideal where the returns come back below the floor.

Self-contained, shipped as a unit, easily installed, requires less space than the horizontal type condensation pump.

All flanges are machine finished and assembled to prevent steam leaks.

Special oil-less bearings are used that will stand up in hot water for several years without lubrication.

Ask for Bulletin 133.

Fig. 1940
Vertical Condensation

Horizontal Pumps

"Chicago" Horizontal Pumps are designed by pump engineers who have had over 25 years in designing and application. Efficiencies are high and the quality of materials used plus meticulous assembly make them outstanding in performance.

Horizontal pumps are made in single and multistage, horizontal and vertical split and the line is complete to handle capacities up to 2000 g.p.m. and heads up to 1000 ft.

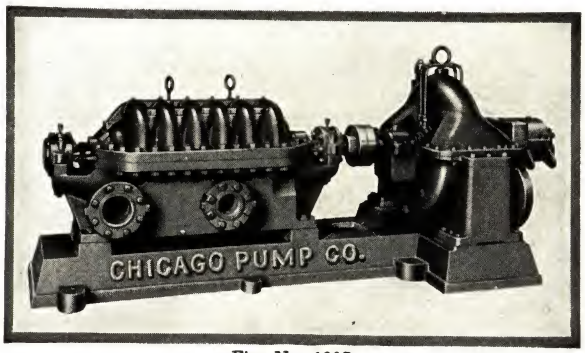


Fig. No. 1907
Type H-S 6-Stage Pump for High Pressures

Services cover water supply, fire protection, circulating, boiler feed, etc.

Pumps may be driven by electric motor, gas engine or steam turbine.

Write for bulletin.

Duplex Gravity Tank House Pump Specifications

Furnish and install on concrete foundation where indicated on plans, two CHICAGO PUMP COMPANY'S automatically controlled centrifugal house pumps, each having a capacity of ..... gallons per minute when pumping into gravity tank against a head of ..... feet, not including friction and with city pressure figured at not more than ..... pounds at suction of pumps. Pumps shall be CHICAGO PUMP COMPANY'S type .....inch full bronze fitted centrifugal pumps, each mounted on a heavy machined cast iron subbase and direct connected by flexible coupling to electric motor.

Fire Pumps—Electric, Steam Turbine or Gas Engine Driven, Centrifugal—Underwriters' Approved

"Chicago" Fire Pumps were the first ball bearing fire pumps to pass Underwriters' tests. "Chicago" Fire Pumps are approved by National Board of Fire Underwriters and Associated Factory Mutual Fire Insurance Companies as well as State and municipal fire prevention bureaus.

"Chicago" Fire Pumps are made in both single-stage and multistage with capacities ranging from minimum of 500 g.p.m., to as large as required. Fire pump fittings as required by Underwriters and local fire authorities are furnished. Illustration shown is that of a typical fire pump with fittings required by the Underwriters.

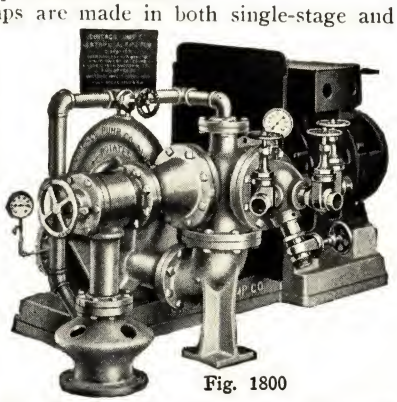


Fig. 1800
Fire Pump with Underwriters' Fittings

CHICAGO PUMP COMPANY also manufactures a complete line of booster and tank filling pumps as well as gas engine driven fire pumps for subdivisions, villages, factory and auxiliary use. Installation diagrams are furnished for each job by the Engineering Department. *Fire, booster and tank filling pumps are described in detail in Bulletin 104.*

***CAPACITIES, HORSEPOWER AND FLOOR SPACE, TYPES M, D AND HS HORIZONTAL PUMPS—PARTIAL ONLY**

Unit No.	Capacity, g.p.m.	Will pump against a head, ft.	Motor hp.
SK- 4	10	56	1
SK- 6	10	112	2
SK- 7	10	168	3
SK-2903	25	55	1½
SK- 23	25	71	2
SK- 28	25	265	7½
SK- 43	50	87	3
SK- 45	50	147	5
SK- 61	50	345	15
SK- 53	75	107	5
SK- 56	75	210	10
SK-3113	100	143	10
S-4205	100	258	20
SK- 84	100	420	30
SK-3120	150	117	10
.....	150	422	40
SK-3128	200	93	10
S-4125	200	197	20
.....	200	384	40
SK-3136	250	77	10
S-4227	250	234	30
S-4414	250	351	60
SK-3144	350	46	10
SK-3313	350	112	20
SK-3405	400	190	40
SK-4752	400	344	75
SK-3413	500	45	10
SK-4755	500	304	75
†SK-3428	700	32	10
†SK-3435	700	180	60
†3712	1000	70	20
†4764	1000	285	125
†3745	1500	99	50
†3748	1600	38	25

*Partial list.

†Limited space does not permit showing medium capacities and heads in 700, 1000 and 1500 g.p.m. *Write for Bulletin 101-A for complete engineering data.*

Specifications

Fire Pump—Furnish and install where indicated on plan, one automatic electric motor driven approved fire pump with all auxiliary apparatus to make a complete fire pump installation.

Pump to be CHICAGO PUMP COMPANY'S approved centrifugal fire pump having a capacity of ..... gallons per minute when discharging against a pressure of ..... pounds with city pressure figured at zero. The pump shall be mounted on a heavy cast iron subbase and direct connected by flexible coupling to the electric motor. Mount pump and motor on a concrete foundation of proper dimensions, installing between them, in an approved manner, sheet iron splash partition.

Furnish complete automatic and manual enclosed fire pump control panel.

Pump motor, panel and method of installation to conform to National Board of Fire Underwriters, Associated Factory Mutual Fire Insurance Companies, and State and local fire prevention bureaus.

Pneumatic Water Supply Systems

Pneumatic water supply systems are used where it is desired to supply water automatically to any size or style of building without the use of a roof or gravity tank. Apartment buildings, schools, hotels, clubs, mercantile buildings and factories use pneumatic systems where city water pressure is insufficient to supply the building. "Chicago" Pneumatic Systems can be had with any size pump in either single or duplex systems and are furnished complete with pump, compressor, tank and control apparatus.

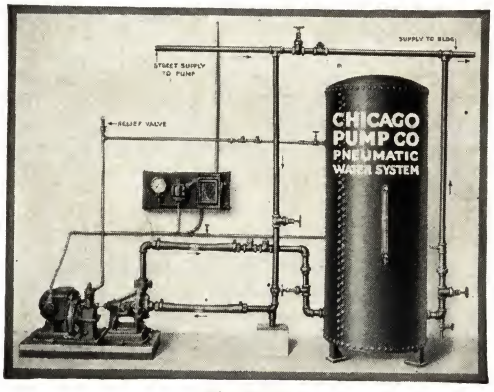


Fig. 2016
Pneumatic Water System

Units are built up to provide any desired amount of water at any pressure. *Ask for Bulletin 111.*

Tankless Systems—Another method of supplying water to buildings is the tankless system. This system is placed in a building where the city water pressure takes care of the requirements under ordinary conditions, but is too low on extremely hot days or at peak load periods. The tankless system is recommended for this periodical service. *See Bulletin 113.*

ECONOMY PUMPING MACHINERY CO.

GENERAL OFFICES
3431 West 48th Place, CHICAGO, ILL.

REPRESENTATIVES

BALTIMORE, MD., W. I. Collier & Co., 522 Park Avenue
BOSTON, MASS., Thermal Engineering Co., 45 Bromfield Street
CINCINNATI, OHIO, Geo. R. Murphy, 309 Main Street
CLEVELAND, OHIO, Tomlinson-MacLachlan, Inc., 1603 St. Clair Avenue, N. E.
DALLAS, TEX., Smith & Whitney, Inc., 2017 Cedar Springs Road
DENVER, COLO., Crane O'Fallon Co., 1631 Fifteenth Street
DES MOINES, IOWA, Globe Machinery & Supply Co., 205 W. Court Avenue
DETROIT, MICH., H. J. Clemens, 517 E. Larned Street
FORT WAYNE, IND., P. & H. Supply Co., 225 E. Columbia Street
HARTFORD, CONN., Earl Sexton, 647 Main Street
JACKSONVILLE, FLA., R. H. Johnson, 662 College Street
KANSAS CITY, MO., The Ritts Co., 609 Linwood Boulevard
NEW ORLEANS, LA., E. W. Carr, Inc., 807 Howard Avenue
NEW YORK, N. Y., Quimby-Ryan Engineering Sales Co., 11 W. 42nd Street
OKLAHOMA CITY, OKLA., Frank Loeffler Supply Co., 710 No. Hudson Street
PEORIA, ILL., Robert P. Nailon, 701 Lehmann Building
PHILADELPHIA, PA., Haynes Selling Co., Inc., 1518 Fairmount Avenue
PITTSBURGH, PA., J. A. Leiendecker, 450 Lincoln Avenue (Bellevue, Pa.)
PLYMOUTH, MICH., Scully Sales Co., 713 Ann Street
PORTLAND, ORE., Ray Smythe, 301 Park Building
SAGINAW, MICH., Engineering Sales Co., Second National Bank Building
SAN FRANCISCO, CAL., J. Harry Russell, Monadnock Building
DOMINION OF CANADA: Crane Ltd., 1170 Beaver Hall Square, MONTREAL, QUE.

Products

WATER SUPPLY PUMPS.
DRAINAGE and SEWAGE PUMPS.
RETURN LINE VACUUM PUMPS.
CONDENSATION PUMPS.
CAISSON SINKING PUMPS.
CAST IRON BLOW-OFF and SUMP TANKS.
MUNICIPAL WATER WORKS and SEWAGE PUMPS.
HIGH PRESSURE BOILER FEED PUMPS.
PAPER STOCK PUMPS.
AXIAL FLOW PUMPS (capacities to 50,000 g.p.m.)
SPECIAL CENTRIFUGAL PUMPS of all kinds.

Economy Pumps

The Company

The ECONOMY PUMPING MACHINERY CO. is a pioneer manufacturer of high efficiency centrifugal pumps for buildings. It is constantly improving its products and broadening its field to cover every pumping requirement of the modern building.

The company maintains a corps of engineers who are ready to assist in the solution of any pumping problem. Consultation with Economy Engineers frequently reduces the cost of the pumping installation and at the same time, results in lower operating costs.

CHECKING LIST FOR CONVENIENCE IN SPECIFYING PUMPS FOR BUILDINGS

I
GENERAL WATER SUPPLY

Wherever city water pressure is inadequate, centrifugal booster pumps should be installed.

(a) **Overhead Tank Systems**.....Pages 2-4
Recommended for all commercial and industrial buildings which afford facilities for supporting tank.

(b) **Pneumatic Systems**.....Page 5
Recommended for use in residential buildings, apartment buildings and other establishments where the requirements are less than 100 g.p.m.

(c) **Tankless Water System**.....Page 6
Recommended where low pressures occur at infrequent periods. Provides booster service with a minimum investment.

II
DRAINAGE PUMPS OR SEWAGE EJECTORS

Used wherever plumbing fixtures are below sewer or where seepage is encountered below sewer level.

(a) Pumps for handling surface water and other clear liquids.....Page 9

(b) Pumps for handling dirty water and sewage. Pages 10-11-12

III
PUMPS FOR HEATING SYSTEMS

(a) **Return Line Vacuum System**.....Page 7
Return line vacuum and boiler feed pumps are used where it is desired to accelerate steam circulation at low pressures by maintaining a vacuum on the return line.

(b) **Air Line System**.....Page 7
An air line pump is used to remove air from air line or Paul system.

(c) **Gravity Heating System**.....Page 7
Condensation pumps and receivers are used for drainage of radiation below the water line of the boiler and for acceleration of circulation.

IV
MISCELLANEOUS PUMP APPLICATIONS

(a) **Air Washer Pumps**.....Page 4
Used to circulate spray water in the air washer system. Capacities and pressures are specified by the air washer manufacturer.

(b) **Brine Pumps**.....Page 4
Used to circulate brine through the individual boxes or coils of a central refrigerating system. Capacities and pressures are specified by the refrigerator manufacturer.

(c) **Hot Water Circulating Pumps**.....Page 4
A small pump is frequently used to keep the hot water in circulation, eliminating cold and hot pockets.

(d) **Fire Pumps**.....Page 4
Selection of fire pumps and capacities should be made after consultation with local underwriter.

(e) **Hydraulic Elevator Pumps**.....Page 4
Capacity and pressures should be obtained from the elevator manufacturer.

(f) **Swimming Pool Circulation Pumps**.....Page 4
Wherever swimming pool water is filtered and re-used, it must be circulated by a pump. Pump should be of the same capacity as the filters and should be capable of discharging against the maximum filter pressure.

(g) **Drinking Water Circulating Pumps**.....Page 4
Circulating pumps are used to maintain uniform temperatures in the drinking water system. The capacity is usually very small—5 to 10 g.p.m. will maintain circulation in a large system. Consumption may be figured at one quart per worker per hour.

ECONOMY CENTRIFUGAL PUMPS

Advantages to the Architect in the Use of Economy Pumps

Reliability—Economy Pumps have been used in many of the country's finest buildings. For more than twenty years they have been giving satisfactory service.

Silence—Smooth, noiseless operation eliminates complaints. Quiet pumps help insure occupants against noise.

Appearance—Economy Pumps are compact and pleasing in appearance. Similarity in design gives a harmonious effect. Pumps and motors are filled and lacquered. Standard color is water-green but other colors are available as specified.

Efficiency—Operating costs are reduced to a minimum because of modern hydraulic and mechanical design.

A Special Service for the Architect

The Economy Organization is highly specialized in the solution of all kinds of pumping problems. Our engineers are constantly in touch with unusual applications and consequently are often able to assist the architect and engineer in securing unexpected savings. High total efficiencies can be secured only through efficient pumps correctly selected for the individual duty. Small pump orders are given the same careful consideration as orders for larger equipment.

Each pump is tested before shipment in accordance with the standards of the Hydraulic Society and the A.S.M.E. A permanent record is made of its capacity and mechanical performance. The results of these tests are always available to the customer so that if changes are ever made in the operating head, complete information may be obtained concerning the capacity under the new conditions. The stringency with which the equipment is inspected under test assures the customer of satisfactory operation.

ENGINEERING DATA FOR SELECTION OF WATER SUPPLY PUMPS

Determination of Pump Capacity From Curves

(1) Tabulate the number and type of fixtures.

(2) Obtain recommended pump capacities for each type of fixture from the curves shown at the right.

(3) Add these values and multiply by the constant for the type of building under consideration, as found in the table below the curve.

EXAMPLE: 200-room commercial hotel.

Fixtures	Recommended Pump Capacity
200 lavatories	50 g.p.m.
200 water closets	70 g.p.m.
100 bathtubs	45 g.p.m.
25 showers	45 g.p.m.
20 slop sinks	85 g.p.m.
6 urinals	10 g.p.m.
	305 g.p.m.

305x.80 (multiplier for commercial hotels) = 244 g.p.m. the required pump capacity.

Note: These recommended pump capacities are based on peak requirements and provide for operation of pumps only part of time.

Various conditions found in certain installations may further modify the capacity. For example, if the number of occupants of any building is abnormally large or small for the number of fixtures installed, the water consumption per fixture will be materially increased or decreased.

Determination of Pump Capacity from Curves

The pressure or head, which the pump must develop, is made up of the following four factors:

(1) The height from the pump to the highest fixture.

(2) The pressure required at the highest fixture.

(3) Pipe friction.

(4) Any pressure available on the pump suction, such as city water pressure (to be subtracted from the sum of the other three items).

Note: The above figures must all be in feet. Items 2 and 4 are usually expressed in pounds per square inch. In this case multiply by 2.31 (1 pound = 2.31 feet).

EXAMPLE: For the 200-room commercial hotel assume-

(1) 250 g.p.m. capacity.

(2) Height from pump to highest fixture = 100 ft.

(3) 15 lbs. pressure required at the highest fixture.

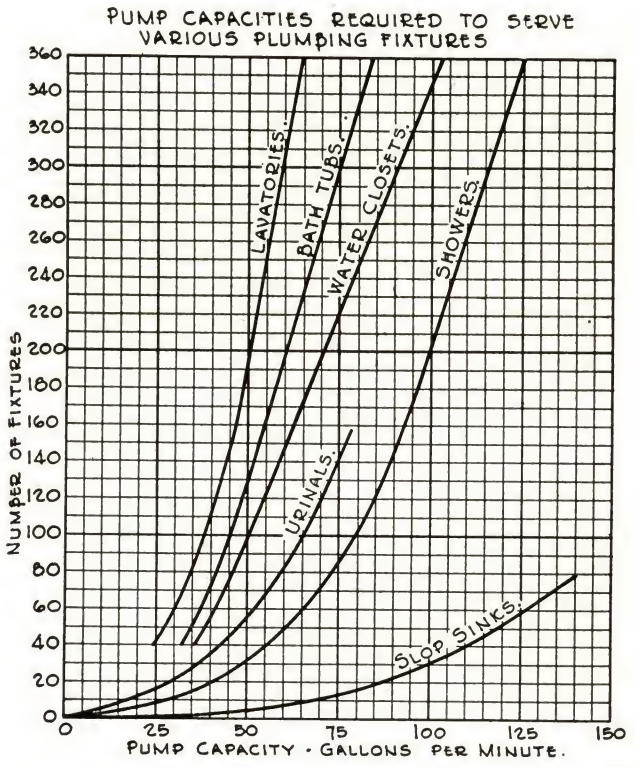
(4) An overhead tank system is used, the piping between the pump and tank being composed of 150 ft. of 4-in. pipe and 6 elbows.

(5) City water available at pump suction at 20 lbs.

Solution:

Height to highest fixture	100 ft.
Pressure on highest fixture (15x2.31)	35 ft.
Friction through 150 ft. 4-in. pipe and 6 elbows (10 + 6) (see pipe friction table on next page)	16 ft.
Total required head	151 ft.
City water pressure (20x2.31)	46 ft.
Required pump pressure	105 ft.

(Continued on next page)



Multipliers for Use With the Above Table

Apartments	.50	Schools	1.50
Apartment hotels	.60	Hospitals	1.50
Commercial hotels	.80	Public comfort stations	2.00
Office buildings (without heavy peak loads)	.60	Golf clubs and gymnasiums (showers only)	3.00
(With peak loads or with a large number of occupants per fixture)	.80	(other fixtures)	1.00
		Factories (no process water) Female	1.50
		Male	1.00

ENGINEERING DATA FOR SELECTION OF WATER SUPPLY PUMPS (Continued)

Selection of Pump

Turn to page 4 for the pump selection table. The recommended pump for this job is No. SA-73, 3-in. double suction pump with a 15-hp. motor.

Note: If smaller piping had been used the friction loss would be more, necessitating a larger size of pump and motor besides increasing the power costs. The proper selection of pipe sizes is essential for an efficiently designed water system.

Type of System

Overhead Tank Systems—Recommended where the required pump capacity exceeds 100 g.p.m. The tank capacity should be from 20 to 40 times the pump capacity in gallons per minute. For the job in the above example, having a pump capacity of 250 g.p.m., the tank capacity would vary from 5,000 to 10,000 gallons. In a more elaborate type of system both pump and tank are installed in duplicate. The tank should be located a sufficient height above the highest fixture to give the required pressure to that fixture (2.31 by required pressure). For buildings over 25 stories in height, it is advisable to have storage tanks at intermediate points in order to avoid excessive pressure as well as to provide for more efficient pumping. The pumps recommended for Overhead Tank Systems are listed in the table on page 4. The tanks are furnished by either the plumber or general contractor.

Pneumatic Systems—May be used for capacities less than 100 g.p.m. (Such systems are frequently used for larger capacities, but are recommended only where the appearance of the building or some structural difficulty would prevent the use of an overhead tank.) Where these systems are used the pump manufacturer furnishes the entire system complete. For a list of units and installation diagrams of these systems see page 5.

Tankless Systems—Should be used only in small buildings or where the pump is required to operate only at frequent intervals. For this service they are both reliable and practical besides being the least expensive system. The pump manufacturer usually furnishes the entire system complete with automatic controls. See page 6 for a table of recommended pumps and installation diagram.

Circulating Pumps for Hot Water Supply Systems

Circulation—Is usually by gravity with acceleration by means of a pump which prevents the forming of cold and hot pockets in the system.

Capacity—Approximately 20% of the capacity of the main supply pump (cold water pump).

Pressure—Only from 10 to 20 lbs. pressure is needed for circulation, but the pump must be designed to withstand the maximum pressure in the system.

FRICTION OF WATER IN PIPES

Loss of Head per 100 Ft. in Straight Cast Iron Pipes of Various Sizes

¾-in. pipe		1-in. pipe		1¼-in. pipe		1½-in. pipe		2-in. pipe		2½-in. pipe		3-in. pipe		4-in. pipe		5-in. pipe		6-in. pipe		8-in. pipe	
g.p.m.	feet	g.p.m.	feet	g.p.m.	feet	g.p.m.	feet	g.p.m.	feet	g.p.m.	feet	g.p.m.	feet	g.p.m.	feet	g.p.m.	feet	g.p.m.	feet	g.p.m.	feet
2	1.9	3	1.26	4	0.57	5	0.40	10	0.50	40	1.1	100	5.0	100	1.2	180	1.2	200	.59	600	1.20
3	4.1	4	2.14	5	0.84	10	1.43	15	1.08	50	3.3	120	7.0	125	1.9	220	1.8	300	1.40	700	1.50
4	7.0	5	3.25	10	3.05	15	3.0	20	1.82	60	4.7	140	9.2	150	2.6	250	2.2	400	2.30	800	2.10
5	10.5	10	11.7	15	6.50	20	5.2	25	2.73	70	6.2	160	11.8	175	3.4	300	3.1	500	3.16	900	2.50
10	38.0	15	25.0	20	11.10	25	7.8	30	3.84	80	7.9	180	14.8	200	4.4	350	4.2	600	5.00	1000	2.80
15	80.0	20	42.0	25	16.6	30	11.0	35	5.1	90	9.8	200	17.8	225	5.9	400	5.4	700	6.10	1200	4.20
20	136.0	25	64.0	30	23.5	35	14.7	40	6.6	100	12.0	225	22.2	250	6.7	450	6.7	800	8.10	1400	5.50
.....	.....	30	89.0	35	31.2	40	18.8	45	8.2	110	14.5	250	28.1	275	7.9	500	8.1	900	10.90	1500	6.50
.....	.....	35	119.0	40	40.0	45	23.2	50	9.9	120	16.8	275	32.3	300	9.3	550	9.6	1000	12.90	1600	7.60
.....	.....	40	152.0	45	50.0	50	28.4	70	18.4	140	22.3	300	38.0	325	10.8	600	11.3	1100	14.60	1800	9.00
.....	.....	.....	.....	50	60.0	70	53.0	75	20.9	160	29.0	325	44.1	350	12.4	650	13.2	1200	18.10	2000	11.50
.....	.....	.....	.....	70	113.0	75	60.0	100	35.8	180	35.7	350	50.6	400	16.0	700	15.1	1300	20.20	2200	13.00
.....	.....	.....	.....	.....	.....	100	102.0	120	50.0	200	43.1	375	57.5	450	19.8	800	19.4	1400	22.50	2400	15.10
.....	.....	.....	.....	.....	.....	120	143.0	150	76.0	225	54.3	400	65.0	500	24.0	900	24.0	1500	25.90	2500	16.10

FRICTION OF WATER IN 90° ELBOWS

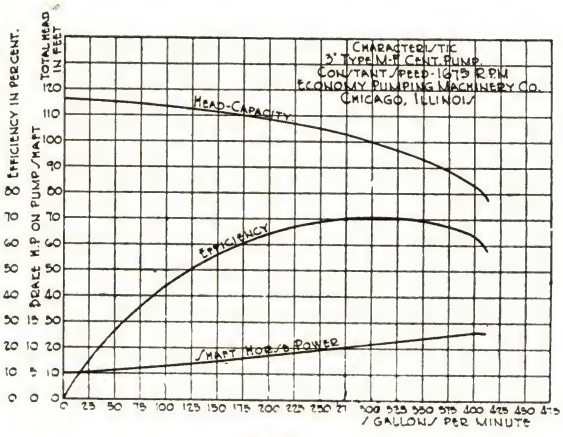
Equivalent Number of Feet Straight Pipe

Size of elbow, in.	½	¾	1	1¼	1½	2	2½	3	4	5	6	8
Friction equivalent feet straight pipe	5	6	6	8	8	8	11	15	16	18	18	24

ECONOMY PUMPS FOR WATER SUPPLY SYSTEMS

Economy clear liquid and general water supply pumps are built in three general types: Type "DS" Double Suction Single Stage Pumps; Type "MS" Multi-stage High Pressure Pumps, both vertically and horizontally split case; and Type "SS" Single Stage Single Suction Pumps. They afford a wide range of capacities and pressures for requirements of any magnitude.

A typical example of performance of Economy Pumps is shown in the accompanying performance chart. The curve shown is taken from an actual test of a standard pump and illustrates performance obtained in regular production. The broad flat efficiency curve insures efficiency over a wide range of capacities. This is of the utmost importance when dynamic head conditions vary or where they cannot be exactly determined. For such conditions it is necessary ordinarily to sacrifice capacity in order to safeguard the driving motor. In the Economy Pumps this is done by maintaining the efficiency rather than by giving the head curve an undesirable droop.

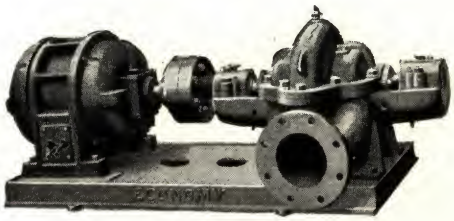


ECONOMY CENTRIFUGAL PUMPS

SINGLE STAGE DOUBLE SUCTION—TYPE "DS"

Capacities 30 to 3000 G.P.M.

Economy Type "DS" (Double Suction) pumps are general purpose pumps for moderate heads. For higher head conditions the multi-stage pumps are recommended. "DS" pumps are of rugged design suitable for heavy duty. They embody the following advantages of construction:



Type "DS"

(1) The rotor is supported between two liberal outboard bearings which give a much longer life than is possible with an overhung construction.

(2) The casing is split on the horizontal center line with the pipe connections in the lower half case. It is possible to remove all rotating parts.

(3) Efficiency is high because the inlet diameter can be kept small and, as a consequence, leakage and friction losses are very much reduced.

(4) All parts subject to wear are readily replaced so that the original pump efficiency may be easily restored.

(5) End thrust is almost negligible and, as a consequence, bearing construction is very much simplified.

Economy double suction pumps can be arranged for drive by any prime mover which will operate at the current speed. The common types are electric motors, steam turbines either geared or direct connected, gasoline engines, steam engines, water turbines, or belts.

CONDENSED CAPACITY TABLE FOR ECONOMY WATER SUPPLY PUMPS

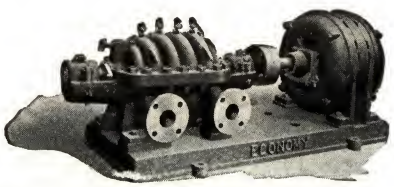
This table shows only one type of pump for each head capacity condition; frequently several types are available. We have, therefore, shown only the type which our experience indicates to be the most suitable for the average job. Our district offices will be glad to submit complete information on alternate types and sizes for any capacity.

Unit No.	Capacity, gallons per minute	Total head, in feet water	Size discharge, in., and type of pump	Number of stages	Motor hp.	Approximate floor space, in.	Unit No.	Capacity, gallons per minute	Total head, in feet water	Size discharge, in., and type of pump	Number of stages	Motor hp.	Approximate floor space, in.
SA-1	10	20	1 -SS	1	¼	16x30	SA-61	200	30	3 -DS	1	3	22x49
SA-2	10	35	1½-SS	1	½	16x30	SA-62	200	50	2½-DS	1	5	20x53
SA-3	10	45	1½-SS	1	¾	16x32	SA-63	200	80	2½-DS	1	7½	20x55
SA-4	10	70	1¼-MS	2	1	20x38	SA-64	200	100	3 -DS	1	10	22x58
SA-5	10	110	1¼-MS	3	2	20x44	SA-65	200	150	2½-DS	1	20	24x60
SA-6	10	160	1¼-MS	4	3	20x55	SA-66	200	200	2½-DS	1	25	25x60
SA-7	10	200	1¼-MS	5	5	20x58	SA-67	200	260	3 -MS	3	25	34x69
SA-8	10	275	1¼-MS	2	5	20x46	SA-68	200	375	3 -MS	5	30	34x74
SA-9	10	325	1¼-MS	3	5	20x48	SA-69	200	550	3 -MS	6	50	34x89
SA-10	10	375	1¼-MS	3	7½	20x48	SA-70	200	700	3 -MS	8	60	34x97
SA-11	20	20	1 -SS	1	¼	16x30	SA-71	300	30	3 -DS	1	5	22x54
SA-12	20	35	1½-SS	1	½	16x30	SA-72	300	70	3 -DS	1	7½	22x56
SA-13	20	45	1½-SS	1	¾	16x32	SA-73	300	100	3 -DS	1	15	26x58
SA-14	20	70	1¼-MS	2	1	20x38	SA-74	300	130	2½-DS	1	20	26x62
SA-15	20	110	1¼-MS	3	2	20x44	SA-75	300	150	3 -DS	1	25	26x62
SA-16	20	160	1¼-MS	4	3	20x55	SA-76	300	200	3 -DS	1	30	30x65
SA-17	20	200	1¼-MS	5	5	20x58	SA-77	300	300	3 -MS	4	40	34x81
SA-18	20	240	1¼-MS	6	5	20x60	SA-78	300	375	3 -MS	5	50	34x87
SA-19	20	325	1¼-MS	3	7½	20x48	SA-79	300	450	3 -MS	6	60	34x98
SA-20	20	375	1¼-MS	3	7½	20x48	SA-80	300	600	3 -MS	8	75	34x100
SA-21	50	20	1½-SS	1	½	16x30	SA-81	400	20	4 -DS	1	3	23x54
SA-22	50	40	1½-SS	1	1	16x32	SA-82	400	30	4 -DS	1	5	23x54
SA-23	50	70	1½-SS	1	2	19x34	SA-83	400	50	4 -DS	1	7½	23x54
SA-24	50	110	1¼-MS	4	3	20x55	SA-84	400	70	4 -DS	1	10	23x54
SA-25	50	160	1¼-MS	5	5	20x58	SA-85	400	100	4 -DS	1	15	23x56
SA-26	50	200	1¼-MS	6	5	20x60	SA-86	400	120	3 -DS	1	20	26x62
SA-27	50	250	1¼-MS	3	7½	20x50	SA-87	400	140	3 -DS	1	25	26x62
SA-28	50	275	1¼-MS	3	10	20x50	SA-88	400	160	3 -DS	1	30	30x65
SA-29	50	375	1½-MS	5	15	24x64	SA-89	400	180	3 -DS	1	30	30x65
SA-30	50	450	1½-MS	6	20	24x68	SA-90	400	200	3 -DS	1	40	30x68
SA-31	80	30	2 -DS	1	1½	20x46	SA-91	500	20	4 -DS	1	5	23x54
SA-32	80	40	2 -DS	1	2	20x46	SA-92	500	40	4 -DS	1	7½	23x54
SA-33	80	60	2 -DS	1	3	20x48	SA-93	500	50	4 -DS	1	10	23x54
SA-34	80	110	1½-DS	1	5	22x44	SA-94	500	80	4 -DS	1	15	23x56
SA-35	80	150	1½-DS	1	7½	22x46	SA-95	500	110	4 -DS	1	20	23x58
SA-36	80	200	1½-DS	1	10	24x44	SA-96	500	120	3 -DS	1	25	26x62
SA-37	80	275	1½-MS	4	15	24x61	SA-97	500	140	3 -DS	1	30	30x65
SA-38	80	350	1½-MS	6	15	24x65	SA-98	500	160	3 -DS	1	40	30x68
SA-39	80	400	1½-MS	6	20	24x68	SA-99	500	180	3 -DS	1	40	30x68
SA-40	80	500	2½-MS	8	25	24x73	SA-100	500	200	3 -DS	1	40	30x68
SA-41	100	30	2 -DS	1	1½	24x46	SA-101	600	20	5 -DS	1	5	25x55
SA-42	100	50	2 -DS	1	3	22x46	SA-102	600	30	5 -DS	1	7½	25x55
SA-43	100	80	2 -DS	1	5	22x51	SA-103	600	40	5 -DS	1	10	25x56
SA-44	100	100	2 -DS	1	5	22x51	SA-104	600	60	4 -DS	1	15	23x56
SA-45	100	150	1½-DS	1	7½	24x41	SA-105	600	80	4 -DS	1	15	23x56
SA-46	100	200	1½-DS	1	10	24x44	SA-106	600	100	4 -DS	1	20	23x58
SA-47	100	275	1½-MS	5	15	24x61	SA-107	600	120	3 -DS	1	30	30x65
SA-48	100	350	1½-MS	6	20	24x68	SA-108	600	150	3 -DS	1	40	30x68
SA-49	100	425	2½-MS	7	20	24x70	SA-109	600	180	3 -DS	1	40	30x68
SA-50	100	500	2½-MS	8	25	24x73	SA-110	600	200	5 -DS	1	50	32x76
SA-51	160	20	2½-DS	1	2	20x48	SA-111	800	20	6 -DS	1	7½	28x60
SA-52	160	60	2½-DS	1	5	20x53	SA-112	800	40	6 -DS	1	10	28x60
SA-53	160	100	2½-DS	1	7½	20x55	SA-113	800	50	5 -DS	1	15	25x56
SA-54	160	150	1½-DS	1	10	24x44	SA-114	800	70	5 -DS	1	20	25x58
SA-55	160	200	1½-DS	1	15	24x47	SA-115	800	90	5 -DS	1	25	25x60
SA-56	160	280	2½-MS	6	20	24x67	SA-116	800	110	6 -DS	1	30	28x66
SA-57	160	400	2½-MS	8	30	24x76	SA-117	800	140	4 -DS	1	40	25x71
SA-58	160	500	3 -MS	6	40	34x87	SA-118	800	160	4 -DS	1	50	25x73
SA-59	160	650	3 -MS	7	50	34x92	SA-119	800	190	5 -DS	1	60	32x78
SA-60	160	750	3 -MS	8	60	34x97	SA-120	800	200	5 -DS	1	75	32x81

For larger capacities refer to Sweet's Engineering Catalogues or our Bulletin 408.

ECONOMY MULTI-STAGE PUMPS—TYPE "MS"

Capacities 10 to 400 G.P.M.—Heads up to 1000 Ft.



These pumps fulfill practically all the high pressure requirements of buildings, small and medium size municipalities and industrial plants. They have been refined to give the user of this type of equipment efficiencies and mechanical constructions which have heretofore been available only in pumps of much larger capacities.

The high efficiencies of these pumps frequently result in large savings in operating costs. For example, in the case of a 160 g.p.m. pump, this saving may be as much as $1580.00 per year for continuous operation (with current at 3½¢ per kw. hour). Such savings are more than enough to pay the first cost of the pump in a comparatively short time. In making a pump selection, this should be carefully considered, because high pump efficiency becomes of much greater importance in high head apparatus than in low head apparatus.

These pumps have many advantages. The mechanical construction is unusually sturdy. All working parts are accessible without disturbing motor alignment. Bronze fitted construction is standard but all iron or antiacid metals are furnished when desired.

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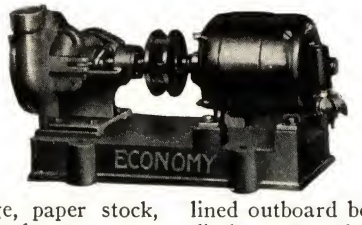
ECONOMY SINGLE STAGE SINGLE SUCTION PUMPS—TYPE "SS"

Capacities 10 to 4000 G.P.M.—Heads up to 100 Ft.



Economy Type "SS" Pumps are general purpose, high efficiency pumps for use where capacity is too small for the double suction design or where it is desired to secure a more moderately priced pump.

These pumps are suitable for heads up to 100 ft. for all around service, such as pneumatic and roof tank water supply, hot water circulation, industrial water supply, etc. They should not be used for pumping sewage, paper stock, sand or gravel, or other fluids which would clog or cause wear on the enclosed impellers. Either non-clogging pumps or special open impeller pumps should be furnished for such services.

The smaller sizes (1 to 1½ in.) are made with both pipe connections in the stand side of the case so that the end plates may be removed for access to the impeller without breaking any pipe connections. Larger sizes (2 to 10 in.) have a horizontally split babbitt lined outboard bearing. They are of end suction design so that discharge may be turned to any 45° angle.

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PNEUMATIC WATER SYSTEMS

Convenient selections of water systems may be made from the table below. This table is made to cover the requirements of apartment and residential buildings. (If any other type of building is under consideration increase or decrease the capacity of the system in accordance with the table of Multipliers shown with the Curve on page 2.)

In order to select the proper system count over the number of fixtures in the building and select the unit for the desired pressure boost.

Apparatus Included—Pump and motor, pressure gauge, automatic control, tank, cork and wood base, rubber connections, air compressor and water level and pressure gauges.

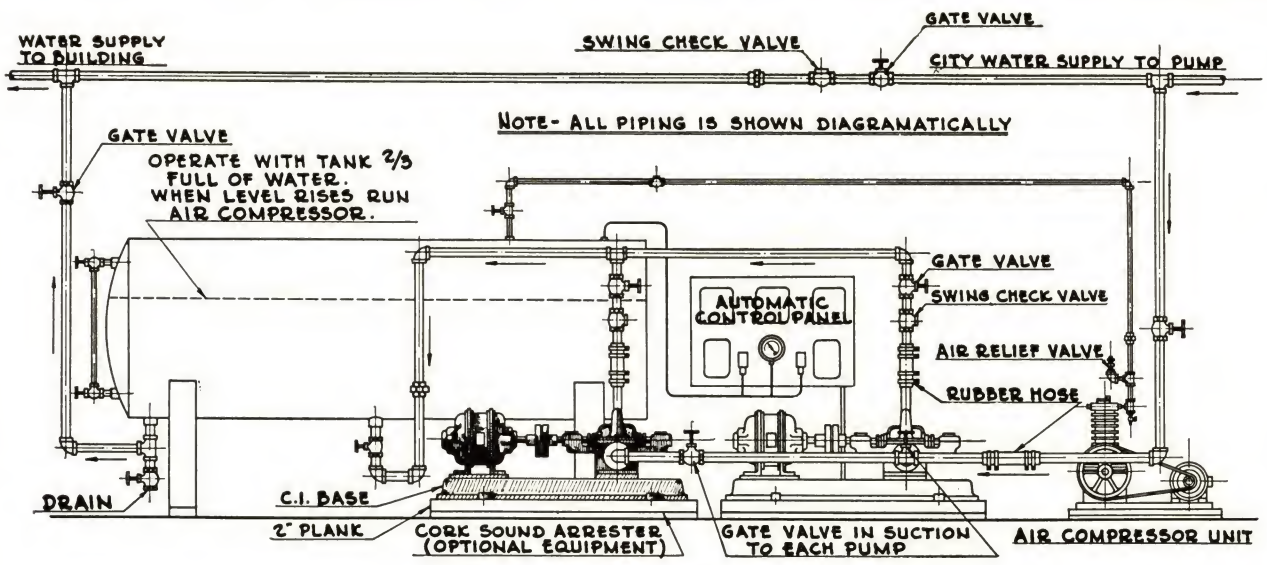
Floor Space—Floor space for pump, tank and compressor are given separately because location of each item may be varied to suit shape of space available.

Duplex Units—Consist of two pumps, motors and control but only one tank and one air compressor.

PNEUMATIC WATER SYSTEM SELECTION TABLE

Unit No.	Number of fixtures syst m will supply	Cap. of pump, g.p.m.	Net pressure boost		Motor hp.	Tank		Floor space pump and motor, in.	Floor space air compressor, in.
			Lb.	Ft.		Cap., gal.	Size, in.		
PW-1	15–40	20	10	23	½	295	30x96	20x8	9x24
PW-2	15–40	20	15	35	¾	295	30x96	30x12	9x24
PW-3	15–40	20	20	46	¾	295	30x96	30x12	9x24
PW-4	15–40	20	30	69	1	295	30x96	38x16	9x24
PW-5	15–40	20	45	104	2	295	30x96	48x16	9x24
PW-6	15–40	20	70	161	3	295	30x96	54x16	9x24
PW-7	15–40	20	100	230	5	295	30x96	59x16	9x24
PW-11	40–60	30	20	46	1	720	42x120	29x12	9x24
PW-12	40–60	30	30	69	1½	720	42x120	37x16	9x24
PW-13	40–60	30	45	104	3	720	42x120	47x16	9x24
PW-14	40–60	30	60	133	3	720	42x120	54x16	9x24
PW-15	40–60	30	75	173	5	720	42x120	56x16	9x24
PW-16	40–60	30	100	230	5	720	42x120	59x16	9x24
PW-21	60–75	40	15	35	1	940	48x120	29x12	12x32
PW-22	60–75	40	30	69	1½	940	48x120	37x16	12x32
PW-23	60–75	40	50	115	3	940	48x120	54x16	12x32
PW-24	60–75	40	75	173	5	940	48x120	56x16	12x32
PW-25	60–75	40	100	230	5	940	48x120	59x16	12x32
PW-31	75–100	50	10	23	¾	1130	48x144	29x12	12x32
PW-32	75–100	50	20	46	1½	1130	48x144	29x12	12x32
PW-33	75–100	50	30	69	2	1130	48x144	39x16	12x32
PW-34	75–100	50	50	115	3	1130	48x144	54x16	12x32
PW-35	75–100	50	75	173	5	1130	48x144	56x16	12x32
PW-36	75–100	50	100	230	7½	1130	48x144	59x16	12x32
PW-41	100–160	75	20	46	1½	1880	48x240	39x16	12x32
PW-42	100–160	75	30	69	3	1880	48x240	39x16	12x32
PW-43	100–160	75	50	115	5	1880	48x240	13x37	12x32
PW-44	100–160	75	75	173	7½	1880	48x240	42x13	12x32
PW-45	100–160	75	100	230	10	1880	48x240	22x56	12x32

Unit No.	Number of fixtures system will supply	Cap. of pump, g.p.m.	Net pressure boost		Motor hp.	Tank		Floor space pump and motor, in.	Floor space air compressor, in.
			Lb.	Ft.		Cap., gal.	Size, in.		
PW-51	160–250	100	20	46	3	2400	60x192	46x22	16x30
PW-52	160–250	100	30	69	5	2400	60x192	51x22	16x30
PW-53	160–250	100	40	92	5	2400	60x192	51x22	16x30
PW-54	160–250	100	55	127	7½	2400	60x192	41x24	16x30
PW-55	160–250	100	75	173	10	2400	60x192	44x24	16x30
PW-56	160–250	100	95	219	10	2400	60x192	44x24	16x30
PW-57	160–250	100	120	277	15	2400	60x192	61x24	16x30
PW-58	160–250	100	150	346	20	2400	60x192	68x24	16x30
PW-61	250–400	125	40	92	5	2400	60x192	51x22	16x30
PW-62	250–400	125	55	127	7½	2400	60x192	41x24	16x30
PW-63	250–400	125	85	196	10	2400	60x192	44x24	16x30
PW-64	250–400	125	100	230	15	2400	60x192	61x24	16x30
PW-65	250–400	125	120	277	20	2400	60x192	68x24	16x30
PW-71	400–600	150	25	58	5	3000	72x168	51x22	48x23
PW-72	400–600	150	45	104	7½	3000	72x168	41x24	48x23
PW-73	400–600	150	75	173	10	3000	72x168	44x24	48x23
PW-74	400–600	150	85	196	15	3000	72x168	48x24	48x23
PW-75	400–600	150	100	230	15	3000	72x168	61x24	48x23
PW-76	400–600	150	140	323	20	3000	72x168	68x24	48x23
PW-81	600–800	200	20	46	5	3500	72x192	41x24	48x23
PW-82	600–800	200	40	92	7½	3500	72x192	41x24	48x23
PW-83	600–800	200	65	150	15	3500	72x192	55x21	48x23
PW-84	600–800	200	85	196	20	3500	72x192	60x25	48x23
PW-85	600–800	200	165	331	30	3500	72x192	68x20	48x23
PW-91	3000–3500	600	30	69	15	7600	96x240	55x20	48x23
PW-92	3000–3500	600	45	104	20	7600	96x240	58x20	48x23
PW-93	3000–3500	600	75	173	40	7600	96x240	68x23	48x23
PW-94	3000–3500	600	100	230	60	7600	96x240	77x27	48x23



Duplex Pneumatic Water System

The Duplex Unit consists of two pumping units and duplex control, but with only one tank and air compressor. The Single Unit is similar in design, except that the extra pumping unit, control and connecting piping are omitted.

Cork and wood sub-bases, rubber hose pipe connectors, and smooth running pumps assure noiseless operation

TANKLESS WATER SYSTEMS

In apartments or similar buildings where shortage of water may occur for only short periods. In such installations the tankless system is used to boost the pressure during the period of low pressure.

Tankless systems are also used for special applications where the demand for higher pressure is continuous, but for only a short period each day. Golf courses, amusement parks, race tracks and some industrials are examples. They have heavy demands for water for short periods. Tankless systems are frequently used in such places for boosting pressure obtained from overhead tanks or other source of supply.

As might be expected the tankless system is the cheapest type of booster system. It is thoroughly satisfactory when properly applied, but is not recommended for buildings such as hotels which have a twenty-four hour demand for water.

Pump and motor, automatic starter, panel with pressure regulator, suction and discharge pressure gauge, rubber connections and vibration absorbing base. All piping and valves are furnished by the plumbing contractor.

The pumps used in Economy Tankless Water Systems are of the same high grade construction as is used in the overhead and pneumatic systems. The only difference in the systems is the omission of the tanks and air compressors.

For apartments and similar buildings it is only necessary to count over the total number of fixtures and select the system listed for that number of fixtures. For other types of buildings select a larger or smaller system as indicated by the table of multipliers, shown with the curve on page 2.

TANKLESS WATER SYSTEMS

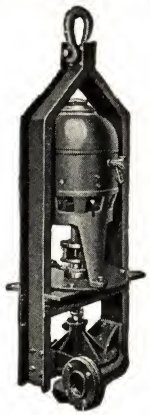
Unit No.	Number of fixtures	Pump capacity, g.p.m.	Net pressure boost		Motor hp.	Pump size	Descriptive Bulletin No.	Floor space of pump and motor, in.
			Ft.	Lb.				
3	15–40	20	23	10	¼	1SS	416	20x9
4	15–40	20	35	15	½	1¼SS	416	30x12
5	15–40	20	46	20	¾	1½SS	416	30x12
6	15–40	20	69	30	1	1¼MS	415	40x16
7	40–60	30	35	15	¾	1½SS	416	30x12
8	40–60	30	46	20	1	1½SS	416	30x12
9	40–60	30	69	30	1½	1¼MS	415	40x16
13	75–100	50	35	15	1	1½SS	416	30x12
14	75–100	50	46	20	1½	1½SS	416	30x12
15	75–100	50	69	30	2	1½SS	416	40x16
18	150–200	80	46	20	1½	1½SS	416	40x16
19	150–200	80	69	30	3	1½SS	416	40x16
20	150–200	80	92	40	5	2DS	408	51x22
21	150–200	80	127	55	5	2x1½DS	408	38x12
24	250–300	100	46	20	2	1½SS	416	40x16
25	250–300	100	69	30	3	1½SS	416	40x16
26	250–300	100	92	40	5	2DS	408	51x22
30	500–700	180	92	40	7½	2x2½DS	408	41x24
31	500–700	180	116	50	10	2x1½DS	408	41x24
32	500–700	180	173	75	15	2x1½DS	408	41x24
33	700–1000	225	92	40	10	2x2½DS	408	41x24
34	700–1000	225	148	65	15	3x2½DS	408	55x21
35	700–1000	225	185	80	20	3x2½DS	408	60x25

ECONOMY CAISSON SINKING PUMPS

Caisson pumps are used in construction work wherever shafts must be sunk through wet soils or gravel.

They were especially developed for foundation work in the lake regions where caissons are sunk 100 to 125 ft. to bed rock. They are also adapted to cofferdam work, mine sinking, etc. They have proved themselves one of the most useful types of equipment for the Excavating Contractor. They not only handle the accumulated water, but also pump a large amount of material which would otherwise be removed by other means. In fact, it is not unusual to see two men shoveling sand from the discharge outlet of a 3-in. pump.

Their shape is such that they fit between narrow ledges and into shafts of small diameter.



CONDENSED CAPACITY TABLE SINKING PUMPS

Capacity, g.p.m.		Total head in feet				
		50	100	150	200	300
100	Size	2	2	3	2½	2½
	hp.	3	5	10	15	20
150	Size	3	3	3	2½	2½
	hp.	5	10	15	20	25
250	Size	3	3	3	2½	2½
	hp.	7½	15	20	25	40
500	Size	4	5	3	3	4
	hp.	10	25	40	50	75
1000	Size	6	6	5	5	6
	hp.	20	40	60	75	125

HOFFMAN-ECONOMY PUMPS FOR HEATING SYSTEMS

Return Line Vacuum Pumps

Uses—These pumps perform three duties:

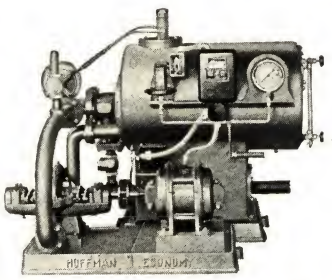
(1) Remove air from the heating system.

(2) Maintain a vacuum on the return main, thus accelerating circulation at low pressures.

(3) Return condensate to the boiler.

All Hoffman-Economy Vacuum Pumps are capable of establishing a maximum vacuum of 24 in. in the smaller sizes, and higher in the larger sizes. This makes them particularly adaptable for use on automatically fired systems where there is a possibility of a high induced vacuum on the boiler.

They are capable of handling water almost at the boiling point.



Single Return Line Vacuum Pump

Standard Equipment—The units come complete, ready to run, including full automatic control for both vacuum and float operations, built-in accumulator tank, vacuum gauge, strainer, water level gauge, etc.

Duplex units are of the same general design as a single unit and consist of one tank, one float switch, two pumps, two motors and two vacuum regulators. Each pump is valved.

CAPACITY TABLE—RETURN LINE VACUUM PUMPS
All Pumps for 20 Lbs. Discharge Pressure

Pump No.	Capacity, direct cast iron radiation or equivalent, sq. ft.	Water capacity, g.p.m.	Air capacity, cu. ft. min.	Orifice size, in.*	Motor hp.	Approx. shipping weight, lb.
V-0 §	1,500	3	1	1/16	1/2	400
V-1A	3,500	7	2	3/32	3/4	700
V-2	5,000	9	3	7/64	1	750
V-2A	7,000	13	4	1/8	1	750
V-3A	12,000	18	7	11/64	1 1/2	950
V-4	16,000	22	9	3/16	2	1,025
V-5	20,000	28	12	7/32	3	1,150
V-6	26,000	35	16	1/4	5	1,300
V-7	40,000	60	20	9/32	5	1,550
V-8	65,000	90	35	3/8	7 1/2	1,800
V-9	100,000	140	48	7/16	10	3,100
V-10	150,000	210	102	9/16 & 5/16	15	4,000
V-11	250,000	350	130	23/32	25	6,000

§Discharge pressure, V-0, 10 lb.

*Size of sharp edge orifice in 1/8-in. plate through which pump maintains 10-in. vacuum.

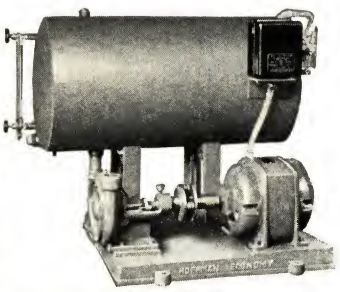
Condensation Pumps

Uses—Low pressure units are used for drainage or radiation below water line and for acceleration of circulation in low pressure gravity heating systems.

Medium and high pressure condensation pumps are used in laundries, cleaning and dyeing plants, greenhouses, textile mills, power plants, etc., where it is desired to return condensate to medium and high pressure boilers or heaters.

Description—The unit consists of a pump, motor and receiving tank with float control, which starts the pump whenever the water level in the tank rises. The unit is sturdily and compactly designed and assembled on a cast iron base.

Single stage pumps are used on the low pressure units and multi-stage pumps on the medium and high pressure units.



Low Pressure Condensation Pump

LOW PRESSURE PUMPS AND RECEIVERS

Unit No.	Capacity, direct cast iron radiation or equivalent, sq. ft.	Capacity in lb. condensate per hour	Pump capacity, g.p.m.	Motor hp.			
				10 lb. pressure	15 lb. pressure	20 lb. pressure	30 lb. pressure
LP-10	1,000	250	2	1/4	.....	.....	.....
LP-30	3,000	750	5	1/4	1/2	3/4	.....
LP-60	6,000	1,500	12	1/4	1/2	3/4	1
LP-100	10,000	2,500	20	1/4	1/2	3/4	1 1/2
LP-150	15,000	3,750	30	1/2	1/2	3/4	2
LP-200	20,000	5,000	40	1/2	3/4	1	2
LP-300	30,000	7,500	53	1/2	3/4	1	2
LP-400	40,000	10,000	80	1	1 1/2	1 1/2	3
LP-700	70,000	17,500	135	2	2	3	5

MEDIUM AND HIGH PRESSURE PUMPS AND RECEIVERS

Unit No.	Capacity, direct cast iron radiation or equivalent, sq. ft.	Capacity in lb. condensate per hour	Pump capacity, g.p.m.	Motor hp.			
				40 lb. pressure	60 lb. pressure	100 lb. pressure	175 lb. pressure
MP-60	6,000	1,500	12	1 1/2	3	5	7 1/2
MP-100	10,000	2,500	20	1 1/2	3	5	7 1/2
MP-150	15,000	3,750	30	2	3	5	10
MP-200	20,000	5,000	40	2	3	5	10
MP-300	30,000	7,500	53	3	5	10	15
MP-400	40,000	10,000	80	5	5	10	20
MP-700	70,000	17,500	135	7 1/2	10	10	25

The above are condensed tables. Complete range of sizes to 300,000 sq. ft. radiation capacity and 400 lbs. pressure.

Vertical Underground Pumps and Receivers

Uses—On gravity heating systems, where returns are located below floor level or otherwise too low for horizontal pumps.

Installation—Cast iron receiver is installed below floor and is cemented in, flush with floor. No provision need be made for access to tank. All apparatus is removable through the cover.

Duplex Unit—Duplex unit consists of two pumps, two motors and two sets of automatic control installed in a single tank.

Description—Pumps are special vertical centrifugals with enclosed bronze impellers of the non-overloading type. The upper shaft bearing is of the ball bearing type mounted in dustproof housing; lower bearing is self-lubricated and is easily renewable without moving impeller from shaft or dismantling pump; shaft is protected in lower bearing by renewable sleeve, turned, ground and locked to shaft.

Underground Pump

VERTICAL UNDERGROUND PUMPS AND RECEIVERS

Unit No.	Capacity, direct cast iron radiation or equivalent, sq. ft.	Capacity in lb. condensate per hour	Pressure lb. per sq. in.	Pump capacity, g.p.m.	Motor hp.	Receiver dimensions, in.
U-30	3,000	750	10	6	1/4	16x30
U-31	3,000	750	15	6	1/2	20x30
U-32	3,000	750	20	6	3/4	20x30
U-50	5,000	1,250	10	10	1/4	16x30
U-51	5,000	1,250	15	10	1/2	20x30
U-52	5,000	1,250	20	10	3/4	20x30
U-80	8,000	2,000	10	16	1/4	18x30
U-81	8,000	2,000	15	16	1/2	20x30
U-82	8,000	2,000	20	16	3/4	20x30
U-120	12,000	3,000	10	24	1/2	24x36
U-122	12,000	3,000	20	24	3/4	24x36
U-200	20,000	5,000	10	40	1/2	24x36
U-201	20,000	5,000	15	40	3/4	24x36
U-202	20,000	5,000	20	40	1	24x36
U-300	30,000	7,500	10	60	1	30x36
U-301	30,000	7,500	15	60	1 1/2	30x36
U-302	30,000	7,500	20	60	2	30x36

See Bulletin 420 for detailed description.

See Manufacturers' Index for Hoffman Specialty Co., Inc. pages describing above pumps in greater detail.

SELECTION OF DRAINAGE AND SEWAGE PUMPS

TYPES AND APPLICATION

This data applies to the following types of apparatus:

Standard Sump Pumps—For drainage where the water is free from large solids.

Usually operated submerged.

Non-clogging Sump Pumps—For handling ordinary domestic and industrial sewage without the use of a strainer. Usually operated submerged.

Open Shaft Pumps—For handling unscreened sewage in the more elaborate type of public buildings. These pumps are installed in dry chambers with suctions piped to the sump.

DETERMINATION OF PUMP CAPACITIES

Capacity for Seepage

Where seepage is to be handled an estimate must be made of the area to be drained and the maximum rise of water in any given length of time; this will determine the required capacity of pump..

Example: An area 50x25 ft. fills with water to a depth of 6 in. in one hour during the heaviest rainfall. It is desired to keep the area dry. The quantity of water to be handled is then

50x25 = 1250 sq. ft. x ½ = 625 cu. ft. per hour.
(A cubic foot contains 7½ gallons)
625x7½ = 4688 gals. per hour.
4688÷60 = 78 gallons per minute.

A pump operating continuously must have this capacity to keep this area dry. Under normal conditions the pump operation would be occasional.

There is no known method of computing seepage into any given excavation; it varies widely even in adjoining properties. Usually test holes or foundation excavations will reveal the maximum rise in water in any given period of time. This should be carefully observed during the wet season and the maximum pump capacity calculated from the observations made. Where the electrical supply is undependable or where sewers are undersize it is advisable to raise the pump motor high enough to prevent damage by flooding. This may be done by means of a cast iron concrete pump extension on which the standard cover may be mounted, or by means of Economy flood collars. Prices on such extensions or flood collars will be furnished on application.

Where extensions are used the pump length or sump depth must be measured from the top of the extension to the bottom of the sump. (The height of the extension usually is from 12 to 36 in.)

Capacity for Sewage

The pump capacity which should be allowed for various fixtures is given below. These allowances are based upon the frequent use of all the different fixtures, such as would be the case in hotels, railroad depots, office buildings, etc.

In some buildings, such as warehouses, private apartment houses, etc., where the number of occupants are few compared to public buildings, capacity may be scaled down from figures given below.

Water closets	6 g.p.m.
Urinals	5 g.p.m.
Lavatories	5 g.p.m.
Bathtubs	5 g.p.m.
Shower baths	8 g.p.m.
Slop sinks, etc.	15 g.p.m.
Half-inch hose connections	5 g.p.m.
Automobile wash racks	15 g.p.m.
Floor drains	5 g.p.m.

Example: Assume a job having the following fixtures draining into the pump pit:

6 closets at 6 g.p.m.	36
6 lavatories at 5 g.p.m.	30
2 shower baths at 8 g.p.m.	16
1 sink at 15 g.p.m.	15
2 half-inch hose at 5 g.p.m.	10
Pump size	107 g.p.m

The above is the required capacity if no provision need be made for seepage. A pump should, therefore, be selected having a capacity of from 100 to 150 g.p.m. against a head equal to the difference in elevation between the low water level in the pump pit to the highest point of the pump discharge, plus the pipe friction.

DETERMINATION OF HEAD

The head given in the table is the total obtained by taking the distance from the low water level in the sump to the highest point of discharge, and adding to it the friction in the intervening piping.

For example: Consider a pump having a capacity of 150 g.p.m. installed in a sump 5 ft. deep and discharging into a sewer line 20 ft. above the pump floor level through a discharge pipe 150 ft. long and 4 in. in diameter.

Total head = 4 ft. (depth of lowest water level in sump) + 20 ft. (static head) + 4 ft. (friction through 150 ft. of 4 in. pipe, as determined from standard friction table) = 4+20+4 = 28 ft. total head.

As the tables do not show a head of 28 ft. a pump should be selected for a head just over this figure, usually 30 ft.

DETERMINATION OF SUMP OR BASIN SIZE

It is advisable to make the basin size as large as practical for the individual job. The contents of the basin or sump between high and low water level should be approximately twice the capacity of the pump in gallons per minute. In selecting the depth it must be remembered that the high water level must be somewhat lower than the lowest drain and that the low water level will be approximately 1 ft. above bottom of the basin. The correct basin depth will be the distance between high and low water level plus the distance from the floor to the lowest drain or inlet, plus 1 ft.

For example: Consider a 150 g.p.m. pump having the lowest drain 2 ft. below the floor level. A pump of this capacity requires approximately 300 gallons storage. If a 48-in. basin is used having a capacity of 94 gallons per foot of depth the distance between high and low water level, to give the proper storage, will be 300 ÷ 94 = approximately 3¼ ft. To this depth must be added 2 ft., the distance to the lowest drain, and 1 ft. pump clearance at the bottom of the basin, giving us a total depth of 6¼ ft. Either a basin 6 ft. in depth or 6½ ft. in depth should then be used. If a larger diameter basin is used the depth will be less, while if a smaller basin is used the depth for the required capacity will, of course, be greater.

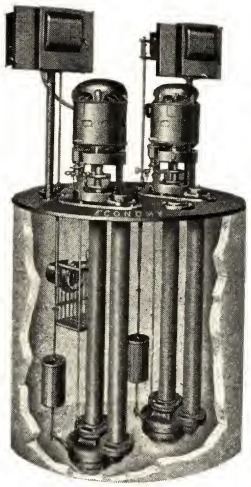
CAPACITIES OF BASINS IN GALLONS

Basin depth*, ins.	Basin diameter, in.							
	24	30	36	42	48	54	60	72
30.....	59	92	132	180	235	298	368	528
36.....	71	110	158	216	282	358	441	632
42.....	82	129	185	252	330	417	514	740
48.....	94	147	211	288	376	477	588	844
60.....	118	184	264	360	470	595	735	1056
72.....	141	221	317	432	565	715	882	1268
96.....	188	294	423	576	753	954	1175	1692
120.....	235	368	528	720	940	1190	1470	2112

*To this depth must be added 1 ft. at bottom for pump and float clearance, plus the depth of lowest inlet. If the lowest inlet is 12 in. down, then 24 in. must be added to the depth required to give the required capacity in gallons.

ECONOMY SUMP PUMPS FOR GENERAL SERVICE

Capacities up to 450 G.P.M.—Heads up to 100 Ft.



Duplex Unit

Uses—Economy General Service Sump Pumps are used for handling seepage, draining basements, boiler pits, scale and elevator pits and similar excavations where the water is free from large solids.

Construction—Economy General Service Sump Pumps are of the drop leg type designed for easy, simple erection.

They are ruggedly built with many refinements of mechanical design.

Renewable bronze bearings with high pressure grease lubrication, ball bearing driving heads with built-in motors, turned and ground shafts, guided floats and cover plates separable from pump are only a few of the many features found in the Economy design.

Speeds—The desired capacity and head can be obtained at any one of several speeds.

We therefore list several speeds for each capacity.

Any of these speeds will give thoroughly satisfactory operation.

The slower speed units are slightly more expensive than the higher speed units.

Architects' Specifications

Furnish and install where shown on the plans a No. ..... (single or duplex) Economy Standard Sump Pump, having a capacity of ..... g.p.m. against a total head of ..... feet.

The motor current characteristics shall be ..... phase, ... cycle, ... volt. The motors and electrical controls shall conform to the National Electrical Code.

Each pump shall be equipped with adjustable radial ball thrust bearings at the motor floor level, bronze renewable guide bearings and bronze impeller. Each pump shall be independently mounted on its motor base plate, and shall be removable without disturbing the basin cover. A complete set of automatic control equipment including float shall be provided for each pump. Float rods shall be of brass. Lubrication to all bearings shall be from a single high pressure gun.

Single Unit

Provide a .... diameter by .... deep cast iron pump basin with .... inch inlets. Cast iron basin cover to be furnished by the pump manufacturers. Provide a swing check valve and a gate valve in the discharge from each pump.

The manufacturers shall guarantee the capacity and efficiency of the pump as well as its mechanical operation.

CONDENSED SELECTION TABLE—GENERAL SERVICE SUMP PUMPS

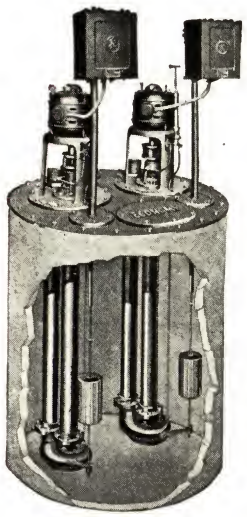
Unit No.	Capacity, g.p.m.	Total head in feet water	R.p.m.	Size of discharge, in., and type of pump	Motor hp.	Recommended basin diameter, in.	
						Single	Duplex
SD-401	15—20	10	1750	1 -VS	¼	18	30
SD-402	15—20	15	1750	1 -VS	¼	18	30
SD-403	15—20	25	1750	1½-VSL	½	24	42
SD-404	15—20	30	1750	1½-VSL	¾	24	42
SD-405	15—20	40	1750	1½-VS	¾	30	42
SD-406	15—20	50	1750	1½-VS	1	30	42
SD-407	25—30	15	1150	1½-VS	½	30	42
SD-408	25—30	20	1750	1½-VSL	½	24	42
SD-409	25—30	25	1750	1½-VSL	¾	24	42
SD-410	25—30	30	1750	1½-VS	¾	30	42
SD-411	25—30	40	1750	1½-VS	1	30	42
SD-412	25—30	50	1750	1½-VS	1½	30	42
SD-413	35—40	15	1150	1½-VS	½	30	42
SD-414	35—40	20	1750	1½-VSL	½	24	42
SD-415	35—40	25	1750	1½-VSL	¾	24	42
SD-416	35—40	30	1150	2½-VS	1	42	48
SD-417	35—40	35	1750	1½-VS	1	30	42
SD-418	35—40	50	1750	1½-VS	1½	30	42
SD-419	50—60	10	1150	2½-VSL	½	36	42
SD-420	50—60	15	1150	2½-VSL	¾	36	42
SD-421	50—60	20	1150	2½-VS	1	42	48
SD-422	50—60	20	1750	1½-VSL	¾	24	42
SD-423	50—60	45	1750	1½-VS	1½	30	42
SD-424	50—60	70	1750	2½-VS	3	42	48
SD-425	75—100	10	1150	2½-VSL	¾	36	42
SD-426	75—100	25	1150	2½-VS	1½	42	48
SD-427	75—100	25	1750	2½-VSL	1½	36	42
SD-428	75—100	50	1750	2½-VS	3	42	48
SD-429	75—100	70	1750	2½-VS	5	42	48
SD-430	75—100	80	1750	4 -VS	7½	48	60
SD-431	100—125	10	860	3 -VS	1	42	48
SD-432	100—125	15	1150	3 -VS	1½	42	48
SD-433	100—125	25	860	4 -VS	2	48	60
SD-434	100—125	25	1150	3 -VS	2	42	48
SD-435	100—125	25	1750	2½-VSL	2	36	42
SD-436	100—125	40	1750	2½-VS	3	42	48
SD-437	100—125	45	1150	4 -VS	3	48	60
SD-438	100—125	60	1150	4 -VSH	5	48	60
SD-439	100—125	70	1750	2½-VS	5	42	48
SD-440	100—125	80	1750	4 -VS	7½	48	60
SD-441	150—175	15	860	4-VS	1½	48	60
SD-442	150—175	20	860	4-VS	2	48	60
SD-443	150—175	20	1750	3-VS	2	42	48
SD-444	150—175	30	860	4-VSH	3	48	60
SD-445	150—175	30	1750	3-VS	3	42	48
SD-446	150—175	40	1150	4-VS	3	48	60
SD-447	150—175	60	1150	4-VSH	7½	48	60
SD-448	150—175	60	1750	3-VS	5	42	48
SD-449	150—175	70	1150	4-VSH	10	48	60
SD-450	150—175	80	1750	4-VS	10	48	60
SD-451	200—250	15	860	4-VS	2	48	60
SD-452	200—250	15	1150	4-VS	2	48	60
SD-453	200—250	25	860	4-VSH	3	48	60
SD-454	200—250	25	1150	4-VS	3	48	60
SD-455	200—250	25	1750	4-VS	3	48	60
SD-456	200—250	40	860	4-VSH	7½	48	60
SD-457	200—250	40	1150	4-VS	5	48	60
SD-458	200—250	60	1750	4-VS	7½	48	60
SD-459	200—250	70	1750	4-VS	10	48	60
SD-460	200—250	80	1750	4-VS	15	48	60
SD-461	300—350	15	860	4-VSH	3	48	60
SD-462	300—350	15	1150	4-VS	3	48	60
SD-463	300—350	15	1750	4-VS	3	48	60
SD-464	300—350	30	860	4-VSH	5	48	60
SD-465	300—350	30	1150	4-VSH	5	48	60
SD-466	300—350	30	1750	4-VS	5	48	60
SD-467	300—350	40	1150	4-VSH	7½	48	60
SD-468	300—350	40	1750	4-VS	7½	48	60
SD-469	300—350	60	1150	4-VSH	10	48	60
SD-470	300—350	80	1750	4-VS	15	48	60
SD-471	400—450	10	1150	4-VSH	3	48	60
SD-472	400—450	15	860	5-VSH	5	60	72
SD-473	400—450	20	860	5-VSH	7½	60	72
SD-474	400—450	20	1150	4-VSH	5	48	60
SD-475	400—450	25	1750	4-VS	5	48	60
SD-476	400—450	35	1750	4-VS	7½	48	60
SD-477	400—450	40	1750	4-VSH	10	48	60
SD-478	400—450	50	1150	4-VSH	15	48	60
SD-479	400—450	50	1750	4-VS	10	48	60
SD-480	400—450	60	1750	4-VS	15	48	60

When any of the above pumps are used for sewage a strainer bucket must be specified for each inlet. See Bulletins 407-418-419 for detailed description.

ECONOMY NON-CLOGGING SUMP PUMPS OR SEWAGE EJECTORS

(Submerged Type)

Capacities up to 5000 G.P.M.—Heads up to 120 Ft.



Duplex Unit

Uses—Ejection of sewage and drainage of sumps where solids are encountered.

Capacities less than 100 g.p.m. are not listed because smaller capacities do not permit the use of waterways sufficiently large to pass solids.

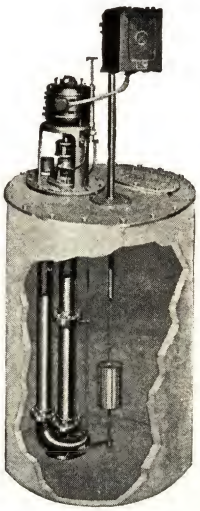
Construction — These pumps are of heavy duty design. They are built to withstand the shocks which occur when heavy solids enter the impellers.

All sizes are equipped with shaft sleeves and lower bearings which extend around the impeller hub. This construction lowers maintenance cost and increases the life of the apparatus.

Speeds—The desired capacity and head can usually be obtained at any one of several pump speeds. The slower speed units are somewhat more expensive than the higher speed units. The slower speed usually results in longer life than the higher speed.

Standard Installations — These pumps may be installed as either single or duplex units in a single sump.

Dry Chamber Installations—These pumps may be installed in dry pits by piping the suction and discharge connections. Such installations may be erected with comparatively unskilled labor.



Single Unit

WIDTH OF WATERWAYS IN INCHES

Size of pump	3-SSV	4-SVL	4-SSV	6-SSV	8-SSV	10-SSV	12-SSV
Width of waterway	2¼	2¼	2½	3¾	5	7	9

If solids of larger than the above will be encountered it is necessary to provide suitable trash screens.

CONDENSED SELECTION TABLE—NON-CLOG SUMP PUMPS OR SEWAGE EJECTORS

Unit No.	Capacity, g.p.m.	Total head in feet water	R.p.m.	Size discharge, in., and type of pump	Motor hp.	Recommended basin diameter, in.	
						Single	Duplex
SF-302	100	10	860	4-SVL	1	42	48
SF-315	100	15	860	3-SSV	1½	42	48
SF-404	100	20	860	3-SSV	2	42	48
SF-407	100	30	860	4-SSV	3	48	60
SF-409	100	40	860	4-SSV	5	48	60
SF-309	100	15	1150	4-SVL	1	42	48
SF-310	100	25	1150	4-SVL	2	42	48
SF-308	100	40	1150	3-SSV	3	42	48
SF-410	100	50	1150	4-SSV	5	48	60
SF-411	100	70	1150	4-SSV	7½	48	60
SF-330	100	30	1750	4-SVL	2	42	48
SF-331	100	40	1750	4-SVL	3	42	48
SF-332	100	50	1750	4-SVL	5	42	48
SF-334	100	90	1750	3-SSV	7½	42	48
SF-336	100	120	1750	4-SSV	15	48	60
SF-313	150	10	860	4-SVL	1	42	48
SF-337	150	15	860	3-SSV	2	42	48
SF-423	150	35	860	4-SSV	3	48	60
SF-338	150	40	860	4-SSV	5	48	60
SF-316	150	20	1150	4-SVL	1½	42	48
SF-318	150	35	1150	3-SSV	3	42	48
SF-421	150	40	1150	3-SSV	5	42	48
SF-339	150	80	1150	4-SSV	10	48	60
SF-340	150	40	1750	4-SVL	3	42	48
SF-341	150	60	1750	3-SSV	5	42	48
SF-342	150	80	1750	3-SSV	7½	42	48
SF-344	150	120	1750	4-SSV	15	48	60
SF-425	200	10	860	4-SVL	1½	42	48
SF-426	200	15	860	4-SSV	2	48	60
SF-428	200	25	860	4-SSV	3	48	60
SF-430	200	40	860	4-SSV	5	48	60
SF-345	200	15	1150	4-SVL	1½	42	48
SF-327	200	30	1150	3-SSV	3	42	48
SF-431	200	40	1150	4-SSV	5	48	60
SF-346	200	80	1150	4-SSV	10	48	60
SF-349	200	50	1750	4-SVL	7½	42	48
SF-351	200	90	1750	4-SSV	10	48	60
SF-353	200	120	1750	4-SSV	20	48	60
SF-442	300	10	860	4-SSV	2	48	60
SF-444	300	15	860	4-SSV	3	48	60
SF-445	300	30	860	4-SSV	5	48	60
SF-363	300	40	860	4-SSV	7½	48	60
SF-364	300	15	1150	4-SSV	2	48	60
SF-446	300	30	1150	4-SSV	5	48	60
SF-447	300	50	1150	4-SSV	7½	48	60
SF-365	300	80	1150	4-SSV	15	48	60
SF-458	400	10	860	4-SSV	3	48	60
SF-460	400	25	860	4-SSV	5	48	60
SF-662	400	35	860	4-SSV	7½	48	60
SF-459	400	20	1150	4-SSV	5	48	60
SF-463	400	35	1150	4-SSV	7½	48	60
SF-464	400	50	1150	4-SSV	10	48	60
SF-471	400	70	1150	4-SSV	15	48	60
SF-475	400	50	1750	4-SSV	10	48	60
SF-476	400	90	1750	4-SSV	15	48	60
SF-477	400	120	1750	4-SSV	20	48	60
SF-478	500	10	680	6-SSV	3	60	72
SF-479	500	20	680	6-SSV	5	60	72
SF-481	500	30	680	8-SSV	7½	72	96
SF-483	500	10	860	4-SSV	3	48	60
SF-468	500	20	860	4-SSV	5	48	60
SF-671	500	30	860	4-SSV	7½	48	60
SF-693	500	40	860	6-SSV	10	60	72
SF-694	500	50	860	6-SSV	15	60	72
SF-695	500	40	1150	4-SSV	10	48	60
SF-696	500	70	1150	4-SSV	15	48	60
SF-700	500	120	1750	4-SSV	25	48	60
SF-701	750	15	680	8-SSV	5	72	96
SF-702	750	30	680	8-SSV	10	72	96
SF-703	750	40	680	8-SSV	15	72	96
SF-704	750	10	860	6-SSV	5	60	72
SF-681	750	20	860	6-SSV	7½	60	72
SF-683	750	30	860	6-SSV	10	60	72
SF-705	750	40	860	6-SSV	15	60	72
SF-685	750	60	1150	6-SSV	20	60	72
SF-708	750	80	1150	6-SSV	30	60	72
SF-710	750	120	1750	6-SSV	50	60	72
SF-894	1250	10	680	8-SSV	5	72	96
SF-896	1250	20	680	8-SSV	10	72	96
SF-906	1250	40	680	8-SSV	20	72	96
SF-908	1250	60	860	8-SSV	40	72	96
SF-912	1250	100	1150	6-SSV	50	60	72
SF-1126	2500	10	680	10-SSV	10	96	120
SF-1132	2500	30	680	10-SSV	30	96	120
SF-1141	2500	50	860	8-SSV	50	72	96
SF-1143	2500	80	1150	8-SSV	100	72	96
SF-1167	5000	10	680	12-SSV	25	120	120
SF-1169	5000	20	680	12-SSV	40	120	120
SF-1171	5000	30	680	12-SSV	75	120	120
SF-1174	5000	60	860	12-SSV	125	120	120
SF-1176	5000	100	1150	12-SSV	200	120	120

ECONOMY NON-CLOGGING DRY CHAMBER PUMPS OR SEWAGE EJECTORS

Capacities up to 500 G.P.M.—Heads up to 60 ft.

Uses

For the ejection of drainage which contains solids or sewage. Their function is the same as that of the submerged non-clogging pumps described on page 9. They are used in the more elaborate type of building where first cost is not a major consideration.

Advantages

These pumps are not submerged in the sewage, but are accessible during operation and naturally are favored by attendants because of easier inspection and maintenance.

Design

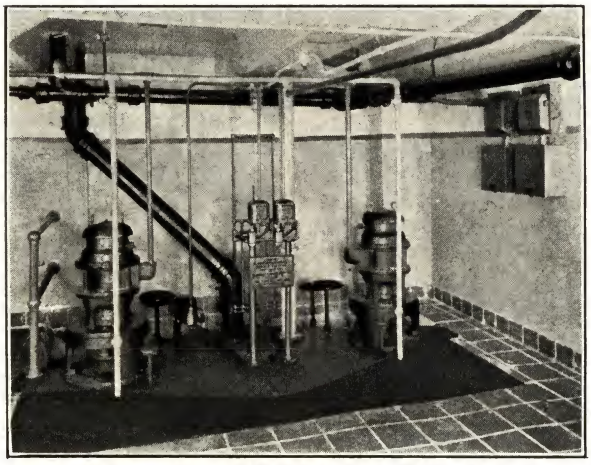
Pumps are of full ball bearing type, adjustable for wear without disassembling. Handholes are provided in both suction and discharge for inspection of interior; shock bearings and shaft sleeves are provided in the interior of the pump. These pumps are capable of passing solids from 2¼ to 10-in. diameter and to withstand the shocks which result from entry of solids into the pump.

Types of Installations

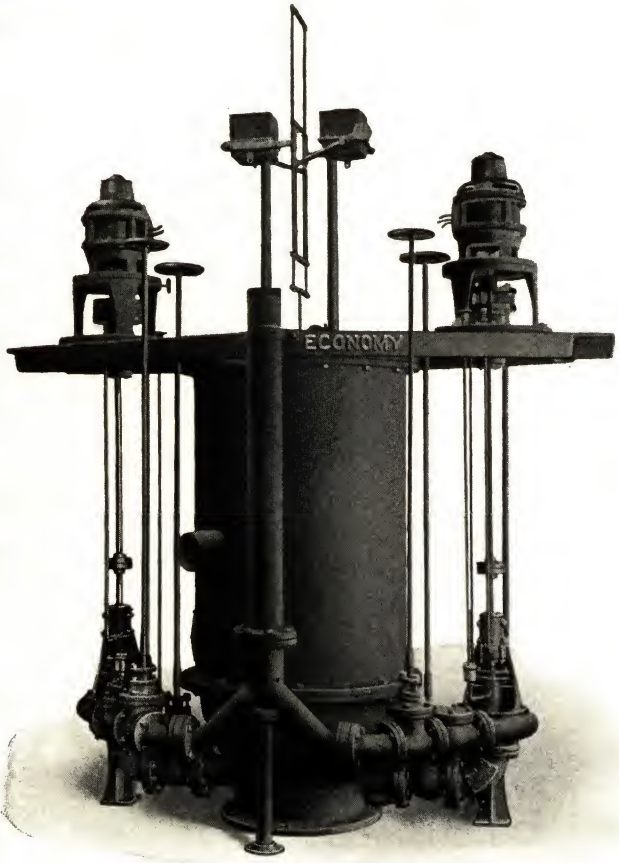
Two types of installations are offered. One has the sewage receptacle located between the pumps (Type CB) and the other type consists of a single large tank divided vertically in the center, one half housing the pumps and the other half housing a sewage receptacle (Type OB).

Both types of apparatus are factory erected and knocked down for shipment.

Type OB—This is the most popular dry chamber design as it combines accessibility with the maximum capacity of wet or sewage chamber.



Motor and Control Floor, 300 G.P.M. Type CB Dry Basin Ejector
Installed in one of the country's finest and largest office buildings, the Pacific Telephone & Telegraph Building, San Francisco



Type CB Center Tank Ejector

Type CB—This type of installation affords maximum accessibility as the pumps are conveniently located at the sides of the sewage receptacle.

Equipment Included

With either type of installation the following equipment is included:

(1) Pumps.
(2) Tank.
(3) All necessary valves and piping from the sewage tank to the pumps and up to the floor level.
(4) All electrical apparatus including suitable panelboard, high water alarm, etc.

Construction

(1) Impeller—A bronze, wide waterway type, designed to handle pulpy materials. Locked on the shaft between a shoulder and countersunk nut so there are no protruding surfaces about which rags or string may twist. The position of the impeller is adjustable without removing the coupling from the shaft.

(2) Bearings—Entire weight of rotor assembly carried by two widely separated radial ball bearings.

(3) Shock Bearing—Bronze renewable shock bearing at impeller hub prevents shaft deflection in case stones or other heavy objects enter the impeller.

(4) Lubrication—Grease lubrication from driving floor level seals bearings so pump may operate in case of emergency flooding.

(5) Cleanouts—In both suction and discharge. Eliminates breaking of pipe connections if any solids which enter the suction piping are too large to enter the pump.

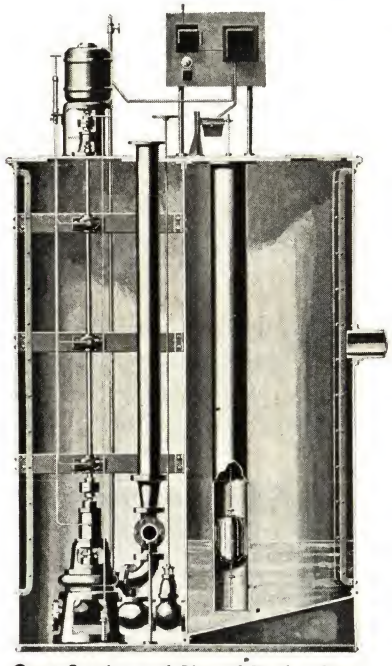
ARCHITECTS' SPECIFICATIONS

Furnish and install where shown on the plan a No. .... Economy Open Shaft Vertical Dry Chamber, Non-clogging Ejector, Type OB or Type CB, having a capacity of .... g.p.m. when discharging against a total head of .... feet at a speed of .... r.p.m.

The motor current characteristics shall be .... phase, ... cycle, ... volt. The motor and electrical control shall conform to the National Electrical Code and shall be complete with overload and undervoltage protection.

The pump shall be suitable for handling sticks, stones, rags and raw sewage without clogging. The impeller shall be of bronze, two-blade, wide waterway type. The rotor assembly shall be carried in two widely separated radial ball bearings mounted in a tight housing with provision for grease lubrication from the driving floor level. A bronze shock bearing shall be provided at the impeller hub to prevent shaft deflection in case of stones or other heavy objects entering the impeller.

The suction elbow shall be of the cast iron flanged type with a large clean-out opening for removal of any solids which enter the suction piping and are too large to enter the pump. The pump shall be filled and painted in duco before shipment. The manufacturers shall guarantee the capacity and efficiency of the pump as well as its mechanical operation.

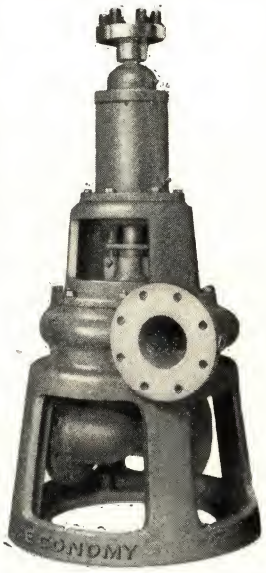


Cross Section and Plan of Duplex Steel Tank Ejector Type OB

TABLE OF CAPACITIES COVERING BOTH TYPE CB AND TYPE OB

Pump No.		1	2	3	4
Capacity g. p. m.		150	250	350	500
Hp. at 15-ft. head		2	3	5	5
Hp. at 25-ft. head		3	5	5	7½
Hp. at 40-ft. head		5	5	7½	10
Hp. at 60-ft. head		7½	10	15	20
Diam. of pit, ft.		8	8	8	10
Wet well capacity, gallons per foot of depth below inlet	Type CB	53	72	94	147
	Type OB	188	188	188	394
Size discharge duplex unit, in.		4	6	6	8

Sump should be of sufficient size to permit 10 to 15 minute flow from sewers between pump operations.



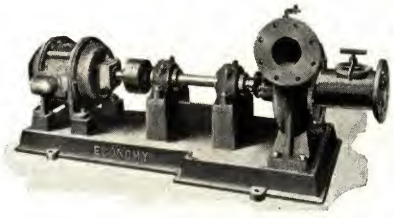
Close-up of Pump Unit Used in Dry Chamber Installations

ECONOMY HORIZONTAL NON-CLOGGING PUMPS

Capacities up to 3000 G.P.M.—Heads up to 60 Ft.

Horizontal sewage pumps may sometimes be substituted for vertical dry chamber or submerged designs.

They offer the advantage of accessibility, but are not always suitable for building use because of floor space or because of high suction lifts. They are extensively used in buildings located on the sides of hills, in subdivisions, municipal sewage pumping plants and other installations where peculiar conditions justify their use.



They are equipped with the same efficient non-clogging impellers as are used in the vertical designs. Handholes are provided for access to the interior of the pumps. Shock bearings are provided around the impeller hub. Double outboard ball bearings carry the normal load.

Architects' Specifications

Furnish and install where shown on the plan ..... Economy Horizontal Non-clogging Pump having a capacity of .... g.p.m. when discharging against a total head of .... feet at a speed of .... r.p.m.

The motor current characteristics shall be .... phase, ... cycle, ... volt. The motor and electrical control shall conform to the National Electrical Code and shall be complete with overload and undervoltage protection.

The pump shall be suitable for handling raw sewage without clogging. The impeller shall be bronze, two-blade, wide waterway type. The weight of the shaft and impeller shall be carried on two widely separated antifriction bearings of the self-aligning type. They are to be enclosed in split dustproof housing, designed for grease lubrication.

The suction fitting shall be flanged with a large clean-out for removal of any solids which are too large to enter the pump. The pump shall be filled and painted with duco before shipping.

The manufacturers shall guarantee the capacity and efficiency of the pump as well as its mechanical operation.

CONDENSED SELECTION TABLE HORIZONTAL NON-CLOGGING PUMPS

Capacity, g. p. m.		Total head in feet					
		15	20	25	30	40	50
100	Size	3	3	3	3	4	4
	hp.	1½	1½	2	2	5	5
	r.p.m.	1150	1150	1150	1150	1150	1150
150	Size	3	4	4	4	4	4
	hp.	2	3	5	5	5	5
	r.p.m.	850	850	850	850	1150	1150
300	Size	4	4	4	4	4	4
	hp.	2	3	5	5	7½	10
	r.p.m.	850	850	850	850	1150	1150
500	Size	4	6	6	6	6	6
	hp.	5	5	7½	7½	15	15
	r.p.m.	850	850	850	850	1150	1150
750	Size	6	6	6	6	6	6
	hp.	7½	7½	10	10	15	20
	r.p.m.	850	850	850	850	1150	1150
1000	Size	6	6	8	8	8	8
	hp.	7½	10	15	15	20	25
	r.p.m.	850	850	850	850	850	850
1500	Size	8	8	8	8	8	10
	hp.	10	15	15	20	25	40
	r.p.m.	670	670	670	850	850	850
2000	Size	8	8	10	8	8	10
	hp.	15	20	25	25	30	50
	r.p.m.	670	670	670	850	850	850
3000	Size	10	10	10	10	10	10
	hp.	25	30	40	40	50	60
	r.p.m.	670	670	850	850	850	850

ESTABLISHED 1848

GOULDS PUMPS, INCORPORATED

Manufacturers of Pumps for Every Service

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CLEVELAND, OHIO, 627 Union Trust Building
HOUSTON, TEX., 2114 Second National Bank Building
NEW YORK, N. Y., 16 Murray Street and 19 Park Place
PHILADELPHIA, PA., 111 North 3rd Street
PITTSBURGH, PA., 636 H. W. Oliver Building
TULSA, OKLA., 213 E. Archer Street

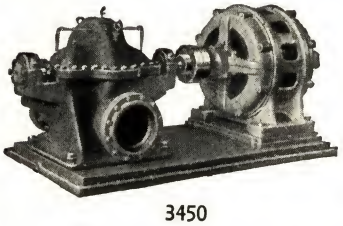
REPRESENTATIVES IN ALL OTHER PRINCIPAL CITIES

CENTRIFUGAL PUMPS FOR TANK FILLING AND GENERAL HOUSE SERVICE

Single Stage, Single and Double Suction

Ball Bearing Type

These are high grade centrifugal pumps for a wide range of capacities, high heads and high efficiencies at medium and high speeds—ratings formerly obtainable only with the more expensive multi-stage pumps. They are particularly suitable for house pumps in hotels, apartment houses and office buildings and as general service pumps.



3450

Construction—Cast iron casing divided horizontally; balanced impeller; deep groove, double-row, heavy duty ball bearings; alloy steel shaft; extra deep stuffing box with bronze water seal rings; cast iron horizontally split glands secured by swing bolts; bronze casing wearing rings; flexible pin-and-rubber-bushing type coupling; pump and driving unit mounted on cast iron bedplate having drip canal.

Four Constructions—***Standard Fitted***—Heat treated steel shaft and bronze or cast iron impeller, according to speed requirements.

Bronze Fitted—Stainless steel shaft and bronze impeller.

All-iron—Heat treated steel shaft and iron impeller.

All-bronze—Monel metal shaft and all parts, which come in contact with liquid, of bronze.

Figure No.	Pump size, in.	Pipe sizes, in.		Approx. capacity gal. per min.	
		Discharge	Suction	Min.	Max.
3480	1½	1½	2	15	200
3450	2	2	2	50	120
3470	3	3	3	75	375
3480	2½	2½	3	100	475
3450	4	4	5	300	600
3450	6	6	8	500	2000
3450	*14	14	16	2200	12,000
3450	*16	16	18	3000	15,000

*Companion flanges not furnished on pumps larger than 12 in.

Sleeve Bearing Type

Sound mechanical design ranks with high efficiency in these pumps which are the result of over 19 years of research and development in the centrifugal pump field.

Construction—Close grained, cast iron casing divided horizontally; balanced impeller; ring oiling type bearings with split cast iron shells lined with babbitt metal; ball thrust bearings; special alloy steel shaft; extra long stuffing box with brass water seal ring; horizontally split glands adjusted by swing bolts; bronze casing wearing rings; flexible pin-and-buffer type coupling; pump and motor mounted on cast iron bedplate with drip canal.

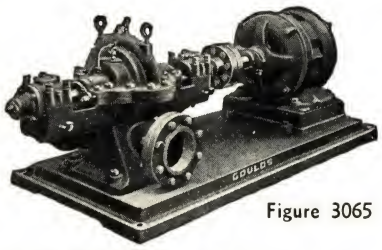


Figure 3065

Four Constructions—These pumps made in standard fitted, bronze fitted, all-iron fitted and all-bronze fitted constructions as described under ball bearing type pump.

FOR HEADS UP TO 231 FT.

Figure No.	Pump size, in.	Pipe sizes, in.		Approx. capacity gal. per min.	
		Discharge	Suction	Min.	Max.
3065	5	5	6	400	800
	6	6	8	600	1300
	8	8	10	1000	2700
	10	10	12	2000	4400
	12	12	14	3000	6000
3075	5	5	6	400	900
	6	6	8	600	1500
	8	8	10	1100	2900
3085	2	2	3	50	325
	3	3	4	150	350
	4	4	5	250	750
	5	5	6	400	1000
	6	6	8	800	1700
	8	8	10	1300	3000
3095	2	2	3	50	250
	3	3	4	200	450
	4	4	5	400	800
	6	6	8	500	2000

MEDIUM PRESSURE MULTI-STAGE CENTRIFUGAL PUMPS—VOLUTE TYPE, SINGLE SUCTION

These pumps are designed for use against very high heads and are therefore suited for use as house service pumps in very high buildings.

Features of Construction

Spiral water passages give free flow of water from suction to discharge without abrupt turns. Due to the construction of the casing, the energy conversion from velocity head to pressure head takes place in the volute itself. High efficiencies result.

These pumps have very few so-called sealing surfaces. This reduces the possibility of leakage from high pressure to lower pressure chambers and makes for high continued efficiency.

It is of very simple construction; by removing the upper half of the casing, the entire pump is opened for inspection. The rotating element may be removed and replaced with the same ease as in an ordinary single stage pump. Wearing rings are held in position by lugs which fit snugly into the casing.

Bearings are the ring oil type with split cast iron shells, lined with babbitt. Bearings are supported in horizontally divided housings, securely locked against rotation or lateral movement and sealed against leakage of oil or entrance of water or dust. Shells are removable without disturbing the voluting element.

A heavy duty, double acting, double-row ball thrust bearing running in a continuous oil bath, is furnished, to take care of any unbalanced thrust which might occur due to clogging, or unequal wear of the impeller sealing surface.

Every wearing surface is protected by a renewable part. It is not necessary to renew or rebore the casing because of wear.

Each impeller is hydraulically balanced. A double acting ball thrust bearing takes care of any unbalance due to wear.

Two volutes of equal size are placed diametrically opposite each other in each stage. This gives more perfect transformation of velocity into pressure, makes the pump more efficient and results in a strong symmetrical casing.

Types of Construction

Bronze Fitted Pumps—Have single suction enclosed type impellers, casing wearing rings, shaft sleeve water seal rings and bushings of bronze, shaft of alloy steel, heat treated, casing and glands of cast iron.

All-iron Pumps—Have all parts coming in contact with the liquid made of iron.

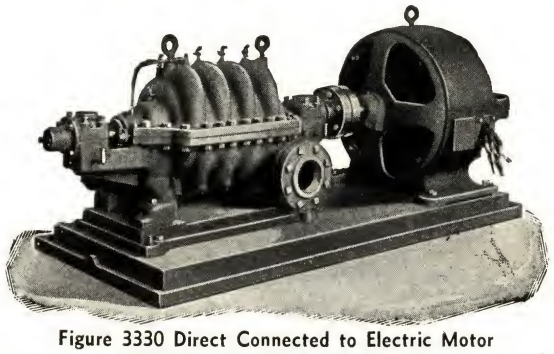


Figure 3330 Direct Connected to Electric Motor

SIZES AND CAPACITIES FIGURE 3330

Pump size, in.	Pipe size, in.		Approx. capacity, gal. per min.		Maximum number stages
	Suction	Discharge	Minimum	Maximum	
3	3	3	40	280	6
4	4	4	120	500	6
5	5	5	200	900	5
6	6	6	300	1700	5
8	8	8	350	2000	4

GOULDS NEW FLEXI-UNIT CENTRIFUGAL PUMPS

High Efficiency, Low Price, Ball Bearing, Self-venting, Non-clogging, Interchangeability of Parts, Stock Delivery

Single Stage Pumps—Figures 3057 and 3058

Particular attention is invited to the use of interchangeable standardized parts. From a minimum of such parts a line of motor driven centrifugal pumps to meet a wide range of heads and capacities may be assembled quickly. Pumps to meet any ordinary conditions may be shipped promptly from mill supply stocks without the delay formerly necessary for factory assembly. Only 11 casings and impellers, 8 bedplates, and 3 sizes of bearing housings with bearings, stuffing box assemblies and shafts are used for the entire range of ratings from 10 to 1100 gal. per minute.

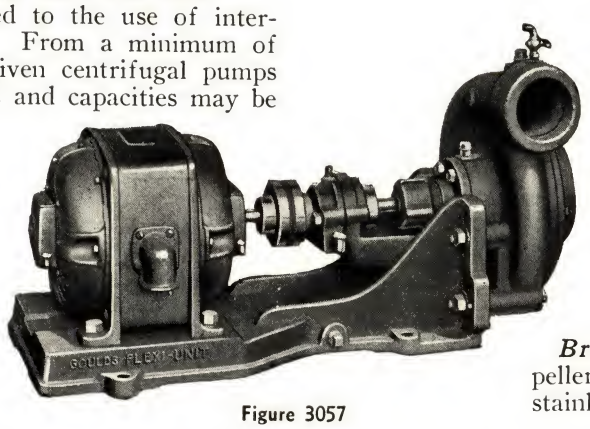


Figure 3057

Non-clogging Impeller—A most efficient type impeller for handling water containing coarse, stringy or fibrous materials. The vanes, two or three in number, warped and joined together to make a well rounded, continuous surface at the inlet, providing smooth surfaces which easily pass any foreign material without clogging.

Non-clogging Impeller

Four Constructions—***Standard Fitted***—Has iron impeller, steel impeller plate and steel shaft.

Bronze Fitted—Has bronze impeller, bronze impeller plate and stainless steel shaft.

All-iron—Has all parts coming in contact with the liquid of iron.

All-bronze—Has all parts coming in contact with the liquid of bronze, except shaft which is monel metal.

SIZES, CAPACITIES AND WEIGHTS (*1750 R.P.M.) FIGURES 3057 AND 3058

Pump		Pipe size, in.		Capacity, gal. per min.		Max. floor space, in.	** Ship. weight, lbs.
Figure No.	Size, in.	Discharge	Suction	Min.	Max.		
3057	1	1	1½	10	40	29 x 13	110
	1½	1½	2	10	75	29 x 13	120
	2	2	3	30	160	41 x 19	170
	3	3	4	60	375	41 x 19	190
	†4	4	6	100	625	63 x 33	275
3058	1½	1½	2	20	125	40 x 19	160
	2	2	3	50	240	61 x 33	270
	3	3	4	100	450	61 x 33	290
	†4	4	6	150	900	63 x 33	320
3357	1	1	1½	5	40	32 x 13	130
3358	1	1	1½	10	60	40 x 19	180

*Ratings for 1450, 2850 and 3450 r.p.m. furnished on application.
**Includes pump, bedplate and couplings for direct connected drive.
†4-in. pumps have flanged suction and discharge connections; all other sizes have screwed connections.

Two-stage—Figures 3357 and 3358

These two-stage pumps vary somewhat in construction from Figures 3057 and 3058; the general design is the same.

Bulletin No. 200 with Charts

This bulletin will prove invaluable when selecting a single stage centrifugal pump for any condition. It is devoted to types and sizes which take care of the average pump requirements and contains charts showing the extremely wide range of capacities and heads covered by these pumps. Sent upon request.

Bulletin No. 201 with Charts

Bulletin No. 201 contains invaluable information for selecting a multi-stage centrifugal pump for any condition. It is devoted to types and sizes which will take care of the average pump requirements and contains charts showing the extremely wide range of capacities and heads covered by these pumps. Sent upon request.

SPECIFICATIONS FOR GOULDS CENTRIFUGAL PUMPS

Furnish and install on concrete foundation where shown on plans, one Tank Filling and General House Service Pump, having a capacity of .... gallons per minute when pumping against a head of .... feet exclusive of friction and with city pressure figured at not more than .... pounds at suction of pump.

Pumps shall be Goulds Figure No. .... Centrifugal .... in. volute type, [ball] [sleeve] bearing, [single] [multi] stage, [single] [double] suction, [bronze] [all-iron] [all-bronze] fitted and adapted for [belt] [motor] [turbine] [gasoline engine] drive, for speed of .... r.p.m. Pump to be mounted on substantial cast iron bedplate and direct connected by flexible coupling to driving or belt-pulley shaft.

GOULDS PUMPS FOR FIRE, BOOSTER AND SPRINKLER SERVICE

Centrifugal Fire Pumps

Goulds Single Stage and Multistage Centrifugal Pumps are built to the specifications of the National Fire Protection Association and have been tested and listed as standard by the Underwriters' Laboratories, Inc., and the Associated Factory Mutual Fire Insurance Companies.

Goulds Centrifugal Fire Pumps can be used to discharge direct into hose lines, or in connection with automatic sprinkler systems. They are built for direct connection to electric motors, gasoline engines or steam turbines.

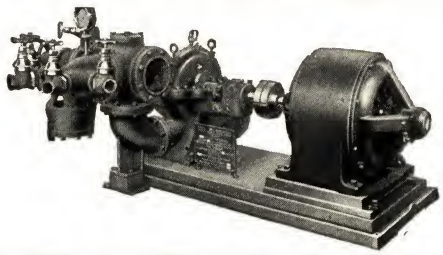


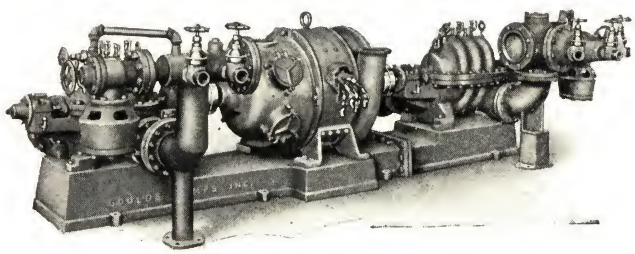
Figure 3099. No. 6 1000-gal. Single Stage Fire Pump

Special Fire Pumps

Special conditions often require special fire pump units which are designed and built for each individual installation. Local boards of fire underwriters pass on such units for approval. Unit shown below was approved for 40-story building. It consists of a Figure 3330, 6-in., 3-stage pump complete with Underwriters' fittings. Capacity 750 g.p.m., 175 lbs.; and a Figure 3330, 5-in., 2-stage pump complete with Underwriters' fittings. Capacity 500 g.p.m., 100 lbs.

Operated either singly or in series giving 1250 gal. for low pressure service and 500 gal. for 275 lbs. service.

Quotations and full recommendations furnished upon receipt of full information regarding requirements.



Goulds Special Fire Pumping Unit

TABLE SHOWING THE PUMP TO USE FOR ANY CONDITION

Type of drive	Capacity, gal. per min.	Number of 1½-in. fire streams	Speed, r.p.m.	100 lb. total pressure		125 lb. total pressure		150 lb. total pressure	
				Pump	Hp.	Pump	Hp.	Pump	Hp.
Electric motor	500	2	1450 1750	Figure 3014 No. 4—3-stage Figure 3014 No. 4—2-stage	50 50	Figure 3014 No. 4—3-stage	75	Figure 3014 No. 4—3-stage	75
	750	3	1450 1750	Figure 3014 No. 5—3-stage Figure 3014 No. 5—2-stage Figure 3099 No. 5	75 75 75	Figure 3014 No. 5—3-stage	100	Figure 3014 No. 5—3-stage	125
	1000	4	1150 1450 1750	Figure 3014 No. 6—3-stage Figure 3014 No. 6—2-stage Figure 3014 No. 6—2-stage Figure 3099 No. 6	100 100 100 100	Figure 3014 No. 6—2-stage	125	Figure 3014 No. 6—3-stage Figure 3014 No. 6—2-stage	150 150
	1500	6	1150 1450 1750	Figure 3014 No. 8—3-stage Figure 3014 No. 8—2-stage Figure 3014 No. 8—2-stage Figure 3089 No. 8	150 150 150 150	Figure 3014 No. 8—2-stage	200	Figure 3014 No. 8—3-stage Figure 3014 No. 8—3-stage	200 200
Steam turbine	500	2	1950	Figure 3014 No. 4—2-stage	52	Figure 3014 No. 4—2-stage	66	Figure 3014 No. 4—2-stage	80
	750	3	1950	Figure 3014 No. 5—2-stage	73	Figure 3014 No. 5—2-stage	96	Figure 3014 No. 5—2-stage	115
	1000	4	1950	Figure 3099 No. 6	90	Figure 3014 No. 6—2-stage	123	Figure 3014 No. 6—2-stage	151
	1500	6	1950	Figure 3089 No. 8	131			Figure 3014 No. 8—2-stage	200
Gasoline engine	500	2	1200	Figure 3014 No. 4—3-stage	54				
	1000	4	1200	Figure 3014 No. 6—3-stage	94				
	1500	6	1200	Figure 3014 No. 8—3-stage	131	Figure 3014 No. 8—3-stage	166		

SPECIFICATIONS FOR GOULDS PUMPS FOR FIRE, BOOSTER AND SPRINKLER SERVICE

Furnish and install on concrete foundation, where shown on plans one Fire, Booster and Sprinkler Service Centrifugal Pump, having a capacity of .... gallons per minute when discharging against a pressure of .... pounds with city pressure figured at ....

Pump shall be Goulds Figure No. .... [single] [multi] stage type mounted on a substantial cast iron bedplate with drip canal around four sides and direct connected by flexible coupling to [electric motor] [gasoline engine] [turbine] drive unit.

Regular equipment shall include all fittings and accessories called for by "N.F.P.A. Standard," such as hose valves, hose manifold, discharge casing, discharge elbow, air and starting valve and fittings, umbrella air cocks, priming connection, pressure and vacuum gauges, relief valve, discharge cone and capacity plate.

Complete installation shall conform to the National Fire Protection Association, Associated Factory Mutual Fire Insurance Companies and State and local fire prevention bureaus.

GOULDS SUMP PUMPS AND CELLAR DRAINERS

These pumps are designed to elevate to street sewers the drainage in buildings where the basement floors, boilers and elevator pits are below sewer level and for any other service where the liquid to be pumped accumulates in a catchbasin, pit or tank. This service requires a pump that is automatic in operation, needs a minimum of attention, occupies little floor space and is of the simplest, most rugged construction.

Goulds pumps fulfill all these requirements.

Goulds New Figure 3047 Sump Pumps

Goulds new sump pump, using a new type, non-clogging, high efficiency impeller will permit the use of motors one or two sizes smaller, and in many cases, motors which are only one-half the size generally required by vertical type pumps.

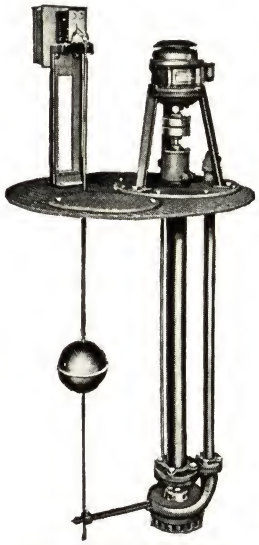


Figure 3047 Sump Pump

Non-clogging Impeller—A most efficient type for handling water containing coarse, stringy or fibrous materials. The two vanes, warped and joined together to make a well rounded, continuous surface at the inlet, provide smoother surfaces, which easily pass any long, stringy or fibrous material without clogging.

Construction—Pumps, light weight steel. Welded assembly gives permanent, unalterable alignment.

Made in 4 sizes to handle from 20 to 650 gal. per minute against 25-ft. head. Will operate up to 70-ft. head. Motor and automatic float switch are mounted on steel pit cover. Pit cover, of "Safety Tread" steel, is of circular or rectangular shape to suit requirements. Covers of 40-in. diameter or 36x36 in. square, or larger rectangular covers, will include an 11x15-in. manhole with cover. All pit covers have circular openings to accommodate the motor unit cover plate which allows removal of pump and motor unit without disturbing the pit cover.

Pumps arranged for pit depths from 5 to 14 ft. Pumps can be furnished for pit depths of less than 5 ft. and for any intermediate depth up to 14 ft. in accordance with customer's specifications.

Motor and Control—We recommend ordering complete pump, motor and control apparatus. The control mounting bracket will be securely attached to the main pit cover and motor and control will be approximately 2 ft. above the cover.

Motors, float switches, floats, thermal protective cutouts, and magnetic starters for stock motors are carried in stock and shipment of the proper control apparatus mounted upon a structural steel motor support, can be quickly made.

Non-clogging Impeller Used on All Goulds Figures 3047 and 3048 Sump Pumps

Figure 3048 Duplex Sump Pumps

For installations where the use of two complete pumping units is desirable, Figure 3048 is made up of two single units of pump and motor mounted on a large main pit cover. This main pit cover is made of "Safety Tread" plate steel with 11x15-in. manhole, and separate float. Float switch and control for each pump unit are mounted on the pit cover. Either unit is readily removable and floats can be set so that second pump operates when conditions are abnormal.

Figure 3029 Sump Pump

Small outfit. Capacity from 10 to 23 gal. against heads from 24 to 11 ft. and pit depth of 2 and 5 ft.

Specifications for Goulds Pumps for Sump Service

Furnish and install where shown on plans, one [single] [duplex] automatic electric motor driven Sump Pump having a capacity of .... gallons per minute against .... feet head.

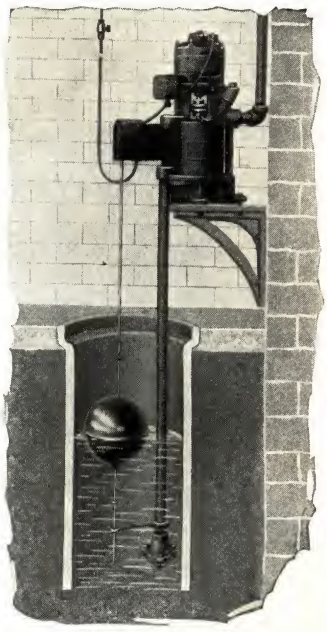
Pump shall be Goulds Non-clogging Impeller Type, direct connected by flexible coupling to a .... hp. electric motor of 1750 r.p.m. 60-cycle, ... volt, ... phase and controlled by automatic float switch. Motor and switch to be mounted on a [circular] [rectangular] shape "Safety Tread" steel pit cover .... inches [square] [diameter] which will include a 11x15-in. manhole cover.

Figure 1776 New "Minute Man" Cellar Drainer

This outfit will handle 25 gal. per minute against 15-ft. head and will operate satisfactorily against heads up to 23 ft. A concrete or brick pit is recommended but a sewer tile sump may be used.

Features—Attractively finished in bronze and black; can be used for pits from 1½ to 5 ft. deep; pump is self-priming centrifugal with bronze impeller and stainless steel shaft; galvanized foot valve and strainer prevent foreign matter entering the pump.

Complete outfit includes ¼ hp. motor of standard make, 8-ft. lamp cord with plug, sentinel circuit breaker for motor protection, foot valve, 3-ft. suction pipe and float switch.



"Minute Man" Cellar Drainer, Figure 1776

Specifications for Goulds Pumps for Cellar Drainer Service

Furnish and install where shown on plans, one Goulds Figure 1776 Automatic Motor Driven Cellar Drainer Outfit having a capacity of .... gallons per minute against .... feet head.

Complete outfit shall include bronze fitted centrifugal pump with .... inch suction pipe, Figure 760 float valve and strainer, float switch, ¼ hp. electric motor direct connected to pump by flexible coupling and wired to circuit breaker and float switch with rubber covered twin cables for protection against low voltage or overload. Motor shall be .... cycle, ... volt, single phase for speed of .... r.p.m. and equipped with 10-ft. all-rubber connecting cord with plug.

Installation shall be in concrete or brick pit .... feet deep and .... inches in diam. or in 18-in. sewer tile.

GOULDS CONDENSATION OUTFITS

These outfits are designed to handle the condensate from a steam or vapor heating system. They consist of a vertical centrifugal pump mounted on a galvanized iron receiver, a ball float and automatic control switch.

They are exceptionally well built and will give years of satisfaction.

The same material and careful workmanship go into these outfits as into the larger pumps.

The vertical type is superior to the horizontal type because it requires less floor space, is simpler in construction, more positive in operation, requires no concrete pit and when necessary to install below the floor level requires a much smaller excavation.

Features—(1) Compact and self-contained requiring very little floor space; (2) easy to install, the outfits being shipped as complete units; (3) automatic in operation, a dependable float switch starting and stopping the pump automatically; (4) vaportight so that they may be used under pressure if desired.

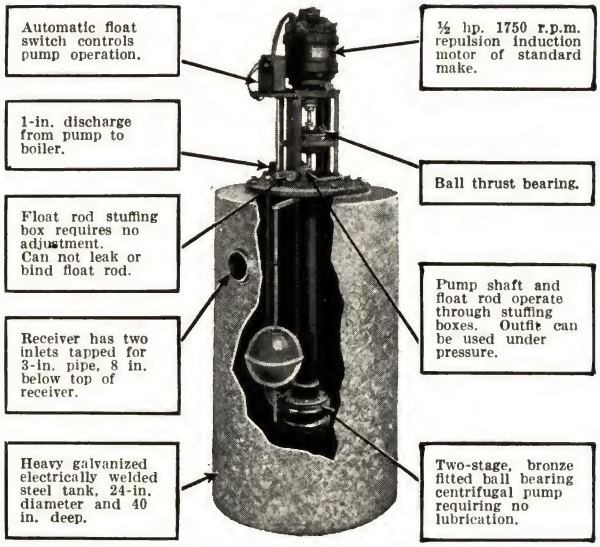


Figure 3354. Condensate Return Pump and Receiver

Capacity—These outfits will handle condensation from 10,000 sq. ft. of direct radiation based on ½ lb. of condensation per square foot per hour or 15,000 sq. ft. of radiation based on ⅓ lb. per square foot per hour.

They will discharge 20 gal. of hot water per minute against 17 lbs. pressure.

Specifications for Goulds Condensation Outfit

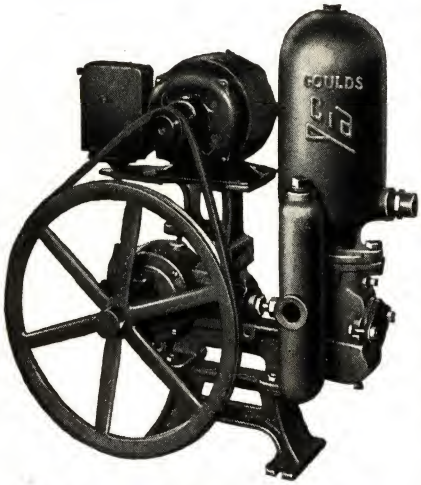
Furnish and install where shown on plans [above] [below] floor level, one Automatic Vertical Type, Condensation Outfit having a capacity of .... square feet of radiation against .... discharge pressure.

Complete outfit shall consist of condensation return pump direct connected by flexible coupling, to float switch-controlled electric motor. Pump shall be Goulds Figure .. Two-stage Centrifugal, Unlubricated Type, bronze fitted and ball bearing, having 1-in. discharge pipe from pump to boiler. Motor of ½ hp. 1750 r.p.m. repulsion-induction type of standard make. Receiver shall be heavy galvanized electrically welded steel, 24 ins. in diameter by 40 ins. deep, having two inlets tapped for 3-in. pipe 8 ins. below top of receiver.

Where there will be a pressure on returns a quick acting thermostatic air valve shall be placed in the vent opening. If returns are below receiver, a balance line shall be installed. Where pressure does not exist on the returns a pipe shall be run from vent connection to stack.

GOULDS WATER SYSTEMS PROVIDE RUNNING WATER EVERYWHERE

These systems are made in two general types and in several sizes in each type to meet every condition and every home from the small cottage to the large country estate, from roadside lunch stands to hotels, camps, schools, country clubs, industrial plants, mills, warehouses, etc.



Goulds Fig. 1798 "CID" Water System for Shallow Well Water Supply

They are built with electric motor for use where electricity is available and with gasoline engine for use where it is not.

Sources of water supply may be divided generally into (1) shallow wells, springs, streams, lakes, etc., where the total suction lift does not exceed 22 ft., and (2) deep wells where the suction lift exceeds 22 ft. and may be as deep as 640 ft.

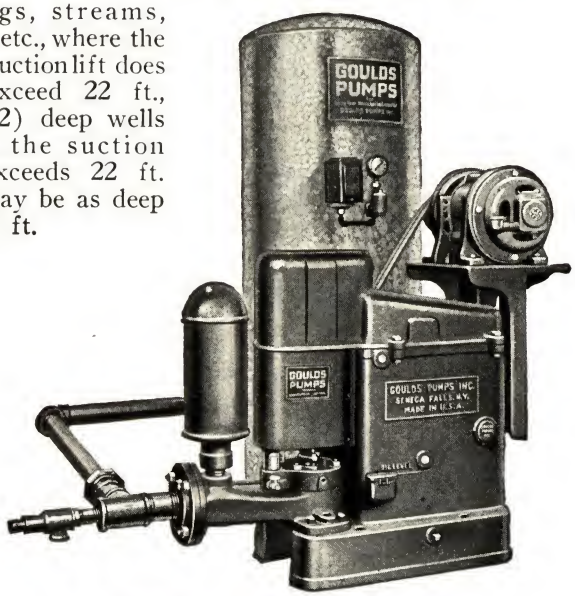


Figure 1782. Deep Well Water System

DATA BOOKS

GOULDS PUMPS, INCORPORATED issue two complete reference books on pumps and pumping. You will also find a catalogue including Pump Selection Charts in SWEET'S ENGINEERING CATALOGUES. Copies of each of the books gladly sent on request.

Bulletin No. 400 "Pump-Fax"—A handy data book covering pumping in general. Description of the various types of pumps, their uses, etc., are included together with a large number of tables of useful data.

Bulletin No. 401 "The Centrifugal Pump"—Goes to considerable detail on the theory, design and operation of centrifugal pumps—an invaluable book for any one interested in the fundamentals of centrifugal pump practice.

SKIDMORE CORPORATION

Manufacturers of Vacuum Pumps and Condensation Pumps and Receivers

MAIN OFFICES AND FACTORY
ST. JOSEPH, MICH.

SALES AND SERVICE OFFICES

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SPOKANE, WASH.
TACOMA, WASH.
TAMPA, FLA.
TOLEDO, OHIO
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Vacuum Pump for Return Line Steam Heating Service

Removes the condensate and air from the returns of a heating system, increasing steam circulation and efficiency. The unit consists of a vacuum creating rotor and a centrifugal impeller mounted on one shaft which is direct connected to an electric motor or steam turbine (can be furnished for belt drive). The shaft is carried on outside annular ball bearings. The rotor and impeller are enclosed in a case above which is a separating tank. When operating, both case and separating tank are under atmospheric pressure. The case and separating tank are mounted on a cast iron tank base which is under vacuum when operating. The float which operates the float switch is located in this base and is placed lower than the return connection. This assures gravity returns at a very low point (about 11 in. from the floor). The construction of this unit calls for no close clearances between moving parts, thus eliminating wear due to sand and scale from the system.

Skidmore Automatic Vacuum Pump

The vacuum producing rotor handles the air, vapor and condensate and discharges them to the separating chamber where the air is released to the atmosphere through a float operated vent valve and the water is discharged to the boiler by the centrifugal impeller.

(1) Unit is bronze fitted throughout.

(2) Furnished for continuous or full automatic service as single or duplex units.

VACUUM PUMP TABLE OF CAPACITIES

No. of pump	Capacity sq. ft. radiation	G.p.m.	Hp., 10 lb. unit	Hp., 20 lb. unit	Approx. floor space, in.	Approx. shipping weight, lb.
0	5000	8	¾	1	18x34	500
1	8000	11	1	1½	18x46	600
1-5	10000	14	1	1½	18x46	650
2	16000	22	1½	2	18x48	700
3	26000	35	2	3	18x50	775
4	40000	60	3	3	18x52	800
5	65000	90	5	7½	20x60	1350
6	100000	150	7½	10	20x66	1650
7	150000	200	10	15	20x68	1725

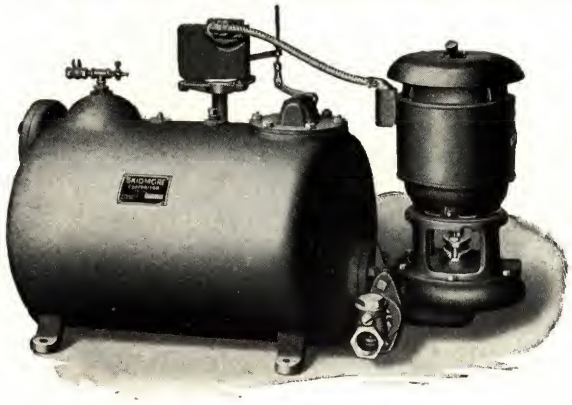
Pumps for 30 to 60 lb. pressure furnished for same capacities.

MAINTAINED SKIDMORE PUMPS EFFICIENCY

Condensation Pump and Receiver

In the condensation pump and receiver, the unit pumps the condensate from the returns back to the boiler after accumulating it in the receiving tank. The Skidmore unit is so designed as to give lowest possible drainage without placing the unit in a pit beneath the floor level. For this reason the motor and shaft are placed vertically at the end of a heavy cast iron receiving tank. This arrangement allows the feed connection to the centrifugal impeller to be at a point only an inch or so above the ground.

The pump is automatically operated by a float switch located on the top of the receiver. This places all the electrical equipment (motor and float switch) high above the floor and out of the way of possible flood waters. The unit is made of heavy cast iron and is fitted throughout with a special hard bronze. This pump and receiver is one of the quietest pieces of pumping equipment made and is very easy to install. Inspection and cleaning of the unit may be accomplished by removing six cap screws and without disturbing the return or discharge pipings. The impeller is of the bronze enclosed type.



Skidmore Condensation Pump

TABLE OF CONDENSATION PUMP CAPACITIES

Size	Capacity sq. ft. radiation	Hp., 10 lb. unit	Hp., 20 lb. unit	Gallons between float stops	G.p.m. pumped	Inlet, in.	Disc., in.	Height of inlet, in.	Shipping weight, lb.	
									10-lb. unit	20-lb. unit
C-2	2000	⅛	⅛	9	4	2	1	11½	325	350
C-4	4000	⅛	⅛	9	6	2	1	11½	325	350
C-6	6000	⅛	⅛	9	8	2	1	11½	325	350
C-8	8000	⅛	⅛	9	11	2	1¼	11½	325	350
C-10	10000	⅛	⅛	18	13	2½	1¼	13	440	460
C-12	12000	⅛	¾	18	16	2½	1¼	13	460	470
C-16	16000	⅛	¾	18	22	2½	1¼	13	460	470
C-26	26000	¾	1	25	35	3	1½	13	495	515
C-40	40000	1½	2	25	60	3	2	13	525	550

Information on units for higher pressures on request.

THE F. E. MYERS & BRO. COMPANY

Manufacturers of Pumps

ASHLAND, OHIO

Products

DEEP WELL POWER PUMPS; SHALLOW WELL POWER PUMPS.

For Myers Private Water Supply Systems, see Manufacturers' Index.

TRADE-MARK

Myers Self-Oiling Deep Well Power Pumps

Myers Self-Oiling Deep Well Power Pumps are designed for general service. The range of sizes in which they are built adapts them to all kinds of installations. The smaller sizes are ideal for homes, farms, country estates, cottages and similar places. Larger sizes are adapted for creameries, dairies, summer resorts, parks, golf courses, hotels, laundries, centralized schools and colleges, hospitals, public and private buildings and institutions, ice plants, mills, mines, factories, railroads, contractors, etc.

They are lifting water from wells or other sources of greater depth than 22 ft. and delivering it to ground level, forcing it into open or pressure tanks, or elevating it to overhead tanks for reservoirs. Made in sizes 6, 9, 12, 18 and 24-in. strokes.

All working parts are fully enclosed and run in oil. Main frame forms oil reservoir from which the gears distribute oil to all moving parts. Bearing shafts are high grade machinery steel. Gears are double, machine cut from solid cast iron. Pinions are steel. All parts are easily removed for adjustments or replacements.

Regularly fitted with tight and loose pulleys for engine drive or single pulley and belt tightener for motor drive. Are supplied with air cylinder for pressure tank service at small additional cost. Anti-freezing set length for all styles furnished extra when desired.

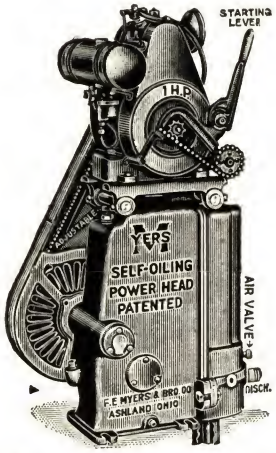


Fig. 2551. Myers Self-Oiling Engine Driven 6-in. Stroke Deep Well Power Pump with Air Cylinder
For pressure tank service

Myers Self-Oiling Deep Well Power Pumps Complete with Motor or Engine for Belt or Chain Drive

Complete units, except lower cylinder and down or suction pipe, ready to connect to power and water lines. Sizes 6, 9 and 12-in. stroke for belt or chain drive, with high class motor of standard make mounted on head; belt or chain drive; with or without air cylinder; all moving parts fully enclosed; positive self-lubrication; machine cut gears; back geared 7 to 1 for open or tubular wells. Compact, easily and quickly installed, economical and dependable.

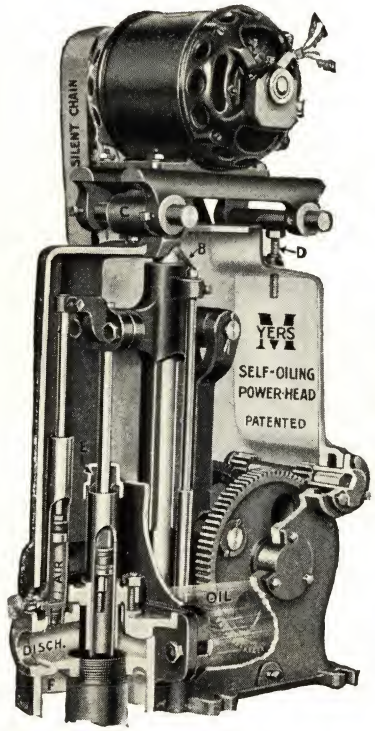


Fig. 2492. Sectional View of Deep Well Self-Oiling Power Pump
Air cylinder and motor mounted on head. For silent chain drive

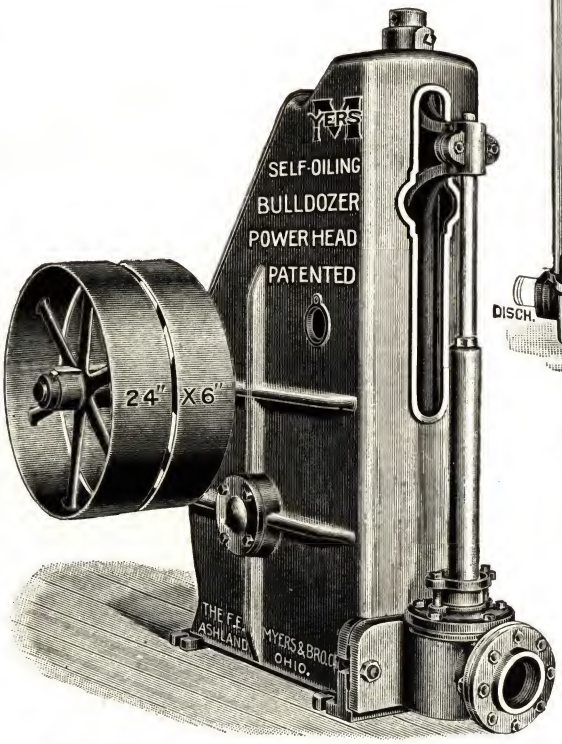


Fig. 2473. 18-in. Deep Well Self-Oiling Power Pump
Engine drive, with differential piston

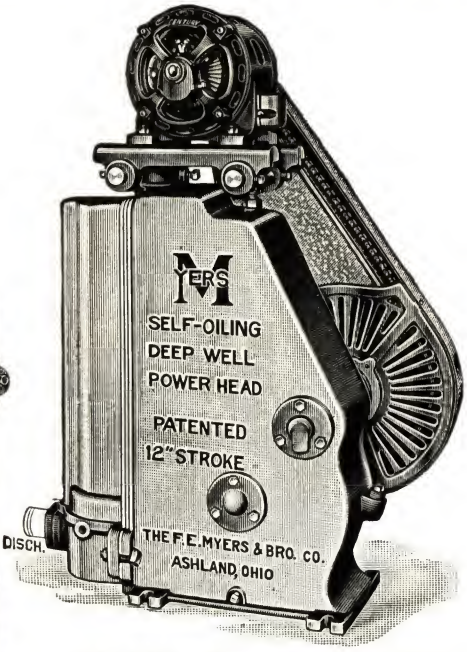


Fig. 2562. Myers Self-Oiling Motor Driven 12-in. Stroke Deep Well Power Pump Complete with Motor and Silent Chain Drive
Furnished in sizes 6, 9, 12 and 18-in. stroke. Motor or engine drive

Myers Brass and Brass Lined Working Barrels

Designed for use with Myers Power Pumps and working heads for pumping water from deep wells. They are furnished with brass poppet, bronze spool or bronze ball valves. Shell is heavy wrought steel, lined with special heavy seamless drawn brass tube, swaged out at upper end and tapered to form seat for check valve. Made in different styles and all standard sizes, meeting depth capacity and operation requirements.

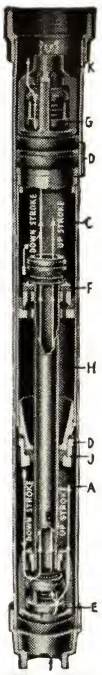


Fig. 2664

Fig. 2460

Brass-lined Double and Single Acting Working Barrels

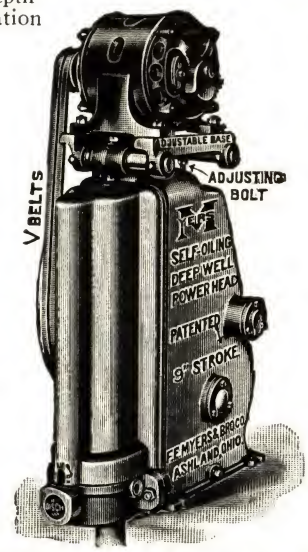


Fig. 2629. Myers V-Belt Driven Self-Oiling Deep Well Power Pump Complete with Motor

Myers Self-Oiling Shallow Well Pumps

These pumps are of the horizontal double acting self-oiling type. They are designed for lifting water from wells, cisterns, etc., 22 ft. or less in depth and forcing it to an elevation. Suitable for general service, such as pumping hot or cold water, oil, gasoline and similar liquids. They are also excellent boiler feed or booster pumps.

Construction—Bulldozer Pumps are extremely simple in construction, easily installed and economically operated by either hand power, motor or engine drive. The power end consists of a one-piece casting forming the base of the pump and oil reservoir and enclosing all working parts. The brass-lined cylinder is a one-piece casting attached to the power end by heavy bolts. The large valves, liberal and direct waterways and positive self-oiling system insure safe and economical operation against heavy pressures or at high speeds, securing large volume with largely increased efficiency. All sizes are equipped with air valve for pneumatic water systems, where desired.

Sizes and Capacities—Bulldozer Pumps are made in twelve sizes from 2½x3 in. to 8x8 in., having capacities from 500 to 9000 gal. per hour.

Types—They are furnished in two general types: standard type, for pressures up to 100 lb. or 230-ft. elevation; high duty type, for pressures up to 250 lb. or 580-ft. elevation.

FIG. 2374—COMPLETE WITH MOTOR—V-BELT DRIVE—FOR OPEN TANK WORK—100 LBS. PRESSURE OR 230 FT. ELEVATION

Pump No.	Cylinder brass lined		Capacity		Tank pressure, lb.	A-c.motor, 1 phase 110–220 volt, 60 cycle hp.	Suction and disch., in.	Floor space, in.
	Diam., in.	Stroke, in.	Plgr. speed, r.p.m.	Max. gal. per min.				
912M	2½	3	70	9	50	½	1¼	14 x 34
913M	3	4	70	17	50	1	1½	16 x 44
914M	4	5	52	28	50	2	2	20 x 54
915M	5	5	52	44	50	3	2½	20 x 56

Also furnished with motor and silent chain drive. Equipped with air valve for pressure tank service when desired.

FIG. 2374—HIGH PRESSURE—BACK GEARED 5 TO 1

Pump No.			Cylinder brass lined		Capacity		Pulleys in.		Chain drive hp.,a-c. motor, 1 phase 110–220 volt, 60 cycle	Suc. and disch. in.	Lb. pres.
Engine belt drive	Motor belt drive	Complete with motor chain drive	Diam. in.	Stroke in.	Max. plgr. speed, r.p.m.	Max. gal. per min.	Engine belt drive	Motor belt drive			
931	931M	C931M	1¾	3	70	4⅓	12x2	15x2½	½	½	100
932	932M	C932M	2¼	4	70	9⅔	14x2½	20x3	2	1¼	200
933	933M	C933M	3	5	52	16	16x4	24x4	5-3Ph.	1½	250
934	934M	C934M	4	6	45	29¼	24x4	30x4	7½-3Ph.	2	250

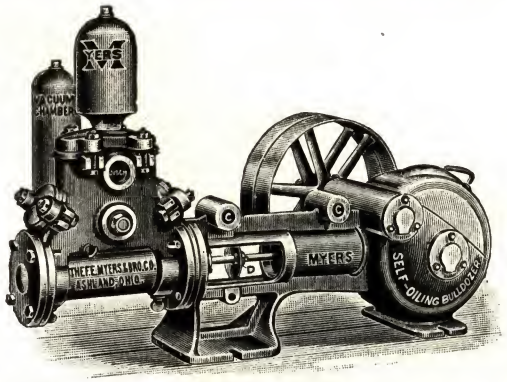


Fig. 2430. Myers Self-Oiling Bulldozer Power Pump

With extra length main frame and motor pads.

Two styles—one for service up to 100 lb. pressure or 230 ft. elevation, the other up to 250 lb. pressure or 580 ft. elevation

FIG. 2430—FOR ENGINE OR MOTOR DRIVE—100 LBS. PRESSURE

Pump No.		Cylinder, brass lined		Capacity				Max. hp.	Engine drive	Engine drive	Motor drive	Motor drive
Engine drive	Motor drive	Diam., in.	Stroke in.	Disp. each rev. of plgr. gal.	Usual plgr. speed, r.p.m.	Max. at speed, r.p.m.	Max. gal. per min.		Pulleys tight and loose in.	Floor space, in.	Tight pulley, in.	Floor space in.
912	912M	2½	3	.128	60	70	9	1	12x2	15x34	15x2½	13x34
913	913M	3	4	.245	60	70	17	2	14x2½	18x42	20x3	16x44
914	914M	4	5	.544	55	65	35	4	16x4	24x54	24x4	20x54
915	915M	5	5	.85	50	60	51	5	16x4	24x56	24x4	20x56
916	916M	6	6	1 47	40	52	76	7	24x4	28x66	30x4	23x66

Furnished with air valve for pressure tanks at small additional cost.

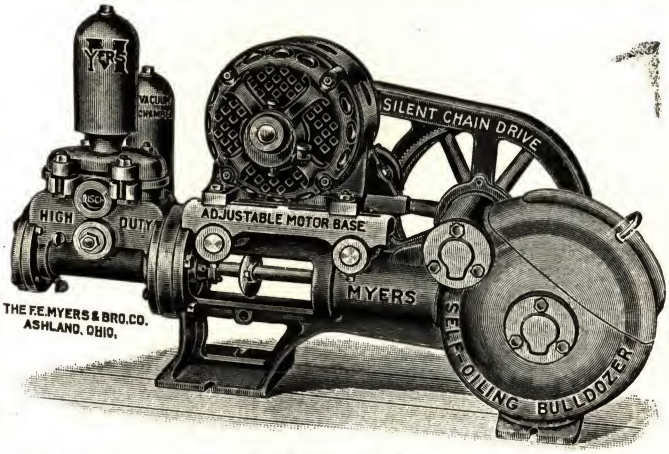


Fig. 2374. Myers High Pressure Self-Oiling Bulldozer Power Pump

For service against 250 lb. pressure or 580 ft. elevation

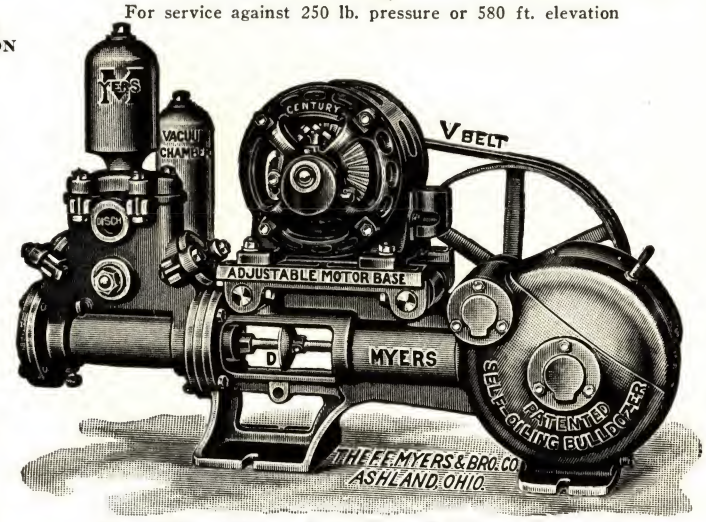


Fig. 2634. Myers Self-Oiling Bulldozer Power Pump

For service against 100 lb. pressure or 230 ft. elevation
V-Belt or silent chain drive

THE NASH ENGINEERING COMPANY

PLANT AND GENERAL OFFICES
201 Wilson Road, SOUTH NORWALK, CONN.

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SAN FRANCISCO, CAL., Sharon Bldg.
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WASHINGTON, D. C., Barr Bldg.
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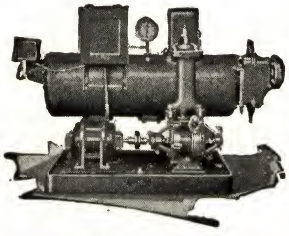
Products

Return line and air line VACUUM STEAM HEATING PUMPS; CONDENSATION PUMPS; CENTRIFUGAL PUMPS, Standard and Suction; COMPRESSORS and VACUUM PUMPS for air and gases; SEWAGE EJECTORS; SEWAGE PUMPS; SUMP PUMPS.

Return Line Vacuum Steam Heating Pump

Removes air and condensation from return lines of vacuum steam heating systems, discharges the air to the atmosphere, and returns the water to the boiler.

Pump consists of two independent units combined in a single casing—an air unit and a water unit. Impellers of both units are mounted on the same shaft, supported on annular ball bearings outside the casing. Pump is bronze fitted throughout.



Jennings Return Line Vacuum Steam Heating Pump

Air unit exhausts air and vapors and delivers these to the atmosphere without back pressure. Water unit removes the condensation and pumps it directly into the boiler. By handling the air independently of the water, power is saved.

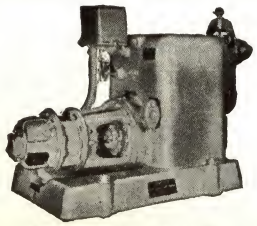
Supplied either direct connected to standard electric motors, for belt drive, or for steam turbine drive. For continuous operation, or with automatic control. For boiler pressures not exceeding 40 lbs.

Furnished in standard sizes with capacities ranging from 4 to 400 g.p.m. of water and 3 to 171 cu. ft. per minute of air. For serving up to 300,000 sq. ft. of equivalent direct radiation.

Condensation Pump

Removes the condensation from radiators in return line steam heating systems, particularly radiators set below the boiler water line level, and pumps the condensation back to the boiler.

By making the pump casing a part of the returns tank, and bolting the motor base to the tank, floor space is conserved. The rectangular construction permits installation in a corner against the wall.

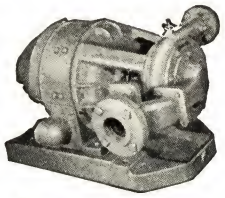


Jennings Condensation Pump

Supplied in standard sizes with capacities ranging from 4 to 200 g.p.m. of water. For serving up to 150,000 sq. ft. of equivalent direct radiation.

Double Suction Centrifugal Pump

For (a) circulating hot and cold water; (b) boosting city water pressure to supply top stories in tall buildings; (c) circulating water to and from swimming pools, through filtering and purifying apparatus, etc.; (d) handling water in air washing and conditioning; (e) for hydraulic elevators, etc.; (f) promoting circulation in pressure hot water heating systems; (g) pumping feed water from the hot well, water softener, etc., to the boiler; (h) removing condensate from heating systems, blowdown from soot blowers and superheaters, exhaust drips from steam ejector air pumps and other auxiliaries, etc.



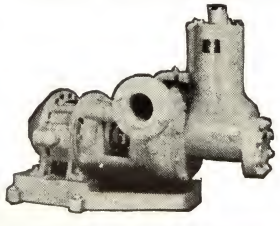
Jennings Centrifugal Pump

Easily installed—inlets and outlets can be assembled in a number of positions. The number of elbows and fittings and the labor required for installation are reduced to a minimum. *Compact*—motor armature and pump impeller are mounted on the same shaft. *Simplified*—no bearings in pump casing, only one stuffing box. *Accessible*—pump impeller can be removed without breaking pipe connections, touching packing, or disturbing shaft alignment.

Capacities to 1500 g.p.m., heads to 320 ft. Bronze fitted standard construction; also all-bronze or all-iron for special service.

Centrifugal Pump Operating with Suction Lift

When the Jennings Suction Centrifugal is started, the built-in Nash Hytor Vacuum Pump exhausts air from the casing and suction piping. Water is quickly drawn into the pump. Full rated capacity is delivered without delay.



Jennings Suction (Self-priming) Centrifugal Pump

Successful performance is assured under conditions where water level is likely

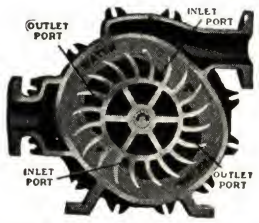
to fall, or where air or gas is handled together with the water being pumped. Intermittent operation is possible without a foot valve.

Furnished in 2, 3, 4 and 6-in. sizes for capacities up to 1200 g.p.m.

Heads up to 120 ft.

Compressors and Vacuum Pumps for Air and Gases

Operation as follows: Rotor, consisting of a cylindrical hub, around the periphery of which are chambers or spaces formed by heavy shrouds cast integrally, revolves freely in an elliptical casing or housing filled with water. As the rotor turns, it carries the water around with it. The water, under the influence of centrifugal force, is compelled to follow contour of the casing, and alternately to enter and to leave the rotor chambers, twice in each revolution. As the water recedes from the rotor, air is drawn into the chambers through the inlet port. As the water is subsequently forced back into the rotor by the converging casing, the air is compressed and then discharged from the rotor through the outlet port.



Nash Hytor Compressor or Vacuum Pump
Showing the unique principle of hydro-turbine operation

A separator, supplied with each compressor, frees the delivered compressed air of entrained moisture.

Supplied in several standard sizes for handling up to 5000 cu. ft. of air per minute.

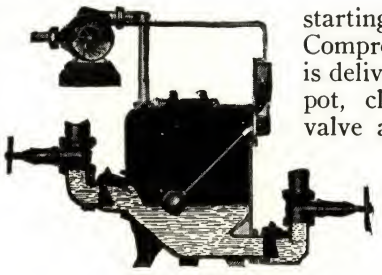
For discharge pressures up to 20 lbs.; vacuums up to 20 ins. of mercury.

Sewage Ejector

For pumping unscreened sewage or drainage from basements below the street sewer level, handling crude sewage from low level districts, pumping effluent, sludge and other heavy liquids.

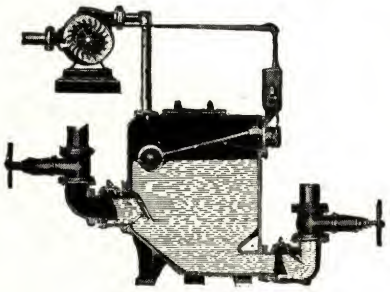
Jennings Sewage Ejector is of the pneumatic type. Air, compressed to the necessary working pressure by a Nash Hytor Air Compressor, is used as the motive power to pump the accumulated sewage from a pot to the sewer. Air is compressed only to the pressure at which it is used. There are no air storage tanks, reciprocating air compressors or screens. Air valves and reducing valves are avoided.

Operation of the ejector is as follows: Sewage, under the action of gravity, flows through the inlet check valve into the pot. As it accumulates, it raises a ball float which, when the pot is full, actuates a float switch, thereby starting up the Nash Hytor Compressor. Compressed air is delivered into the top of the pot, closing the inlet check valve and expelling the sewage through the outlet check valve. When pot has been emptied, the float, having reached the lower limit of its travel, opens the float switch through which the air in the stopping compressor, pot is vented. The sewage again flows by gravity into the pot, repeating the cycle.

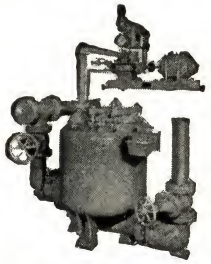


Ejector Filling

Furnished in several standard sizes with capacities ranging from 30 to 1500 gal. per minute against heads up to 50 ft.



Ejector Discharging



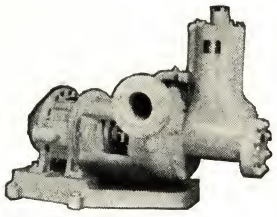
Jennings Pneumatic Sewage Ejector

Suction (Self-priming) Sump Pump

Jennings Suction Sump Pump is an open impeller self-priming centrifugal pump for handling seepage water and liquids reasonably free from solids. It is mounted entirely above and either near to or removed from the sump. Only the suction pipe is submerged. It is quickly and conveniently accessible.

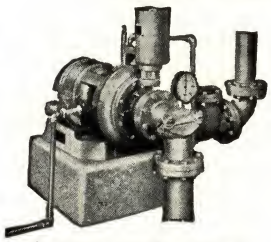
There are two moving parts: the centrifugal impeller and the vacuum priming pump rotor. Both rotate without metal-to-metal contact in the casing. Both are mounted on the same shaft that carries the rotor of the driving electric motor, making possible a single compact assembly.

Furnished in sizes and capacities to meet all the usual requirements.



Jennings (Self-priming) Suction Sump Pump

Suction (Self-priming) Sewage Pump



Jennings (Self-priming) Suction Sewage Pump

Jennings Suction Sewage Pump is similar in design and operation to Jennings Suction Sump Pump. The principal difference lies in the centrifugal impeller which is of the two-bladed, non-clog type. Solids passing through eye of the impeller will pass through entire wheel. Sand, dirt, sticks and rags are readily handled without damage to the pump and without clogging.

Furnished in sizes and capacities to meet all usual requirements.

Bulletins

No. 10 Nash Hytor Compressors
No. 11 Nash Hytor Vacuum Pumps
No. 15 Jennings Return Line Vacuum Steam Heating Pumps, piped-up type
No. 17 Jennings Air Line Vacuum Steam Heating Pumps
No. 40 Jennings Flat Box Pumps
No. 85 Jennings Return Line Vacuum Steam Heating Pumps, manifold type
No. 87 Jennings Return Line Vacuum Steam Heating Pumps, unit manifold type
No. 97 Jennings Suction Sump Pumps
No. 99 Jennings Condensation Pumps
No. 103 Jennings Sewage Ejectors, Type B
No. 108 Jennings Sewage Ejectors, Type A
No. 155 Jennings Centrifugal Pumps
No. 161 Jennings Suction Sewage Pumps

ESTABLISHED 1886

PENBERTHY INJECTOR CO.

Automatic Electric Sump Pumps and Automatic Cellar Drainers—Copper and Brass Construction Throughout

DETROIT, MICH.

CANADIAN PLANT: WINDSOR, ONTARIO

Penberthy Automatic Electric Sump Pumps

Used Wherever Water Accumulates

In spite of our efficient municipal sewerage systems, there are numerous places where water accumulates by seepage, overflow, flood or backing up, that can not be drained off directly, either because the flow line of the sewer is not deep enough or because obstacles intervene between the sump and the sewer.

Among the more common instances may be mentioned the cellars of residences where no sewers exist or where the sewer line is above the basement floor level or deep cellars of buildings, boiler rooms, settling basins, flywheel and elevator sumps, tunnels, and scale pits.

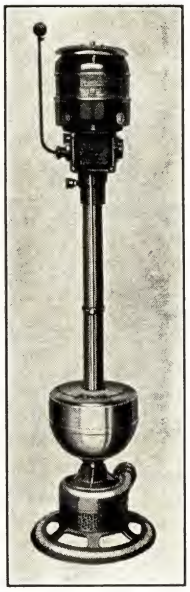
While ordinarily this seepage may amount to only a small trickle, its flow is continuous and if neglected the accumulated water soon becomes a real menace to health and property.

To keep such places dry, the incoming water is most economically disposed of as it accumulates, either by an automatic cellar drainer (water or steam operated) or an automatic sump pump (electrically operated). Local conditions determine which is preferable.

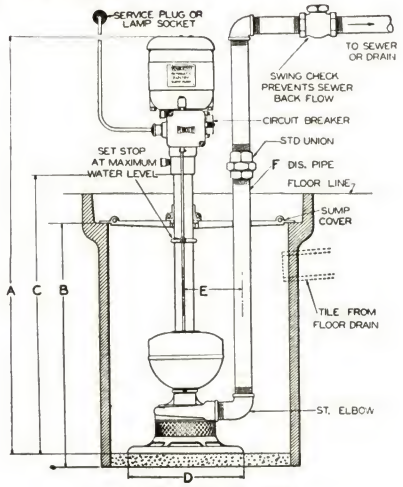
Penberthy manufactures a complete line of both types, and can consequently supply the unit best suited to meet requirements.

Conditions favoring the electric pump are:

(1) For districts where city water pressure is not available, or at least very low. (2) Larger quantities of seepage water to be handled. (3) Discharge heads up to 20 ft. (4) Low cost of operation.



Penberthy Automatic Electric Sump Pump



Installation Details

Installation

The automatic electric sump pump is set in a floor sump which can be conveniently made by taking a piece of 15 to 24-in. sewer crock 2 ft. long. A sump cover is recommended. The pump outlet is piped to the nearest and lowest sewer or surface outlet. The motor switch cord is plugged into the nearest plug or light socket and the pump is ready for operation. Be sure that the electric current is left permanently connected to the motor switch, and that the electric current is entirely suitable to the motor furnished with the pump. General instructions accompany each pump. There are no projecting arms or delicate parts to require special supports or protection. The entire unit is simple and easily installed and operated. It meets all the requirements of the various building codes.

Specifications

Motor—Not an ordinary horizontal motor turned on end, but a special motor with ball thrust bearings for vertical operation. Repulsion induction type which has better characteristics for sump pump service than other types. Motors regularly furnished are for 110 volts and 60 cycles; motors to suit other current characteristics at slight additional cost.

Circuit Breaker—Protects motor against overloading and prevents damage from voltages for which motor was not intended. Absolutely dependable in operation being free from effects of friction; it will not cut out motor until overheating makes it absolutely necessary.

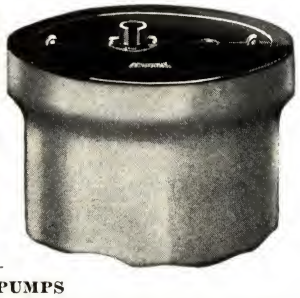
Switch—Special mercury type switch of exceptionally rugged construction. This type of switch is recognized by leading electrical engineers as most reliable and durable, but due to the high manufacturing costs is only used on the most expensive electrical appliances. Switch is controlled by extra heavy copper float sliding freely on supporting column. Sensitive to slightest difference in water level. Adjustable bronze ring governs position of water level at which pump starts.

Impeller Shaft—Bronze, Fully Enclosed—Held to perfect alignment and supported by ball bearings—motor shaft relieved of all undue strain.

Lubrication—All bearings that require lubrication are provided with oil or grease cups.

Material—This pump is immune to corrosion; it is made of copper and bronze throughout.

Sump Cover—A sump cover is recommended to exclude ashes, coal dust and other solid material from accumulating in sump. Penberthy Sump Pump Covers provide proper working clearances for the automatic control mechanism.



DIMENSIONS OF SUMP PUMPS

Size No.	A Height of pump, ft. in.	B Depth of sump, ft. in.	C Base to motor, ft. in.	D Diameter of base, in.	E Cent.cut-outs in cover, in.	F Discharge pipe, in.
1G	3 5	2 —	2 3¾	10¾	6	1
2G	3 7¼	2 —	2 4	11¾	6	1¼
3G	5 6	4 —	4 3	11¾	6	1¼
4G	7 6	6 —	6 3	11¾	6	1¼
5G	9 10	8 6	8 7	11¾	6	1¼

LIST PRICES, SIZES AND WEIGHT

Cover No.	List Price	Outside diameter, in.	Shipping weight, boxed, lb.
1	$ 8.50	19¾	28
2	12.00	24	47
3	15.00	27½	58

LIST PRICES, SIZES, CAPACITIES, ETC., OF PENBERTHY ELECTRIC SUMP PUMPS

Size No.	List prices	Pipe connection, in.	Sump depth, ft.	Height of pump ft. in.	Approximate capacity, gallons per hour against discharge head of 1 ft.	5 ft.	10 ft.	15 ft.	20 ft.	Operation cost per hour, cts.	Size motor, hp.	Weight boxed, lb.
1G	$ 65.00	1	2	3 5	1200	1000	750	500	...	0.8	1/6	89
2G	85.00	1¼	2	3 7¼	3000	2500	2000	1500	600	1.6	¼	102
3G	100.00	1¼	4	5 6	3000	2500	2000	1500	600	1.6	¼	128
4G	125.00	1¼	6	7 6	3000	2500	2000	1500	600	1.6	¼	144
5G	150.00	1¼	8½	9 10	3000	2500	2000	1500	600	1.6	¼	195

Model "L" Automatic Cellar Drainer
Sizes 3, 4 and 5

Penberthy Automatic Cellar Drainers—Water or Steam Operated

The Penberthy Automatic Cellar Drainer has been on the market for years and is of distinct service for installations such as office buildings, residence or factory basements, sumps, tanks, settling basins, flywheel, elevator, coal and scale pits, or wherever it is desired to remove seepage, flood or backwater from point below the natural drainage level of sewer.

For conditions such as these the Penberthy Automatic Cellar Drainer offers a desirable solution, as it operates by city water pressure and the drainer itself is ideally constructed to occupy the least possible space. It is also entirely automatic and requires no attention after installation.

Special Notice: The capacities given are the actual capacities of water taken from sump and not the combined discharge of operating and drainage water as given in most tables. For higher elevations than shown above, special drainers can be made.

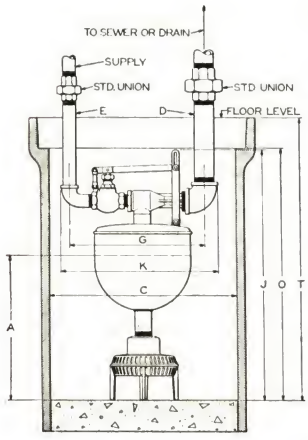
Model "R" Automatic Cellar Drainer
Sizes 1 and 2

CAPACITIES AT DIFFERENT PRESSURES AND ELEVATIONS, PIPE SIZES, ETC., MODEL "R"

Size and model	Pipe sizes, in.		Working head, ft.	Maximum net capacities from sump in gallons per hour at 10 to 150 lbs. water pressure										
	Supply	Discharge		10	15	20	25	30	40	60	80	100	120	150
				MODEL "R"										
No. 1 Model "R"	½	1	3	80	210	300	340	400	510	700	720	700	660	600
			6	.....	90	140	240	300	390	570	670	690	650	600
			9	.....	.....	90	150	210	330	480	620	660	640	600
			12	.....	.....	...	100	150	220	390	550	630	630	600
			15	.....	.....	...	.....	90	190	300	450	600	620	600
			18	.....	.....	...	.....	..	120	250	320	550	610	600
No. 2 Model "R"	¾	1¼	3	190	390	550	620	750	910	1180	1240	1220	1170	1100
			6	.....	210	340	420	600	750	1020	1140	1200	1130	1100
			9	.....	.....	210	300	380	540	900	1090	1150	1090	1100
			12	.....	.....	...	210	300	420	780	1020	1110	1060	1100
			15	.....	.....	...	.....	210	370	570	940	1050	1030	1100
			18	.....	.....	...	.....	....	300	510	850	970	1000	1100

CAPACITIES AT DIFFERENT PRESSURES AND ELEVATIONS, DIMENSIONS AND PIPE SIZES, MODEL "L"

Size and model	Pipe sizes, in.		Working head, ft.	Actual capacities in gallons of water per hour taken from sump and not total amount of discharged water			
	Supply	Discharge and suction		At 25 lbs. will elevate	At 40 lbs. will elevate	At 60 lbs. will elevate	At 80 lbs. will elevate
No. 3 Model "L"	1	1½	3	660	1100	1440	1650
			6	520	860	1230	1440
			9		720	1050	1320
			12			840	1040
			18				760
No. 4 Model "L"	1¼	2	3	960	1600	2020	2400
			6	760	1240	1880	1980
			9		1040	1600	1800
			12			1280	1440
			18				1050
No. 5 Model "L"	1½	2½	3	1280	2100	2700	3200
			6	1000	1620	2300	2820
			9		1260	1960	2600
			12			1560	2060
			18				1500



Model "L" Cellar Drainer
Sizes 3, 4 and 5

WATER CONSUMPTION, MODEL "R"

Working head, ft.	Approximate gals. or fractional gals. of pressure water required to pump 1 gal. from sump with a Model "R" Drainer									
	10 lb.	15 lb.	20 lb.	30 lb.	40 lb.	60 lb.	80 lb.	100 lb.	120 lb.	150 lb.
3	.80	.50	.40	.38	.35	.30	.30	.35	.40	.58
6	.....	.90	.75	.50	.42	.38	.38	.40	.41	.55
9	.....	.....	1.00	.65	.50	.45	.40	.41	.42	.52
12	.....	.....	.....	.90	.65	.52	.45	.42	.43	.48
15	.....	.....	.....	1.20	.85	.60	.50	.43	.44	.45
18	.....	.....	.....	.....	1.00	.70		.45	.45	.43

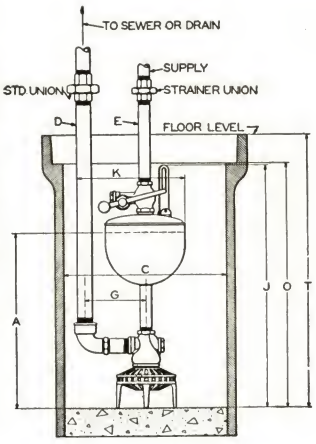
Unless otherwise specified, the Model "R" drainer is supplied and used for all conditions above the heavy line running through the table of capacities (see table above).

For conditions below the black line we furnish a low pressure drainer.

The Model "R" drainer requires 5-lb. water pressure or more for each foot of elevation, while the low pressure drainer will work on 2 to 4-lb. per ft. of elevation.

PRICE LIST

	Model "R"		Model "L"		
Size	1	2	3	4	5
List price	$25.00	$40.00	$55.00	$80.00	$110.00



Model "R" Cellar Drainer
Sizes 1 and 2

DIMENSIONS OF PENBERTHY AUTOMATIC CELLAR DRAINERS

Nos. Models "R" and "L"	A	C	D	E	G	K	J	O	T
	High water, in.	Diameter crock, in.	Iron pipe diam., in.		Centers of cutouts in cover, in.	Diam. of drainer, in.	Height of drainer valve open. in.	Height to seat of socket, in.	Height to floor level, in.
			Discharge	Supply					
R1	13½	15	1	½	6	10⅜	21½	21	23½
R2	13½	15	1¼	¾	7½	12⅞	21½	21	23½
L3	12¾	20	1½	1	13	15⅛	25⅜	33	36
L4	14½	24	2	1¼	15⅞	18½	27½	33	36
L5	14½	27	2½	1½	17½	20⅛	27⅝	33	36

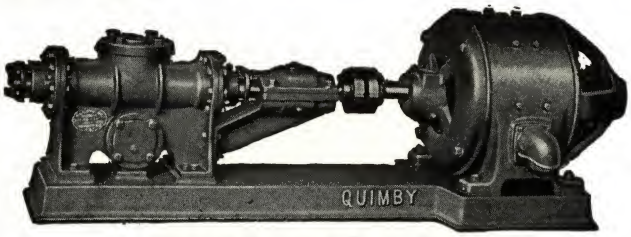
QUIMBY PUMP CO., INC.

MAIN OFFICE AND WORKS
343 Thomas Street, NEWARK, N. J.
BRANCH OFFICES AND SALES REPRESENTATIVES IN PRINCIPAL CITIES

QUIMBY HOUSE AND SPRINKLER PUMPS

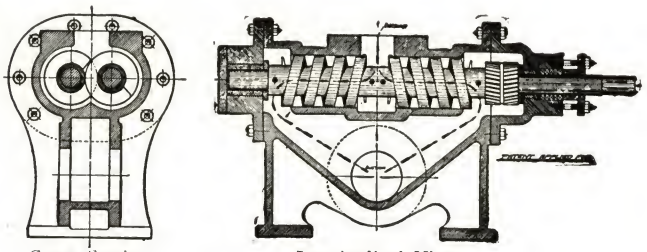
Quimby Screw Pumps

House Pumps—There are hundreds of Quimby Screw Pumps on house service in New York City alone. For many years the unique features of this pump have appealed to architects and engineers, who have specified it because of its simplicity, durability, quiet operation and efficiency under conditions where a centrifugal pump is unsuitable. Our sales engineers are showing new people every day how to reduce their operating cost by the use of Quimby Screw Pumps for house or booster service.



Quimby Standard Screw Pump

The construction of the Quimby Screw Pump is extremely simple. There are no valves and no air chamber, for the discharge is pulseless and will not cause noise in the piping.



Cross Section — Longitudinal View

Construction of Quimby Screw Pump

The water enters through a suction chamber below the pump directly from the street mains or from a surge tank, and passes to the two ends of the cylinder where it is trapped by the screws and forced to the center discharge chamber. Shaft stuffing boxes are on the suction side so that there is no danger of blowing out packing. Foundation bolts are not required because there is no vibration.

The Only Two Moving Parts in a Quimby Screw Pump

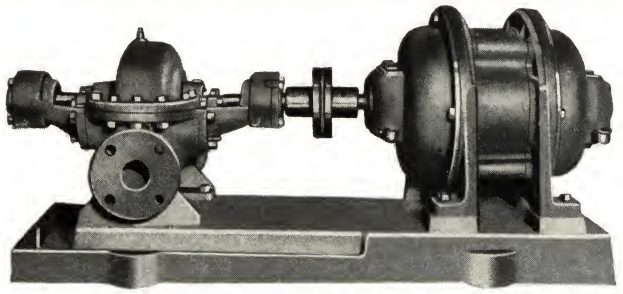
The Quimby Screw Pump is built in sizes suitable for all house pump applications for pressures up to 200 lb. per sq. in.

Sprinkler Pumps—For sprinkler service the Quimby Screw Pump has long been recognized as particularly suitable. Centrifugal pumps are apt to overload on this service due to the two conditions required, but the screw pump serves both purposes without overload and with reduced power consumption. Quimby Screw Pumps are built for pressures up to 300 lb. per sq. in. for this service.

Quimby Centrifugal Pumps

Quimby Single Stage Centrifugal Pumps—These pumps are suitable for house service in moderate sized buildings. Running at 1700 r.p.m., they are built for capacities up to 800 g.p.m. and heads up to 170 ft. At 3400 r.p.m. they are built for capacities up to 1600 g.p.m. and heads of 680 ft.

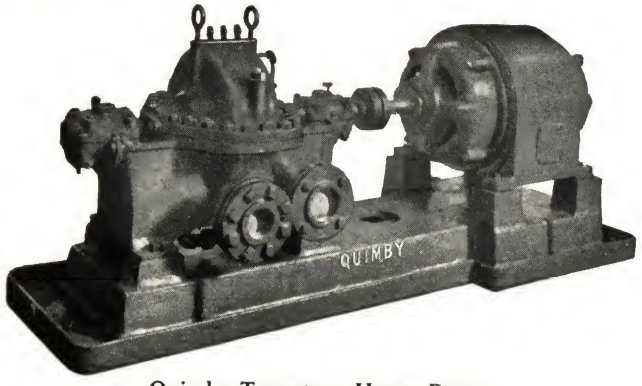
These pumps are built in accordance with a new design and give unusually high efficiencies. They are all of the horizontal split case type, with double suction impellers, ball bearings, and are fully bronze fitted. They operate without noise at high speeds and are particularly desirable for house pump service.



Quimby Single Stage Type Pump

Quimby Multistage Centrifugal Pumps—Made in three sizes for capacities up to 500 g.p.m. at heads up to 1400 ft. at 1750 r.p.m.

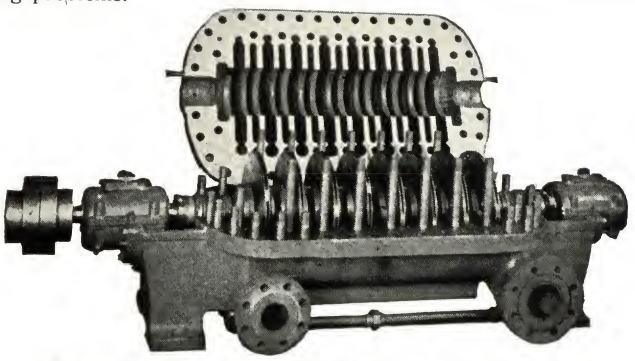
These pumps embody all the latest improvements in centrifugal pump design and have many unique features. Impellers are of the side suction balanced type, of enclosed construction. These pumps are bronze fitted throughout and designed to give maximum efficiency and long life. A perfect balance is maintained at all times by the use of an automatic hydraulic balancing disc.



Quimby Two-stage House Pump

All types of Quimby House Pumps are designed to give satisfactory service without the use of aids, such as mats and rubber hose connections used to deaden noise or absorb vibration.

Our sales engineers are always at the service of architects and engineers and will welcome the chance to study any pumping problems.

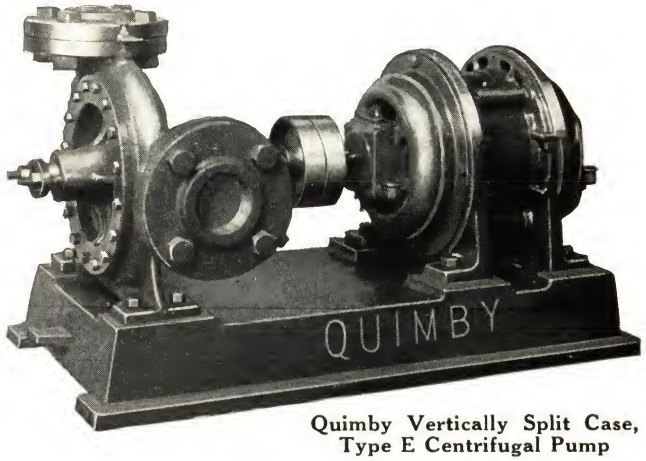


Eight-stage Pump with Top Half of Casing Raised

QUIMBY CIRCULATING PUMPS

Type E—Open Impeller

The Quimby Vertically Split Case Open Impeller Type E Pumps were especially designed to meet many building needs. They are suitable for service as circulating pumps for hot or cold water, and for calcium or salt brine in either open or balanced systems. Their construction also renders them suitable for swimming pool circulation and cleaning pumps.



Quimby Vertically Split Case, Type E Centrifugal Pump

They are mechanically balanced for either a suction lift or a suction pressure, and are capable of operating with a suction lift up to 15 ft. when primed and a foot valve is used. Built in four sizes—Nos. 1, 1¼, 1½ and 2 for direct connection to motors. Capacities up to 500 g.p.m. at heads up to 150 ft.

Construction—For clear water these pumps are bronze fitted; for calcium brine, all-iron to avoid electrolysis; and for salt brine, all-bronze. Impellers are open type, balanced suction, mechanically and dynamically balanced, rigidly keyed to shaft and may be removed easily without disturbing piping connections. The close-grained cast iron, accurately machined, and vertically split casings will withstand a pressure of 200 lb. per sq. in.

The shaft is keyed for impeller and coupling; stuffing boxes are liberal in depth and water sealed for suction lifts; bed plate is cast iron, box type, ribbed, stiffened and machined.

No. 1 pump has 2-in. suction and 2-in. discharge.
No. 1¼ pump has 2½-in. suction and 2½-in. discharge.
No. 1½ pump has 3-in. suction and 3-in. discharge.
No. 2 pump has 4-in. suction and 4-in. discharge.

Type RS—For Large Capacities

The Quimby Type RS Balanced Centrifugal Pump is suitable for large capacities. For service as swimming pool filling pumps and other applications where large capacity pumps are required, their advantages are many.

Designed especially for applications where dependability under continuous operation is essential. An almost perfect balance for the rotating elements is obtained by the use of a special dynamic balancing machine. Efficient and quiet in operation.

Built in sizes having capacities from 35 to 16,000 g.p.m. at heads from 15 to 250 ft. Suitable for direct connection to motors and steam turbines.

Construction—Fittings of bronze or iron as required. Impellers are statically and dynamically balanced; inside, hand finished; outside, machine finished.

Impeller wearing rings are furnished around both impeller entrances to hydraulically balance any axial thrust.

Type RS Centrifugal Pump

Bronze sleeves on the shaft extend through stuffing boxes to protect the shaft from liquid being pumped. Stuffing boxes are deep and water sealed. Gland is split and held by swing bolts, making packing easily accessible. Bed plate has planed pads for pump and motor. Bearings are equipped with ring oilers in large oil reservoir. Flexible couplings allow for slight variations in alignment.

QUIMBY HIGH PRESSURE PUMPS FOR WASHING SERVICE

Architects and engineers writing specifications for garages will be interested in the Quimby High Pressure Screw Pumps for washing service.

Quimby Standard Screw Pumps are used for this service, mounted on bed plates complete with motors of the proper current characteristics for the job. Since they take the water direct from the supply tanks or the city mains, they can be placed in any location which best meets the needs of the user.

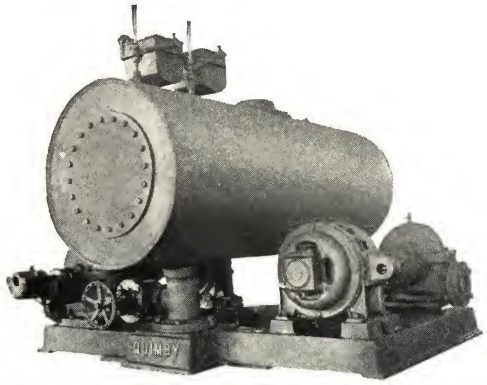
The most important requirement of a pump for this service is that it delivers a stream of water under pressure without pulsation. The Quimby Screw Pump meets this requirement and eliminates the excessive high pressures hitherto used. The cleansing action of water is most effective and rapid at 10 g.p.m. per nozzle at a pressure of 200 lb. per sq. in.

Complete units can be furnished with valves, hose and as many nozzles as are required. The nozzle furnished is a patented one designed to give the best service with this type of pump. It is of rugged construction and cannot be harmed by dropping it on floors. It is equipped with a hardened steel chisel for scraping mud from under fenders.

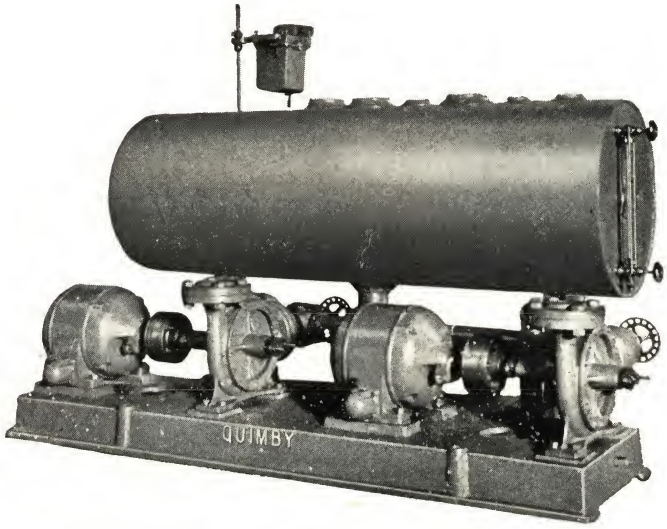
Pressure Stream from Quimby Pump

QUIMBY CONDENSATION RETURN UNITS

In many buildings it is necessary to set some of the radiation so low that the hot water of condensation will not return to the boiler by gravity. The Quimby Condensation Return Unit is designed to collect the hot water in such cases and pump it back into the boiler. The saving of fuel is greatest when the water is returned to the boiler hottest. The Quimby Unit takes advantage of this saving and does not allow water to remain in the receiver long enough to get cold.



Condensation Return Unit with Horizontal Tank and Pumps on Different Sides



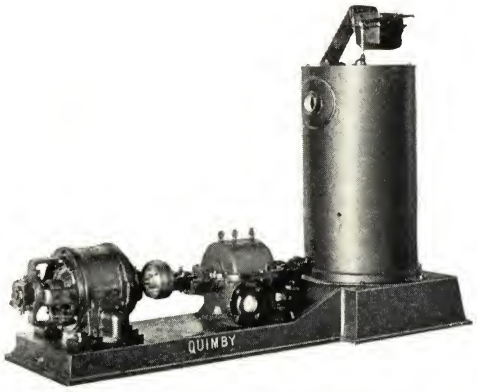
Condensation Return Unit with Horizontal Tank

In every type of unit—whether low or high pressure, small or large capacity, vertical or horizontal tank, single or duplex pumps—the advantages of the Quimby Condensation Return Unit are always found. Water is not allowed to lose its heat, flexibility of design, and unified mounting of all equipment on a common bed plate.

There are many types of Quimby Condensation Return Units, which can be made to suit every need and space requirement. They are furnished for any capacity depending on the area of radiation, and for any boiler pressure.

In all Quimby Units a common bed plate is used to carry all the equipment. Pumps, tank, valves and float switches are all assembled ready for piping and wiring.

The pumps used in Quimby Units were designed especially for hot water service and have years of experience behind them.



High Pressure Unit with Vertical Tank

QUIMBY ELECTRIC SUBMERGED VERTICAL SUMP AND BILGE PUMPS

Quimby Sump Pumps are always ready for service, automatic, accessible in all parts and capable of handling dirty water containing more or less solids. A centrifugal pump has to be primed. By having the starting device set so that the pump will not start until it is submerged, the certainty of priming is automatically assured and the necessity of a foot valve eliminated.

These sump pumps are designed to run at either 1150 or 1750 r.p.m. without noise or vibration. Complete fully automatic units can be furnished when desired with tank, cover, float switches, starters, and high water alarm.

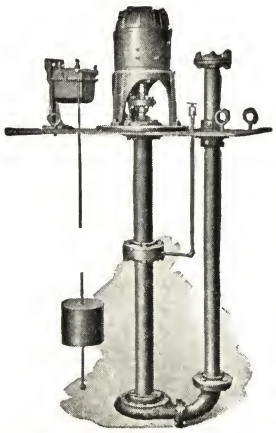
Quimby Sump Pumps are built for capacities up to 1000 g.p.m. at heads up to 150 ft.

Construction—The self-aligning roller bearing which carries the impeller and vertical shaft is situated at the level of the sump pit cover instead of being at the pump and thus underneath the gritty water. The pump is suspended from the cover plate by a steel tube through which the vertical shaft passes. The discharge pipe also passes through the cover plate. The plate is removable with its attachments which permits free access to all parts. For pumps more than 6 ft. long, one or more bearings are used to steady the shaft.

Motor is of the vertical type, direct connected to the pump by a flexible, noiseless coupling.

Heavy angle iron safety curbs for square or rectangular pits, and cast iron curbs for circular pits carry the cover plates and can be furnished gastight to specification.

Pump Nos. 1, 1¼, 1½, 2, 3 and 4 have respective discharge sizes of 2, 2½, 2½, 3, 4 and 6 in.



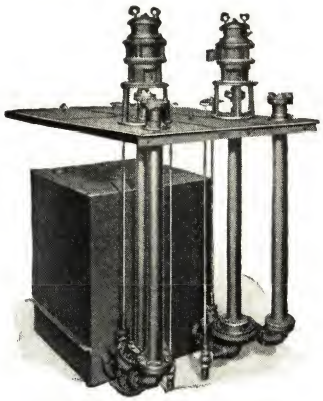
Quimby Sump Pump

QUIMBY SEWAGE EJECTORS

Quimby Electric Single and Duplex Dry Pit Sewage Ejectors

Capacities from 30 to 1000 gal. of sewage per minute.

Advantages of the Quimby Ejector are simplicity in construction, few moving parts and economy of operation. All moving parts, except the automatic control, are outside the sewage chamber and easily accessible. Vertical pump shaft is covered to prevent accidents if it is necessary to enter pump chamber while the pump is running.



Quimby Duplex Sewage Ejector

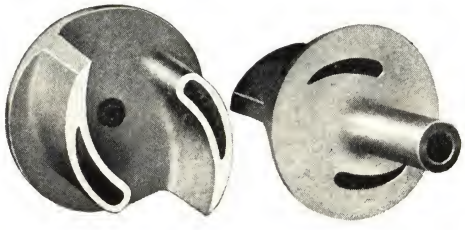
Sewage Receiver—Is a gastight steel tank with a manhole, gastight cover and steel bar screen.

Ejector Pump—Is substantially the same as the sump pump, but fitted with non-clogging impeller.

Emergency Pump Connection—Supplied to drain pit in case it becomes flooded.

Duplex Ejectors—Have great advantages over single type. In case repairs are needed on one pump, motor, or automatic control, the other handles the sewage without interruption.

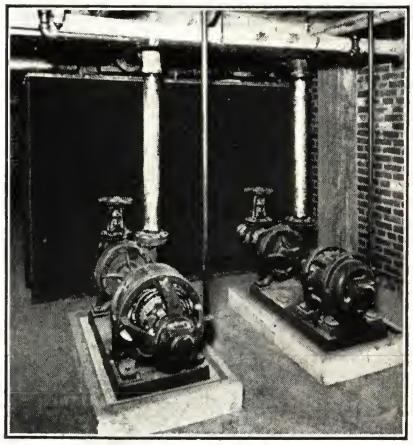
Each pump is usually large enough to handle the ordinary amount, but in case of an unusual flow both pumps operate until the receiver is empty.



Non-clogging Impeller

Horizontal Ejectors

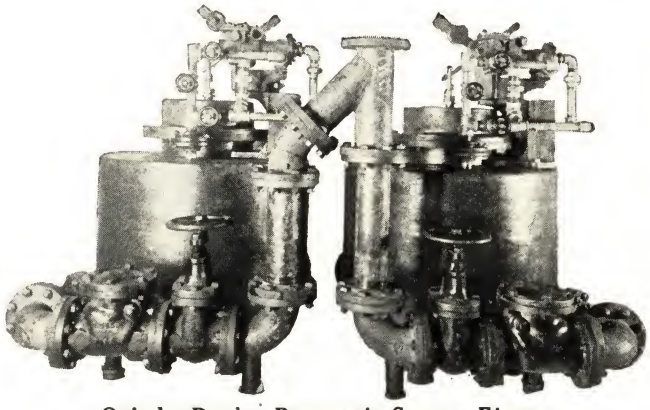
Horizontal ejectors are used when all the fixtures from which the tank fills are above the floor level. This type of ejector obviates the necessity for a pit. In construction it is very similar to the Dry Pit type. The pumps can be attached to the tank in any way that best meets space requirements.



Horizontal Ejector

Quimby Pneumatic Sewage Ejectors

Where the conditions of service are too heavy for the centrifugal type of electric sewage ejector, Quimby Pneumatic Sewage Ejector is used. This is built in a wide range of sizes



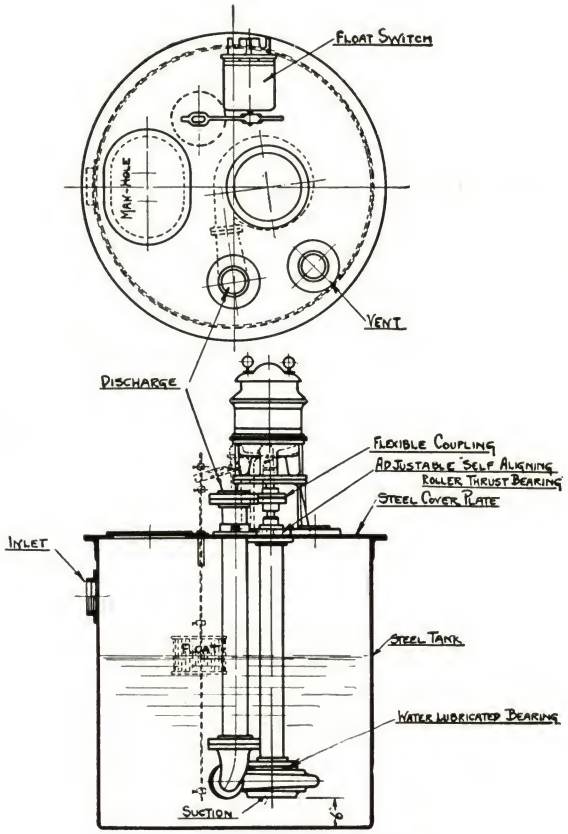
Quimby Duplex Pneumatic Sewage Ejector

and for almost any discharge head. Its operation is controlled by a patented valve. This installation has proved satisfactory under all conditions where other types of ejectors are unable to perform the work.

Submerged Ejectors

Submerged ejectors are used when there is no place for the large pit required by the Dry Pit type. The pumps are of the same construction, except for the fact that they take their suction from the bottom, as in a sump pump, instead of from the side. Non-clogging impellers are standard equipment.

No screens are required on any Quimby Sewage Ejector.



Single Submerged Ejector

ESTABLISHED 1859

TABER PUMP CO.

295 Elm Street, BUFFALO, N. Y.

Products

TABER STANDARD SUMP PUMPS; TABER STANDARD SEWAGE PUMPS; TABER MIDGET SUMP PUMPS.

Also Taber Booster and Circulating Pumps, Taber Centrifugal and Rotary Pumps, and Specially Engineered pumps.

Standard Sump Pumps

Self-contained single units suspended from substantial sump cover plates. Duplex units suspended from auxiliary elliptical plates mounted on main cover plates. Built for pits 5 ft. deep which allows for 3 in. of clearance at bottom. Pumps can be built for other diameters or for special depths at a nominal extra cost. Pumps are provided with automatic control. Auxiliary automatic starters furnished as additional equipment.

Standard Sewage Pumps

Wide open type impellers pass sewage and toilet tissue. As a protection against clogging, caused by cloths, etc., we urge the use of a strainer basket which we can furnish.

Taber Standard Sewage Pumps are built for pits 5 ft. deep, but can be furnished for other depths. Cover plate is fitted for a 3-in. vent pipe and with a manhole and cover. Entire mechanism, including float can be removed for adjustments without going into pit.

RATINGS PER PUMP—STANDARD SEWAGE PUMPS—SINGLE AND DUPLEX

Type No.	Cap., gal. per min.	Head, ft.	Cover plate diam., in.	Motor hp.	Type No.	Cap., gal. per min.	Head, ft.	Cover plate diam., in.	Motor hp.
No. 1 Single Units—1750 R.P.M., 60-cycle or D-c.					**No. 1 Duplex Units—1750 R.P.M., 60-cycle or D-c.**				
SA-1	75	25	36	1½	DSA-1	75	25	54	1½
SA-2		20		1½	DSA-2		20		1½
SA-3		15		1	DSA-3		15		1
No. 2 Single Units—1150 R.P.M., 60 or 40-cycle or D-c.					**No. 2 Duplex Units—1150 R.P.M., 60 or 40-cycle or D-c.**				
SC-1	100	32	36	3	DSC-1	100	32	66	3
SC-2		22		2	DSC-2		22		2
SC-3		17		1½	DSC-3		17		1½
SC-4	150	30	36	3	DSC-4	150	30	66	3
SC-5		20		2	DSC-5		20		2
SC-6		10		1½	DSC-6		10		1½

RATINGS PER PUMP—STANDARD SUMP PUMPS—SINGLE AND DUPLEX

Type No.	Cap., gal. per min.	Head, ft.	Cover plate diam., in.	Motor hp.	Type No.	Cap., gal. per min.	Head, ft.	Cover plate diam., in.	Motor hp.
Single Units—1750 R.P.M., 60-cycle and D-c.					**Duplex Units—1750 R.P.M., 60-cycle and D-c.**				
AL- 25-2	25	20	24	½	XL- 25-2	25	20	48	½
AL- 50-1	50	10	32	½	XL- 50-1	50	10	48	½
AL- 50-2		20		¾	XL- 50-2		20		¾
AL- 50-3		25		1	XL- 50-3		25		1
AL- 75-1	75	10	36	¾	XL- 75-1	75	10	54	¾
AL- 75-2		20		1	XL- 75-2		20		1
AL- 75-3		25		1½	XL- 75-3		25		1½
AL-100-1	100	10	36	1	XL-100-1	100	10	54	1
AL-100-2		20		1½	XL-100-2		20		1½
AL-100-3		30		1½	XL-100-3		30		1½
AL-150-1	150	10	36	1½	XL-150-1	150	10	66	1½
AL-150-2		20		1½	XL-150-2		20		1½
AL-150-3		30		2	XL-150-3		30		2
AL-200-1	200	10	36	2	XL-200-1	200	10	66	2
AL-200-2		20		2	XL-200-2		20		2
AL-200-3		30		3	XL-200-3		30		3
AL-300-1	300	10	36	3	XL-300-1	300	10	66	3
AL-300-2		20		3	XL-300-2		20		3
AL-300-3		30		5	XL-300-3		30		5
Single Units—1150 R.P.M., 60 or 40-cycle or D-c.					**Duplex Units—1150 R.P.M., 60 or 40-cycle or D-c.**				
CL-100-1	100	10	36	1	ZL-100-1	100	10	54	1
CL-100-2		16		1	ZL-100-2		16		1
CL-150-1	150	10	36	1½	ZL-150-1	150	10	66	1½
CL-150-2		20		1½	ZL-150-2		20		1½
CL-150-3		25		2	ZL-150-3		25		2
CL-200-1	200	10	36	2	ZL-200-1	200	10	66	2
CL-200-2		20		2	ZL-200-2		20		2
CL-200-3		30		3	ZL-200-3		30		3
CL-250-1	250	10	36	2	ZL-250-1	250	10	66	2
CL-250-2		20		3	ZL-250-2		20		3
CL-250-3		30		5	ZL-250-3		30		5

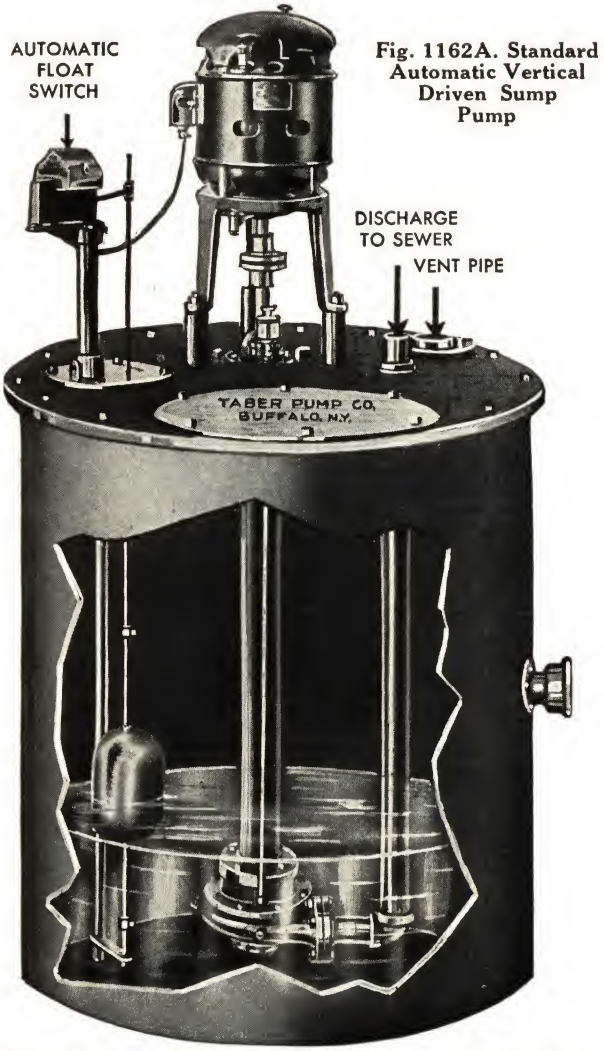


Fig. 1162A. Standard Automatic Vertical Driven Sump Pump

These pumps are used for drainage purposes below sewer level and are made for handling either drainage water or sewage. It also has many industrial applications, such as conserving condensate and returning it to the boiler feed water supply tank. The pump is sold with or without tank

Fig. 1161. Duplex Unit of Fig. 1162A

We are in position to successfully solve any pump problems within the limitations of types and sizes of pumps we construct. All data received is held strictly confidential. Send your pumping problems to us on a Taber Data Sheet

Taber Midget Sump Pump No. 1

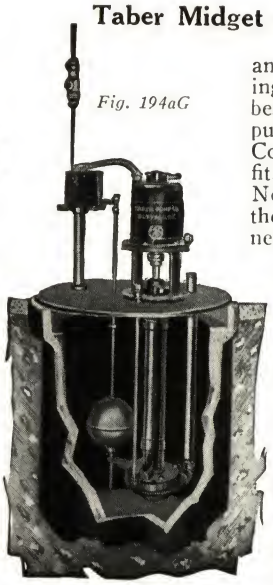


Fig. 194aG

"Dry Cellar Insurance" for the smaller buildings. G-E ¼ hp., ball bearing, moistureproof, repulsion induction motor. Complete 24-in. cover plate fits top of an 18-in. tile. Nothing but water enters the sump. Taber engineered throughout.

Simply plug into lamp socket to operate. The pump needs no servicing after installation.

RATINGS OF MIDGET SUMP PUMPS

10-25 G.P.M.

For 60-cycle, 1750 R.P.M.				
Gal. per min...	10	15	20	25
Total head, ft.	23	21	20	18
For 25-cycle, 1450 R.P.M.				
Gal. per min...	10	15	20	25
Total head, ft.	15	14	12	10

ESTABLISHED 1898

YEOMANS BROTHERS COMPANY

Sewage Ejectors, Pumping Machinery, Air Compressors

1419 Dayton Street, CHICAGO, ILL.

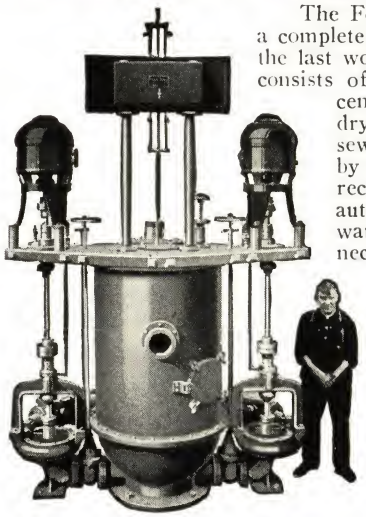
REPRESENTATIVES IN PRINCIPAL CITIES

Products

YEOMANS FORM "A" SCREENLESS DUPLEX CENTRIFUGAL ELECTRIC SEWAGE EJECTORS; SHONE PNEUMATIC SCREENLESS SEWAGE EJECTORS; YEOMANS SINGLE and DUPLEX ELECTRIC BILGE or SUMP PUMPS; YEOMANS SUBMERGED TYPE SCREENLESS SEWAGE EJECTORS.

Also Yeomans Horizontal Centrifugal Pumps; Yeomans Condensation Return Pumps; Automatic Lubricators; Rotary Air Compressors and Dry Vacuum Pumps.

Yeomans Form "A" Sewage Ejector (Screenless)



Form "A" Duplex Ejector (Screenless)

The Form "A" Sewage Ejector is a complete pumping unit and represents the last word in quality equipment. It consists of two vertical, non-clogging centrifugal pumps operating in dry pit, connected to cast iron sewage receiver. Pumps driven by vertical motors mounted on receiver cover. Equipped with automatic controllers, high water alarm, pit-drainage connections, gate and flush back check valves. Top plate of pump casing can be raised without disturbing shafting, bearings or impellers.

No accumulation of solids in receiver, requires minimum space, high efficiency, noiseless, sanitary and reliable. Non-clogging impeller does away with screens. Complete details given in Bulletin A-2400.

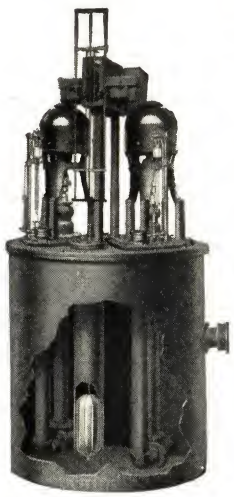
FORM "A" DUPLEX EJECTOR (SCREENLESS)

No.	3	4	5	6
Capacity each unit.....g.p.m.	100–125	150–200	250–350	400–500
Pit diameter.....ft.	8	8	8	10
Depth of pit below inlet.....ft.	4	4	4	5

Yeomans Heavy Duty Bilge or Sump Pumps

Automatic, self contained, heavily constructed, slow speed machines, with submerged centrifugal pumps, vertical direct connected motors and automatic controllers, equipped with standard open impellers. Unsurpassed for handling waste water, seepage, drainage, flood water, boiler blowoff heating returns. Will handle any hot drainage with absolute certainty. No priming devices required.

Furnished with either moderate or slow speed, continuous or intermittent duty motors and with high water alarms, pipe casing for float, force feed lubricated bearings, automatic oil economizers, etc., as desired. Write for Bulletin B-3400.



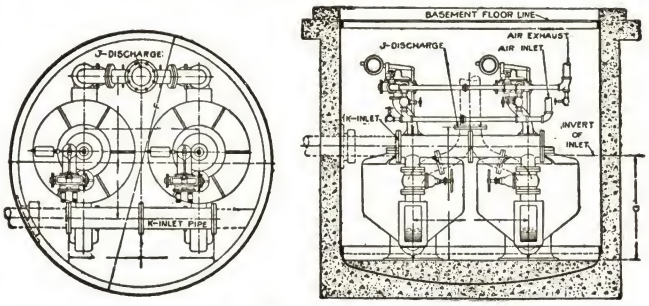
Yeomans Heavy Duty Duplex Bilge Pump

HEAVY DUTY BILGE PUMPS

No.	Cap., g.p.m.		Basin diam., in.	
	Single	Duplex	Single	Duplex
1¼	15- 25	30- 50	24	36
1½	35- 50	70- 100	36	36
2	60- 75	120- 150	36	42
3	100-125	200- 250	36	48
4	150-200	300- 400	36	60
5	250-350	500- 700	48	60
6	400-500	800-1000	48	72

Shone Pneumatic Sewage Ejector (Screenless)

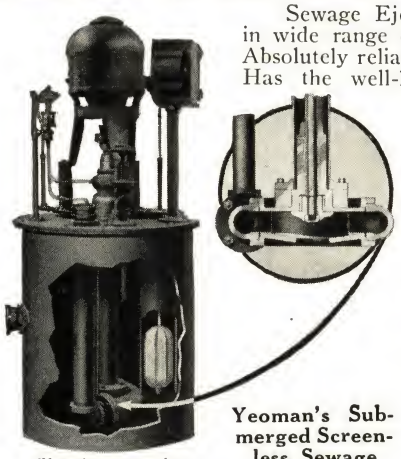
Well known as a most reliable pneumatic sewage ejector. Unsurpassed for simplicity, reliability, durability, substantial design, and economy of operation. No screens required; no accumulation of solids; special non-clogging check valves; no airtight floats; bronze pressure operated piston valves located outside of ejector pit; no electric float switches. Piston valves prevent sewage from getting into compressors. Furnished with either motor or steam driven air compressors. Compressors can be located at any desired distance from ejectors. Ejectors can be operated from air supply maintained for general purposes. Especially recommended for municipal work. Write for complete Bulletin P-4400.



Dimension Diagram of Shone Duplex Ejector (Screenless)

G.p.m. each unit	G	S	Single ejectors				Duplex ejectors		
			F-round pit diam.	Rect. pit	J dis.	K inlet	F-round pit diam.	Rect. pit	J & K inl. and dis.
50	3′1″	6′6″	6′	3′6″x6′0″	4″	6″	8′	6′0″x7′0″	6″
100	3′7″	7′1″	7′	4′0″x7′0″	5″	6″	9′	7′0″x8′0″	8″
150	4′0″	7′6″	7′	4′0″x7′0″	5″	6″	9′	7′0″x8′0″	8″
200	4′7″	8′2″	8′	4′6″x8′0″	6″	8″	10′	8′0″x9′0″	8″
250	4′1″	7′8″	9′	5′0″x9′3″	6″	8″	10′6″	9′3″x9′3″	8″
300	4′7″	8′2″	9′	5′0″x9′3″	6″	8″	10′6″	9′3″x9′3″	8″
400	5′7″	9′2″	10′	5′0″x9′3″	8″	10″	10′6″	9′3″x9′3″	10″
500	6′4″	10′1″	12′	6′6″x12′0″	10″	12″	14′	12′0″x14′0″	12″
600	7′3″	10′11″	12′	6′6″x12′0″	10″	12″	14′	12′0″x14′0″	12″
750	5′9″	10′5″	13′	7′3″x13′0″	12″	14″	16′	13′0″x15′0″	14″
1000	6′9″	11′5″	13′	7′3″x13′0″	12″	16″	16′	13′0″x15′0″	16″

Yeomans Heavy Duty Screenless Submerged Type



Showing non-clogging impeller

Yeoman's Submerged Screenless Sewage Ejector

Sewage Ejector can be furnished in wide range of sizes and capacities. Absolutely reliable, high-grade machine. Has the well-known Yeomans non-clogging impeller which eliminates all screens—gives years of dependable service at low maintenance cost. Ideal for handling sewage and drainage containing rags, solids and other waste. Engineers will find it effective for use in deep basements, subdivisions, subways, disposal works, power stations and industrial plants.

Write for Bulletin B.S.-8000.

YEOMANS SUBMERGED SCREENLESS SEWAGE EJECTORS

No.	Capacity, g.p.m.		Basin diam., in.	
	Single	Duplex	Single	Duplex
3	100-125	200- 250	36	48
4	150-200	300- 400	36	60
5	250-350	500- 700	48	60
6	400-500	800-1000	48	72

WESTCO PUMP CORPORATION

Manufacturers of Pumps for Handling Commercial Liquids, for Circulating, and General Service

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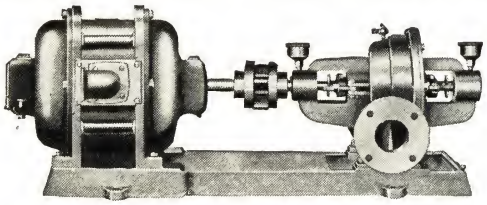
Products

WESTCO SINGLE STAGE TURBINE TYPE PUMPS for low and high head duty; WESTCO CONDENSATION PUMPS and RECEIVERS; BOOSTER SYSTEMS; DOMESTIC WATER SYSTEMS; REFRIGERATING PUMPS for brine and water circulation; UNDERWRITERS' LABORATORY APPROVED TANK FILLING PUMPS for supplying sprinkler, gravity and pressure tanks.

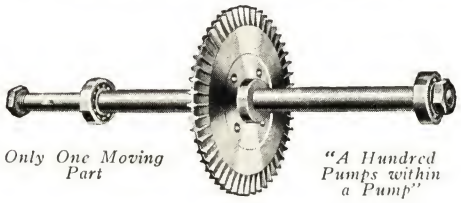
Also Westco Deep Well Turbine Pumps.

Westco Pumps (Turbine Type)

The application of the turbine principle to pumping liquids is an exclusive feature of Westco pumps and is broadly covered by patents. It is the one important improvement in pump design since the development of the centrifugal. The Westco possesses distinct advantages in providing high efficiency performance in small capacities, plus the ability of each individual pump to deliver against high heads in single stage and against widely varying pressures with little change in capacity or efficiency. The power requirements are comparable to the piston or reciprocating type pump in that power consumption decreases with a decrease in discharge head.



Westco Turbine Pump, Motor Driven



Only One Moving Part

"A Hundred Pumps within a Pump"

Wide Operating Range—On account of its wide operating range, variations in pumping head, due to fluctuation of city pressure or change in discharge conditions, affect only slightly the capacity or efficiency of the Westco pump. When pump and motor are selected in accordance with maximum head requirements, any decrease in head will have only slight effect on discharge volume and power requirements will decrease. Westco Pumps automatically adjust themselves to changes in the operating conditions.

Only One Moving Part—The impeller (shown at the left) is the only moving part of the Westco pump. It is of bronze or such other material as has been proven most suitable for the individual purpose for which the pump is to be used, and is carried on a shaft of monel metal mounted on outboard ball bearings.

CONDENSED SELECTION TABLE, WESTCO SINGLE STAGE PUMPS

Performance when operating at full load speed of 1725 r.p.m., motors pumping *clear water at normal temperatures*

Capacity, g.p.m.	Total head, feet												
	20 or less	30	40	50	60	80	100	125	150	175	200	250	300
5	3H6-¼	4H6-¼	4H6-¼	4H6-¼	4H6-⅓	4H6-½	4H6-½	5L7-¾	5L7-1	4H6S-1*	4H6S-1*	5L7S-1½*	5L7S-2*
10	4H6-¼	4H6-¼	4G7-⅓	4G7-½	4G7-½	4G7-¾	4G7-¾	5K8-1	5K8-1½	5K8-1½	5K8-1½	6K7-3	6K7-3
15	4G7-¼	4G7-⅓	4G7-⅓	4G7-½	4G6-¾	4G6-¾	5K8-1	6K7-1½	6K7-1½	6K7-2	6K7-2	6K7-3	6H7-5
20	4G6-⅓	4G6-½	4G6-½	4G6-¾	4G6-¾	6K7-1	6K7-1½	6K7-1½	6H7-2	6H7-3	6H7-3	6H7-5	6H7S-5*
25	4G6-⅓	4G6-½	4F6-½	4F6-¾	6K7-1	6H7-1½	6H7-1½	6H7-2	6H7-2	6H7-3	6H7-3	6H6-5	6H7S-5*
30	4F6-½	4F6-½	4F6-½	4D7-1	4D7-1½	6H7-1½	6H7-1½	6H7-2	6H6-3•	6H6-5	6H6-5	6H5-7½	7H8-10
40	4F5-½	4F5-½	4D7-1	4D7-1	4D6-1½	5F8-2	6H6-2	6H6-3	6H5-5	6H5-5	6H5-5	7H8-7½	7H8-10
50	4D7-¾	4D7-¾	4D6-1	4D6-1½	5F8-1½	5F6-3	6H5-3	6H5-3	6H5-5	6H5-5	7H8-7½	7H8-7½	7H8-10
60	4D6-¾	4D6-1	4D6-1	4D5-1½	5F6-2	6H5-3	6H5-3	6F8-5	7H8-5	7H8-7½	7H8-7½	7H7-15	7H7-15
70	4D5-1	4D5-1	4D5-1½	5F5-2	5F5-2	6F8-3	6F8-5	6F7-5	7H8-5	7H8-7½	7H7-10	7H7-15	7H7-15
80	5F5-1	5F5-1½	5F5-1½	5F5-2	6F8-3	6F7-5	6F7-5	6F6-5	7H7-7½	7H7-10	7H7-10	7H7-15	8F9-20
90	5F5-1	5F5-1½	6F7-3	6F7-3	6F7-3	6F6-5	6F6-5	6F6-5	7H7-7½	7H7-10	7H7-10	7H7-15	8F9-20
100	5D7-1½	5D7-2	5D7-3	5D7-3	5D7-3	6F6-5	6F6-5	6F5-7½	7H7-7½	7H7-10	7H7-10	8F9-20	8F9-20
120	5D7-1½	5D7-2	5D7-3	6F6-3	6F6-3	6F5-5	6F5-7½	7H7-7½	7H7-7½	7H6-15	7H6-15	8F9-20	8F9-20
160	5D6-2	5D6-3	5D6-5	5D5-5	6F5-5	7H6-7½	7H6-7½	7H6-10	7H5-15	7H5-15	8F9-15	8F9-20	8F8-30
200	5D5-3	5D5-5	5D5-5	7H5-7½	7H5-7½	7H5-10	7H5-10	7H5-15	7H5-15	8F8-20	8F8-20	8F8-25	8F8-35
250	7H5A-7½	7H5A-7½	7H5A-7½	7H5A-10	7H5A-10	7H5A-15	7H5A-15	7H5A-15	7H5A-20	8F8-20	8F8-20	**	**
350	8F6-10	8F6-15	8F6-15	8F6-15	8F6-15	8F6-20	8F6-20	8F6-25	8F6-25	8F6-30	.....	**	**

Notes:

*Indicates two standard pumps connected in series.

**Write for recommendation when pumps of larger capacities or for greater head are required.

Reference indicates model pump and horsepower of motor—Example: 3H6-¼ is Model 3H6 pump with ¼ hp. motor.

To reduce feet head of water to pounds pressure divide by 2.31. Example: 100-ft. head is equivalent to 43.3 lb. pressure per sq. in. *Liquids other than water*—Westco pumps will deliver the same volume of other liquids as long as their viscosity is approximately the same as water. The horsepower required will be increased or decreased in proportion to the specific gravity.

Pumping head need not be closely calculated. Simply estimate roughly the maximum head which you are sure will not be exceeded and select pump and motor for that condition. Any decrease in head lessens power required and increases capacity only slightly.

Accessibility—The pump casing is split vertically which permits disassembly without disturbing suction or discharge connections.

Perfect Hydraulic Balance—Westco pumps are of the double suction type, providing equal pressure on both sides of the impeller and a free running clearance without the use of complicated balancing devices. There is no metal-to-metal contact in the interior of the pump to cause friction or loss of efficiency.

Other Features—Westco Turbine Pumps are particularly suited for the following pump duties in modern buildings:

Booster pump—The Westco Turbine Pump can be installed directly in the line, insuring a steady, adequate stream without any pulsations. Delivers against heads up to 250 ft. in single stage at 1725 r.p.m.

Circulating pump for drinking water—Casings are built to withstand high static pressures in balanced systems in high buildings.

Brine circulating pump—Wide operating range eliminates the necessity for accurately computing the pump head. Simply select the pump and motor for the maximum head you know will not be exceeded, and no matter how much less than this the head may actually be, the pump will deliver only a slightly increased volume and the power required will decrease with the head, thus removing the hazard of motor overload.

Westco's turbine design insures efficient operation in single stage against heads up to 250 ft., thus eliminating complicated and costly multistage installations.

The pump impeller is direct driven from motor through a flexible coupling. Westco performance is accomplished at standard motor speed up to 1725 r.p.m. against high or low heads.

Grease cups that require replenishment of lubricant but once a year are located on the bearing pedestals. In addition to slight adjustment of packing glands, no other attention is required.

In the bronze fitted or all bronze pump, the impeller is machined from a solid cast bronze disc and from cast iron in the iron fitted pump. It is also made from other metals when conditions demand.

Westco Turbine Pumps are sealed against leakage by a round rubber gasket which fits in grooves in casing and cover.

Due to Westco's compact, simple design, only minimum floor space and headroom are required for installation. Silent operation is a distinguishing characteristic of the throbless, humless, smooth-running Westco.

Write for copy of Architect's Specifications.

Westco Domestic Water Systems (Self-priming)

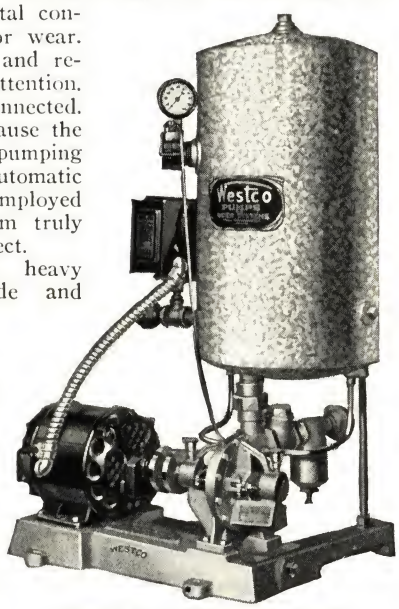
Ideal for supplying the water needs of suburban or farm homes, estates, golf courses, greenhouses, etc., and are much used for booster service in apartment dwellings where normal city water supply does not deliver adequate pressure to upper floors. They will deliver all water needed under adequate pressure, even in case of fire.

Pump is of the turbine type, all-bronze construction, self-priming. It is simple in design, having only one moving part; there is no metal-to-metal contact to cause friction or wear. Pump operates silently and requires only minimum attention. Motor is direct connected. Speed, 1725 r.p.m. Because the pump is capable of pumping both air and water, an automatic air volume control is employed which makes the system truly automatic in every respect.

The tank is extra heavy steel, galvanized inside and outside. Automatic mechanical pressure regulator is supplied.

The standard setting provides that the switch will cut in at 20 lb. and cut out when the storage tank pressure reaches 40 lb.

Westco Water Systems are furnished in all sizes and also gasoline engine driven where electric current is not available.



Westco Domestic Water System
(Self-priming)

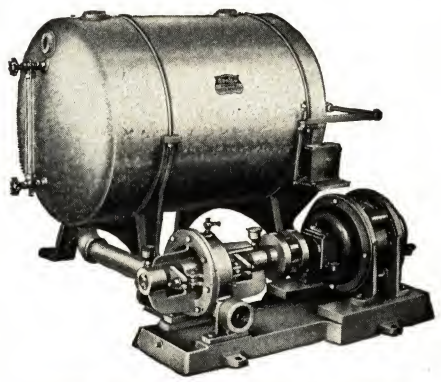
Westco Condensation Pumps and Receivers

For automatically returning to low and high pressure steam plants, condensation from radiation systems, heaters, steam coils, etc. They save the water supply, and to a considerable extent the fuel, by returning the condensate while hot. Through their aid proper circulation in the system is induced.

These units are entirely automatic in operation and consist of a Westco Bronze Fitted Pump equipped with two outboard ball bearings, and direct connected to an electric motor of approved make.

All pumps are of the double suction type, designed in such a manner that they can be entirely disassembled without disturbing the suction and discharge connections.

Receiver tank is made of heavy steel plate, galvanized inside and out, and is provided with a vent opening to allow the escape of any vapors that come back with the condensate.



Westco Condensation Pump and Receiver

Tank has an inlet opening at the top, also end. Suction pipe is connected in the bottom of the tank and extends up in the receiver sufficiently to allow liberal space for collection of sediment which can be cleaned out through drain opening.

Necessary piping and fittings between pump and receiver tank are furnished with all units.

Float control switch is of approved make—enclosed type—meets requirements of the Underwriters. It is mounted on a cast iron plate which is bolted to the head of the receiver and is actuated by means of a seamless copper float inside of tank.

Write for copy of Architect's Specifications

SELECTION TABLE WESTCO CONDENSATION PUMP AND RECEIVER UNITS

Maximum direct radiation, sq. ft.	*Pump capacity g. p. m.	Pounds pressure—against which pump will discharge operating at 1725 r. p. m.										Approx. floor space, in.
		10	20	30	40	50	60	70	80	90	100	
1000 to 2000	5	C3H6-¼	C4H6-¼	C4H6-⅓	C5L7-¾	C5L7-¾	C5K8-1	C5K8-1½	C5K8-1½	C6K7-2	C6K7-3	36x40
2000 to 4000	10	C4G7-¼	C4G6-½	C4G6-¾	C5K8-1	C5K8-1	C6K7-1½	C6K7-2	C6K7-2	C6K7-2	C6K7-3	
4000 to 6000	15	C4G6-⅓	C4G6-½	C6K7-1	C6K7-1	C6H7-2	C6H7-2	C6H7-3	C6H7-3	C6H7-3	C6H6-5	
6000 to 7500	20	C4F6-⅓	C4F5-¾	C6H7-1½	C6H7-1½	C6H7-2	C6H6-3	C6H6-3	C6H6-5	C6H6-5	C6H5-5	
7500 to 10000	25	C4F5-½	C4D7-1	C5F8-1½	C6H6-2	C6H6-3	C6H6-3	C6H5-5	C6H5-5	C6H5-5	C6H5-5	46x45
10000 to 15000	30	C4F5-½	C4D7-1½	C5F6-2	C6H6-2	C6H5-3	C6H5-5	C6H5-5	C6H5-5	C7H8-7½	C7H8-7½	
15000 to 20000	40	C4D6-¾	C4D5-1½	C5F6-2	C6H5-3	C6F8-5	C6F8-5	C7H8-5	C7H8-7½	C7H8-7½	C7H8-7½	
20000 to 25000	50	C4D5-1	C5F5-2	C5D7-3	C6F8-3	C6F7-5	C6F6-5	C7H8-5	C7H8-7½	C7H7-10	C7H7-10	
25000 to 30000	60	C5F5-1½	C5D7-3	C6F7-3	C6F7-5	C6F6-5	C7H7-7½	C7H7-10	C7H7-10	C7H7-10	C7H7-10	
30000 to 35000	70	C5D7-1½	C5D7-3	C5D6-5	C6F6-5	C6F6-5	C7H7-7½	C7H7-10	C7H7-10	C7H7-10	C7H7-10	62x50
35000 to 40000	80	C5D7-1½	C5D7-3	C5D6-5	C6F5-7½	C6F5-7½	C7H7-7½	C7H7-10	C7H7-10	C7H6-15	C7H6-15	
40000 to 45000	90	C5D7-1½	C5D6-5	C5D6-5	C6F5-7½	C6F5-7½	C7H6-10	C7H6-15	C7H6-15	C7H5-20	C7H6S-20	
45000 to 50000	100	C5D6-2	C5D6-5	C6F5-5	C7H6-7½	C7H6-10	C7H6-10	C7H5-15	C7H5-15	C7H6S-20	C7H6S-20	

*Pump capacity based on handling 190° F. water.

Note: The above unit numbers indicate the model Westco pump and size motor. Example: Unit number C3H6-¼ indicates a model 3H6 Westco double suction bronze fitted pump requiring a ¼ hp. 1725 r.p.m. motor.

GRINNELL COMPANY, INC.

MANUFACTURERS AND CONTRACTORS

Automatic Sprinkler Systems

EXECUTIVE OFFICES

PROVIDENCE, R. I.

OFFICES, PLANTS AND BRANCHES

ALBANY, N. Y.
ATLANTA, GA. (Plant and Foundry)
AUBURN, R. I. (Plant and Foundry)
BALTIMORE, MD.
BOSTON, MASS.
BUFFALO, N. Y.
CHARLOTTE, N. C. (Branch)
CHICAGO, ILL. (Branch)
CINCINNATI, OHIO
CLEVELAND, OHIO (Branch)
COLUMBIA, PA. (Plant)
DALLAS, TEX.
DETROIT, MICH.
HARTFORD, CONN.
INDIANAPOLIS, IND.
KANSAS CITY, MO.
KEARNY, N. J. (Branch)
MILWAUKEE, WIS.
MINNEAPOLIS, MINN. (Branch)
NEW ORLEANS, LA.
NEW YORK, N. Y. (Serviced from Kearny Branch)
PHILADELPHIA, PA. (Branch)
PITTSBURGH, PA.
PROVIDENCE, R. I. (Plant and Foundry)
ROCHESTER, N. Y.
ST. LOUIS, MO. (Branch)
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WARREN, OHIO (Plant and Foundry)

GRINNELL COMPANY OF THE PACIFIC

LOS ANGELES, CAL. (Branch) SAN FRANCISCO, CAL. (Branch) OAKLAND, CAL. (Branch) SEATTLE, WASH. (Branch)

GRINNELL COMPANY OF CANADA, LTD.

MONTREAL, QUE. (Branch) TORONTO, ONT. (Plant and Foundry) OSHAWA, ONT. (Foundry) VANCOUVER, B. C. (Branch) WINNIPEG, MAN.

Products

GRINNELL AUTOMATIC SPRINKLER SYSTEMS and other FIRE PROTECTION APPARATUS and DEVICES.

For Heating and Power Piping Installations, Pipe Fittings, Hangers and Accessories, Thermoliers (Unit Heaters), Thermoflex Heating Specialties, see Manufacturers' Index.

Grinnell Sprinkler Systems

Grinnell has been a leader in automatic sprinkler protection for nearly fifty years. Over 30,000,000 Grinnell Sprinklers have been installed and are safeguarding property valued at more than 10 billion dollars. The average loss per fire in Grinnell protected buildings in over 26,000 recorded fires is less than $300, an estimated saving of over 90% as compared to the average fire loss in similar properties without sprinklers.

Types of Systems

(1) Wet-Pipe System—With water in the pipes under pressure.

(2) Dry-Pipe System—With air in the pipes under pressure.

(3) Deluge System—With air in pipes under atmospheric pressure and using "open" sprinkler heads.

(4) Preaction System—Similar to 3, but using closed heads.

(5) Simplex System—Using a pressure tank, with air in pipes and the same air pressure in tank and system.

(6) Outside Open Head Systems (Water Curtains)—For protection against exposure fires.

Features Common to All Grinnell Automatic Sprinkler Systems

A sprinkler equipment is attached to or concealed in the ceiling. When fire breaks out, the temperature at the ceiling rapidly increases and causes the fusible strut of the solder type sprinkler head to melt, or the bulb of the quartz bulb sprinkler head to burst. This allows the water to emerge from the sprinkler head in a heavy spray onto the fire.

Grinnell Automatic Sprinkler heads are of two general types—Solder Type and Quartz Bulb Type—and when installed are located a few inches below ceiling and spaced from 8 to 12 ft. apart, depending on fire hazard conditions. The piping on which sprinklers are located is fed by upright riser pipes controlled by shut-off valves. Water supply of adequate volume and pressure is obtained from various sources, such as city water mains, elevated gravity tanks, pressure tanks, reservoir, or pumps.

The sprinkler heads are designed to operate automatically at temperatures of 135 degrees or more according to conditions and the water is distributed over the area protected by each sprinkler.

An automatic alarm is sounded when a sprinkler head goes into operation.

Grinnell Quartz Bulb Sprinkler

This sprinkler was first brought out about eight years ago and it has many advantages over the ordinary solder type sprinkler. An entirely new principle is used, solder is discarded, and in its place a quartz bulb partially filled with a special colored liquid is used. It can be manufactured to operate at any desired temperature and the ordinary or "low" test sprinkler operates at 135° as compared to the 160° solder type. The Grinnell Quartz Bulb Sprinkler is more sensitive or quicker to operate than the solder type and it is to be preferred where prompt operation is necessary because of severe fire hazard or danger of fire spreading quickly. This new type is not subject to failure from corrosion as is the solder type. The bulb itself is non-corrosive and the rest of the sprinkler can be lead coated or otherwise protected. Chemical and other plants where severe corrosive conditions exist can now have sprinkler protection because of the Grinnell Quartz Bulb Sprinkler Head. It also is not affected by "loading" or "gumming" from dust, varnish fumes, paint, etc.

Grinnell Quartz Bulb Sprinkler Heads are specified in many cases because of their unusually attractive appearance.

One million Grinnell Quartz Bulb Sprinkler Heads have been installed and experience has shown that not only are they preferable for general use, but are especially desirable where quick action is necessary or where the sprinklers are subject to corrosive influences, loading, or gumming.

Wet-Pipe System

Pipes are full of water under pressure. When sprinkler operates, water is at once discharged on the fire. Buildings having wet-pipe systems must be heated throughout in cold weather to prevent water in pipes from freezing.

Dry-Pipe System

These systems are used in buildings or portions of buildings where a wet-pipe system could not be used because of danger of freezing. A Grinnell Dry-Pipe Valve is used, holding back the water, with air in pipes under pressure. When sprinkler head operates, the air pressure drops and water automatically enters system and is discharged from the sprinkler head. The Grinnell Dry-Pipe Valve is equipped with a Grinnell Accelerator which causes the dry-pipe valve to trip and admit water to the system almost instantaneously, thereby reducing the delay in water reaching the sprinkler head to a minimum. The air pressure is maintained by an air compressor that can be arranged to operate automatically if desired.

Deluge System

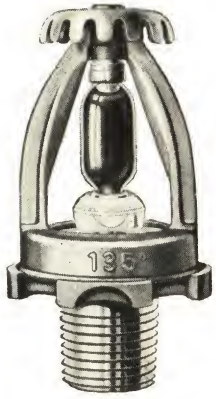
Open heads are used and the water supply is controlled by a Deluge Valve which in turn is operated by a thermostatic system of heat actuated devices located on ceiling. The heat actuated devices are very sensitive to heat from fire and almost immediately after fire starts, the Deluge Valve trips and water is at once discharged from all the open heads in area or room, thus "deluging" the fire. This system can be used to advantage where the fire hazard is severe and quick action necessary, such as inflammable liquid spraying, manufacture or use of extra hazardous liquids or compounds, airplane hangars, etc.

Preaction System

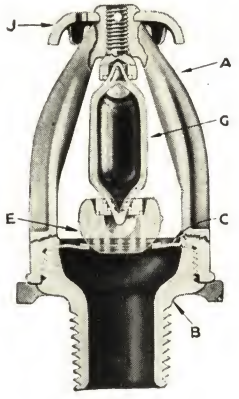
In this type of dry-pipe system, a thermostatically controlled Deluge Valve is used as for Deluge Systems. Regular automatic sprinkler heads are used and there is no water in the pipes. No air pressure is maintained as with the ordinary dry-pipe systems. The sensitive heat actuating devices on the ceiling cause the Deluge Valve to trip and admit water to the piping system before the automatic sprinkler head operates. An alarm is given when the Deluge Valve trips and there may be sufficient time to extinguish fire by other means before the sprinkler operates. This system is especially adaptable to properties with unusually valuable contents, where the danger of any damage by water must be avoided, such as museums, art galleries, printing establishments, cold storage plants, etc. It is also designed for use in asylums, prisons, hospitals, or similar properties where inmates may intentionally injure the piping system.

Florida Type Head

An ornamental form of the Grinnell Quartz Bulb Sprinkler, to harmonize with interior decorative schemes

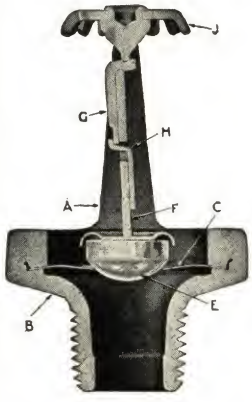


A—Yoke
B—Body
C—Diaphragm
E—Glass disc
G—Quartz bulb
J—Deflector



Quartz Bulb Sprinkler Head

A—Yoke
B—Body
C—Diaphragm
E—Glass disc
F—Main strut piece
G—Hook on strut
H—Key on strut
J—Deflector



Solder Type Sprinkler Head

Simplex Dry-Pipe System

This is a simplified type of system having a pressure tank for a water supply. There is no dry-pipe valve and the same air pressure is automatically maintained in the tank and system. It is especially intended for use in properties where the fire hazard is not severe and where city water is not available. This would include hotels, clubs, institutions, large dwellings, and similar properties. It is less expensive to install and easy to maintain. The tank can be located in the basement and this is the only part of the system that needs to be heated.

Outside Open Head Systems (Water Curtains)

Special types of Grinnell "Open" Sprinklers are used and located outside of building, over each window, at eaves, or on roof, as a protection against outside exposure to fire. They are connected to a system of piping with adequate water supply, such as city water or pumps. The water is normally shut off and is turned on when needed. These systems are of great value in preventing an outside fire from entering the building.

Installation

Grinnell Automatic Sprinkler Systems are factory-assembled to blue prints, fittings being made-on as far as possible by machinery. The result is that the equipment is delivered ready for quick and botherless installation by our highly trained erecting crews. This reduces interference with usual plant operation to a minimum.

Designs and Estimates

Inquiries addressed to the executive offices of GRINNELL COMPANY, INC., or to any of the branch offices will immediately receive the attention of the engineering staff, who will promptly furnish expert advice with designs or estimates as required, without cost or obligation.

Sprinkler Supervisory Service

A safeguard of the dependability and efficiency of an Automatic Sprinkler System is provided by the A.D.T. Central Station System of Sprinkler Supervisory Service.

Day and night this service automatically and continuously supervises all the vital parts of the Sprinkler System. It eliminates human carelessness by an electric equipment which automatically transmits signals to a central station, indicating any trouble that might make the system inoperative. This A.D.T. Central Station System of Sprinkler Supervisory Service is described in detail in another section of SWEET'S CATALOGUE. See Manufacturers' Index.

W. D. ALLEN MANUFACTURING CO.

Manufacturers of Fire Protection Equipment Since 1887

566-570 West Lake Street, CHICAGO, ILL.

BRANCH OFFICES

NEW YORK, N. Y., 69 Warren Street
BOSTON, MASS., 77 Summer Street
SALT LAKE CITY, UTAH, Scott Building
DENVER, COLO., U. S. National Bank Building
NEW ORLEANS, LA., 302 Interstate Building
CHICAGO, ILL. (Factory), 5630-58 Roosevelt Road

Products

GENERAL FIRE PROTECTION and STANDPIPE EQUIPMENT for interior and exterior use, comprising: Hose Racks and Reels; Fire Hose, linen and cotton rubber lined; Brass Hose Couplings, Valves and Nozzles; Steel Hose Cabinets; Fire Extinguishers; Brass Siamese Standpipe Connections; Hose Spanners, Fire Axes and other auxiliary equipment.

Facilities

Allen products include the most modern fire fighting appliances on the market. Over forty years' experience, harmonious co-operation with insurance companies and underwriters, coupled with a close study of their requirements, have enabled the W. D. ALLEN MANUFACTURING CO. to satisfy the most exacting specifications.

Literature and Co-operation

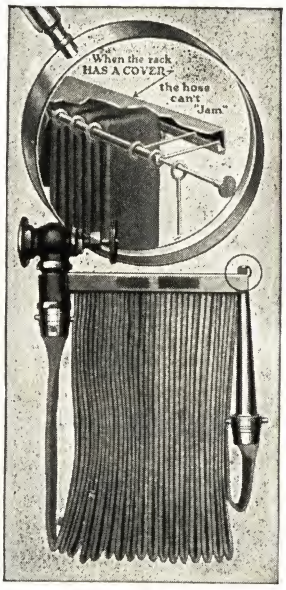
Our specification and detail brochure, No. 29A, "Allen on Interior Fire Protection," covering interior fire protection equipment in a most comprehensive way, will be mailed on request. Correspondence is also invited and our service department will co-operate in furnishing special data and information.

Bowes Hose Rack for Linen Hose

Regular Bowes Hose Racks are accepted in practically every city. However, certain municipalities require, and when in doubt specify, Bowes Underwriters' Labeled Semi-Automatic Hose Rack; this is accepted everywhere and also assures lowest insurance rates.

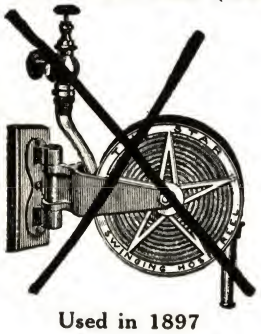
The Bowes Rack enables anyone to get water to the fire in the fewest seconds, is positive in action, efficient and simple in operation and practically "foolproof." Finishes are duco, aluminum or gold bronze. Duco Red finish is optional. Also Nickel Plate or Chrome on steel or brass.

As unlined linen hose is simply a flexible woven fabric, the normal folds along the edges and the easy bends following installation in an Underwriters' Hose Rack do the hose no injury. Dampness and mildew are the chief enemies of unlined linen hose and when properly hung in a Bowes Rack the circulation of air between the loops prevents deterioration.



Bowes Hose Rack Alenco Fig. 139

Fire Hose Reels (Unapproved)



Used in 1897

This illustration is from our catalogue printed in 1897, and while we still manufacture hose reels, we no longer recommend them for unlined linen hose. Up to this date no fire hose reel has been approved by the National Board of Underwriters, and credit cannot officially be given for their installation.

The normal method of operating a fire hose unit is to open the valve, grasp the nozzle and proceed to the fire. In the case of a hose reel, when the water is released it distends the hose, presses against the yoke of the reel, acting as a hydraulic brake, thus preventing the reel from revolving and defeating the purpose of the installation.

Underwriters' Unlined Linen Hose

Made in two grades, both approved and accepted by all municipal codes. Specify Flax Line Linen Hose with Underwriters' yellow label or Flax Tow Linen Hose with Underwriters' green label, properly coupled in lengths not longer than 50 ft. with Alenco Fig. 97, 12 in. brass nozzle attached.

Hose Valves

Under the recent ruling of the National Underwriters' Associations angle valves are now accepted for all classes of standpipe work. They are preferred on account of the absence of leakage and in the average installation they lend themselves to a more compact hose unit.

For pressures up to 100 lb. specify Alenco 100 lb. (angle) valves.

For pressures 100 to 150 lb. specify Alenco 150 lb. Underwriters' (angle or gate) valves.

For pressures 150 to 250 lb. specify Alenco 250 lb. Underwriters' (angle or gate) valves.

Pressures over 100 lb. should have the nozzle pressure reduced by means of restricting orifices placed inside the coupling.

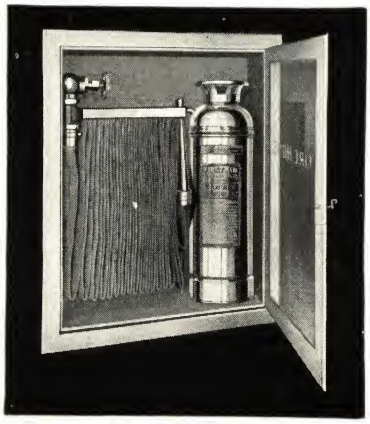
Alenco Fig. 171
100, 150, 250 lb.
Angle Hose Valve
Female Hose Connection

Alenco Fig. 170
100, 150, 250 lb.
Angle Hose Valve
Male Hose Connection

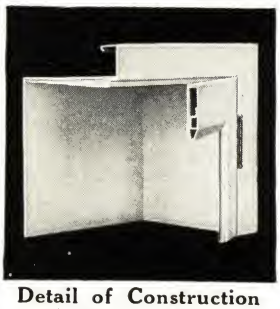
Alenco Fig. 358
150, 250 lb.
Hose Gate Valve

Alenco Steel Fire Hose Cabinet

Cabinet and door are pressed from furniture steel and being of hollow metal construction give strength and beauty without excess weight. The recommended finish is white enamel inside with heavy priming coat outside to be finished on the job. Cabinets may be furnished with any color or grained to match any particular trim. Specify Alenco Hollow Metal with (Plate) or (DSA) glass panel.



Alenco Fire Hose Unit Fig. 215



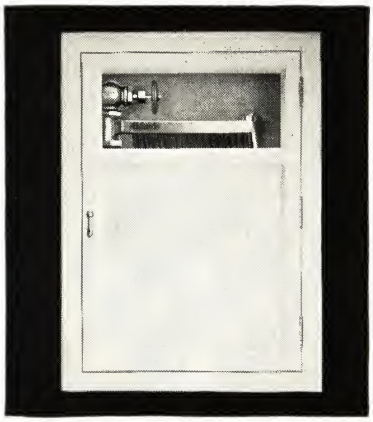
Detail of Construction of Alenco Hollow Metal Steel Fire Hose Cabinets

Alenco Duo Panel Cabinet

Has bevel plate glass panel in upper portion of the steel cabinet door instead of full glass door. May be furnished on any Alenco Hollow Metal Hose Cabinet.

Other Cabinets

Write for information on Outside Wall Cabinets, Fire Extinguisher Cabinets, Tamper Proof Cabinets for Asylums, etc., Steel Boxes without doors, etc.



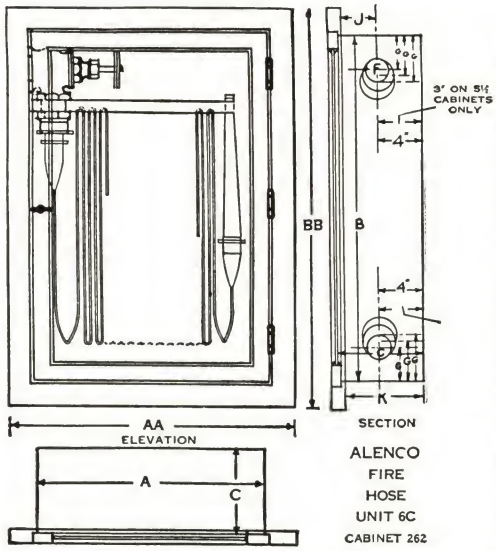
Alenco Duo Panel Door—Fig. 220A

First Aid Fire Extinguisher

Underwriters' Approved 2½ gal. Soda and Acid Fire Extinguishers are required in most types of buildings. Many city ordinances call for their installation charged and ready for instant use before the building is occupied. Extinguisher may be hung on brackets with the upper rim five feet from the floor, or installed in an extinguisher steel cabinet (specifications on request), or placed in cabinets with the Fire Hose Unit.

For ordinary occupancy specify one Fig. 3080 First Aid Extinguisher to every 2500 square feet of floor area, and so arranged that one is always available within 35 ft.

Fig. 3080

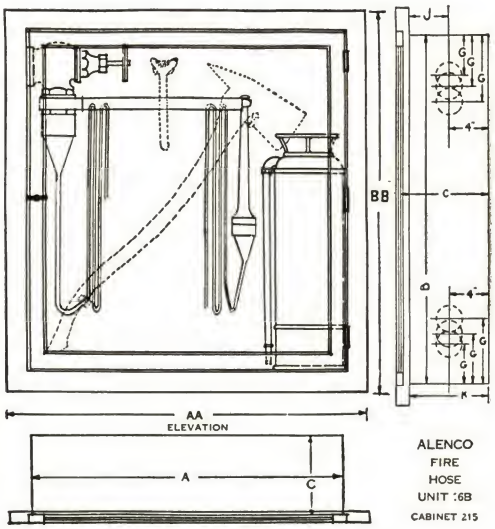


Minimum Hose Unit Requirements

Buildings 4 Stories or Less in Height—The recommended standard equipment is a 1½-in. valve with 1½-in. hose attached. In this class of buildings the fire department would fight the fire from the outside with their own equipment and the installation of a 2¼-in. valve is, therefore, unnecessary.

Buildings 5 Stories or More in Height—Standard practice provides a 2½-in. valve for the use of the municipal fire department, and 1½-in. hose for the use of the occupants of building. This hose to be attached to the 2½-in. valve outlet by means of a Fig. 2113 reducing coupling.

Buildings 5 Stories or More in Height. New York Standard Requirements—In some cities 2½-in. hose is insisted upon by municipal authorities. When large hose is used, however, the matter of excessive pressure should be guarded against.



Alenco Fire Hose Unit 6C, Cabinet 262

With or without Alenco hollow metal hose cabinet.

Specifications—Furnish and install where shown on plan, one Fig. 139 Bowes Hose Rack with (50, 75 or 100 ft.) Underwriters' (yellow) or (green) Labeled Linen Fire Hose (1¼, 1½, 2 or 2½ in.) properly coupled in lengths not over 50 ft., with a Fig. 97 12-in. plain Hose Nozzle attached; all to be supported on a Fig. 171 (100, 150 or 250 lb.) Angle Hose Valve (1¼, 1½, 2 or 2½ in.) and Nipple. If 2½-in. hose valve, specify outlet to be threaded to agree with local fire department thread. If a 2½-in. Valve with 1½-in. hose is to be used, specify the 1½-in. hose to be connected to the 2½-in. Valve Nipple with a Fig. 2113 Reducing Coupling. If equipment is to be installed in hose cabinet, specify a Fig. 262 Alenco Steel Hose Cabinet having (Plate) or (DSA) (Full glass door) or (Duo Panel door).

Architects' Note: Cabinet is large enough to hold a quart Allen's "Reddy" Hand Fire Extinguisher which is a valuable first aid adjunct.

Alenco Fire Hose Unit 16B, Cabinet 215

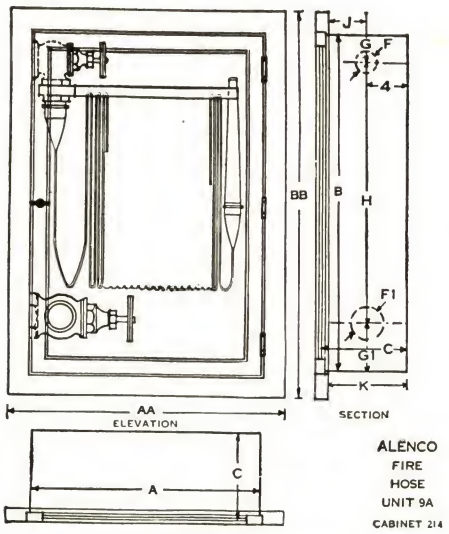
With or without Alenco hollow metal hose cabinet.

Specifications—Furnish and install where shown on plan, one Fig. 139 Bowes Rack with (50, 75 or 100 ft.) Underwriters' (yellow) or (green) Labeled Linen Fire Hose properly coupled in lengths not over 50 ft. with a Fig. 97, 12-in. plain Hose Nozzle attached; all to be supported on a Fig. 171 Angle Hose Valve (1¼, 1½, 2 or 2½ in.) (100, 150 or 250 lb.) and Nipple. If 2½-in. hose valves, specify outlet to be threaded to agree with local fire department thread. One First Aid Underwriters' Fig. 3080 Approved Soda and Acid Tip-Over Type 2½-gal. Fire Extinguisher, complete, charged and ready for instant use. If equipment is to be installed in cabinet, specify a Fig. 215 Alenco Hollow Metal Hose Cabinet having full (Plate) or (DSA) (Full glass door) or (Duo Panel door).

Note: An additional 2½-in. Angle Valve (side supply) for use of Fire Department may be installed if required.

DIMENSIONS OF FIRE HOSE UNITS

Capacity		Cabinet size, in.			Extreme size of trim, in.		Inlet opening, in.	Inlet distance, from top inside, in.	Wall to valve center, in.	Wall to outside cabinet, in.	Size of glass, in.	Opening required in wall, in.		
		Inside dimensions			Outside dimensions									
Hose, ft.	Valve, in.	Width A	Height B	Back to glass	Width AA	Height BB	F	G	J	K		Width	Height	Depth
Cabinet 262. For Hose Unit 6C. With One Angle Valve														
50	1¼—1½	19¾	28¾	5½	24½	33½	2	3¼	1⅞	5	15 x 24	20½	29½	5
50	2	19¾	28¾	7½	24½	33½	2½	3⅝	2⅞	7	15 x 24	20½	29½	7
50	2½	19¾	28¾	7½	24½	33½	3	4	2⅞	7	15 x 24	20½	29½	7
75	1¼—1½	20¾	30¾	5½	25½	35½	2	3¼	1⅞	5	16 x 26	21½	31½	5
100	1¼—1½	22¾	32¾	7½	27½	37½	2	3¼	2⅞	7	18 x 28	23½	33½	7
75	2	22¾	32¾	7½	27½	37½	2½	3⅝	2⅞	7	18 x 28	23½	33½	7
75	2½	22¾	32¾	7½	27½	37½	3	4	2⅞	7	18 x 28	23½	33½	7
100	2	24¾	34¾	7½	29½	39½	2½	3⅝	2⅞	7	20 x 30	25½	35½	7
100	2½	24¾	34¾	7½	29½	39½	3	4	2⅞	7	20 x 30	25½	35½	7
125	1¼—1½	24¾	38¾	7½	29½	43½	2	3¼	2⅞	7	20 x 34	25½	39½	7
125	2	24¾	38¾	7½	29½	43½	2½	3⅝	2⅞	7	20 x 34	25½	39½	7
125	2½	24¾	38¾	7½	29½	43½	3	4	2⅞	7	20 x 34	25½	39½	7
Cabinet 215. For Hose Unit 16B. With Angle Valve and Fire Extinguisher														
50	1¼—1½	32¾	34¾	8½	37½	39½	.....	6½	3⅞	8	28 x 30	33½	35½	8
75	2	32¾	34¾	8½	37½	39½	.....	5	3⅞	8	28 x 30	33½	35½	8
100	2½	32¾	34¾	8½	37½	39½	.....	4	3⅞	8	28 x 30	33½	35½	8



Alenco Fire Hose Unit 9A, Cabinet 214

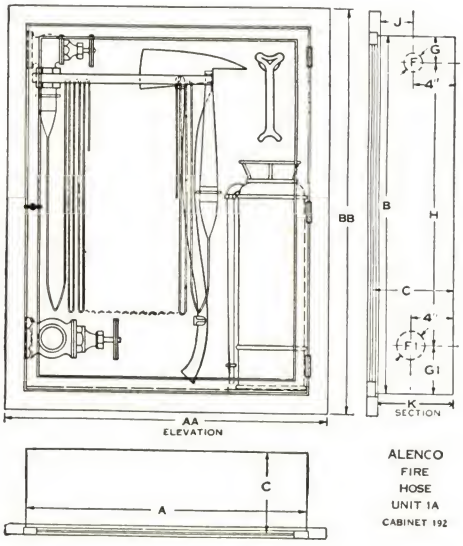
With or without Alenco hollow metal hose cabinet.

Specifications—Furnish and install where shown on plan, one Fig. 139 Bowes Rack with (50, 75 or 100 ft.) of 1½ in. Underwriters' (yellow) or (green) Labeled Linen Fire Hose properly coupled in lengths not over fifty feet with one Fig. 97, 12 in. plain hose nozzle attached; all to be supported on a 1½ in. Fig. 171, Angle Hose Valve (100, 150 or 250 lb.) and Nipple. One Fig. 170, 2½ in. Angle Hose Valve, with outlet threaded to match city fire department standard. If equipment is to be installed in cabinet, specify a Fig. 214 Alenco Hollow Metal Hose Cabinet having (Plate) or (DSA) (full glass door) or (Duo Panel door).

Alenco Fire Hose Unit 1A, Cabinet 192, Chicago Std.

Two angle valves with or without steel hose cabinets.

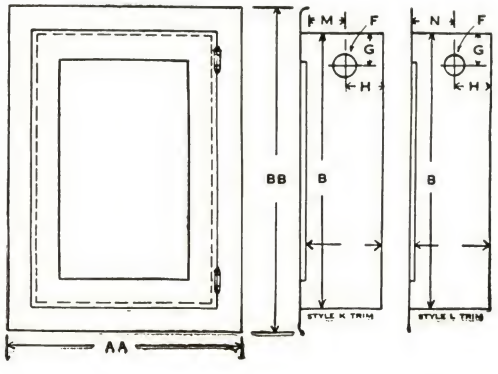
Specifications—Furnish and install where shown on plan, one Fig. 139 Bowes Semi-Automatic Underwriters' Labeled Rack with (50, 75 or 100 ft.) 1½ in. Underwriters' (yellow) or (green) Labeled Linen Fire Hose, properly coupled in lengths not over 50 ft. with one Fig. 97, 12 in. plain hose nozzle attached; all to be supported on a 1½ in. Fig. 171 Angle Hose Valve (100, 150 or 250 lb.) with Nipple. One Fig. 170, 2½ in. Angle Hose Valve (100, 150 or 250 lb.) with outlet threaded to match city fire department thread; the 2½ in. valve to be protected with cap and chain. One Fig. 3080 First Aid Underwriters' Approved Soda and Acid Tip-Over type 2½ gal. Fire Extinguisher complete, charged and ready for instant use. One Fig. 20 Alenco Underwriters' approved fire axe with brackets and one Fig. 5, 2½ in. and 1½ in. combination spanner. If equipment is to be installed in hose cabinets, specify a Fig. 192 Alenco Hollow Metal Hose Cabinet having (Plate) or (DSA) (Full glass door) or (Duo Panel door).



DIMENSIONS OF ALENCO FIRE HOSE UNITS

Capacity		Cabinet inside, in.			Extreme size of trim, outside, in.		Diameter inlet opening, in.		Inlet distance inside, in.		Valve centers, in.	Wall to valve center, in.	Wall to outside back of cab., in.	Size of glass, in.	Opening required in wall, in.		
									From top	From bottom							
Hose, ft.	Valve, in.	Width A	Height A	Depth C	Width AA	Height BB	F	F1	G	G1	H	J	K		Width	Height	Depth
Cabinet 214 for Fire Hose Unit 9A with Two Angle Valves																	
50	1¼ or 1½	20¾	30¾	8½	25½	35½	2	3	2¾	5	23	3⅞	8	16 x 26	21½	31½	8
75	or 2½	22¾	32¾	8½	27½	37½	2	3	2¾	5	25	3⅞	8	18 x 28	23½	33½	8
100		24¾	38¾	8½	29½	43½	2	3	2¾	5	31	3⅞	8	20 x 34	25½	39½	8
Cabinet 192 for Chicago Standard Hose Unit 1A with Two Angle Valves																	
50 75 100	1½ and 2½	30¾	38¾	8½	35½	43½	2	3	2¾	5	31	3⅞	8	26 x 34	31½	39½	8

Nella Sheet Steel Fire Hose Cabinet 11A



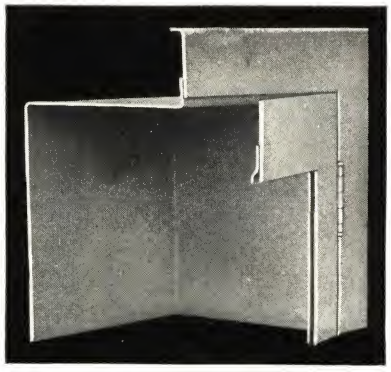


Illustration shows the edge turned over ½ in. A straight edge can be furnished when specified.

Can be used instead of the Alenco Hollow Metal Steel Cabinets for any of the preceding Fire Hose Units.

Nella Cabinets are of a superior type and are substantial in construction. Body is made of 16 gauge sheet steel.

Door is 12 gauge sheet steel in one piece. Trim is one piece.

Specifications—When Nella Cabinets are wanted *Change specifications* as follows: Furnish Fig. (....) Nella Sheet (instead of Alenco Pressed Hollow Metal) Steel Fire Hose Cabinet.

Siamese Connections—Bronze; Bronze Chromium Plated; or White Metal

These Siamese connections are ornamental on any building, they are well proportioned and are distinctively handsome. Fig. 232 specify [bronze] [bronze chromium plated] or [white metal]. Fig. 231 specify [bronze] or [bronze chromium plated] only.

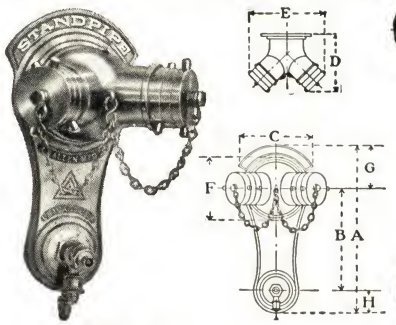


Fig. 232

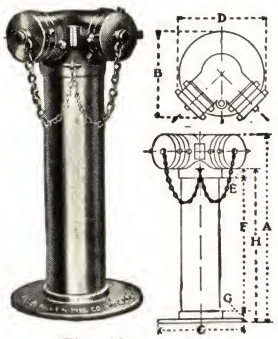


Fig. 231

Combination Siamese Connections

These connections are furnished with double clapper

Dimensions	Fig. 232		Fig. 231	
Size.....in.	4x2½x2½	6x2½x2½	4x2½x2½	6x2½x2½
A.....in.	18⅝	21⅜	24	24
B.....in.	10	11 13/16	11	14¼
C.....in.	10½	11¼	10¼	12
D.....in.	9⅜	10	12½	14⅞
E.....in.	12½	12	⅞	⅞
F.....in.	10	12	17¾	17¾
G.....in.	5 15/16	6⅞	1	1
H.....in.	2 11/16	2 11/16	19⅝	19⅝

Specification for Siamese Connection—Run main .. in. pipe line from standpipe to street at front wall as directed, attach a Fig. .. W. D. ALLEN MANUFACTURING CO.'s double clapper Siamese with plugs or caps, with bronze plate with proper wording. On inside of main wall, located where frost can not affect it, not less than 10 ft. from wall, place .. in. check valve, to check against house tank or pump pressure, with [½] [¾] in. automatic ball drip, placed at lowest point between check valve and Siamese connection. Means of draining risers shall be provided.

Concealed Flush Type Siamese Control Valve and Wall Hydrant

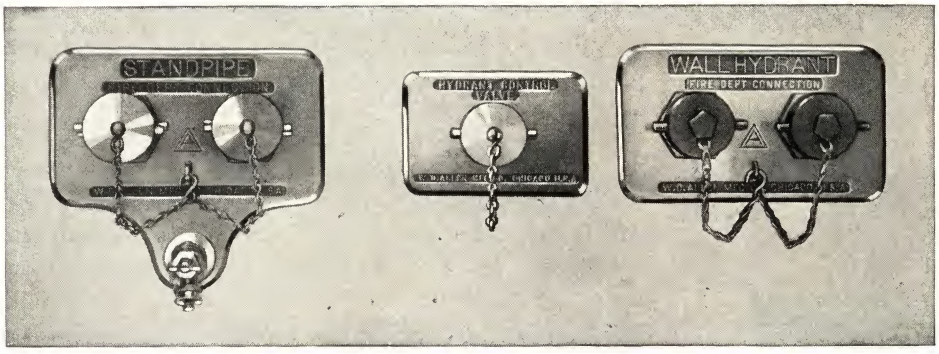


Fig. 283. Siamese (inlet) with Sill Cock (Patented)

Fig. 274S. Hydrant Control Valve

Fig. 276WH. Wall Hydrant (Outlet)

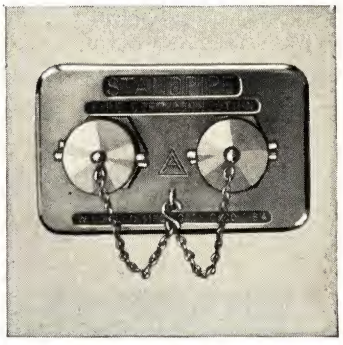


Fig. 276. Siamese, (inlet) Without Sill Cock. Can be substituted for Fig. 283 (Patented)

Concealed (or Flush) Type Siamese—Designed to solve the problem presented by the restricted sidewalk space in crowded metropolitan districts. The body of the Siamese with its two independent self-closing clapper valves can be built into wall of the building during construction. When the building is completed, the plate and the two independent swivel inlets are attached to the body of the Siamese by means of the required length pipe nipples. The Siamese is made of bronze, bronze chromium plated, or white metal, extra heavy throughout and will last as long as the building.

Specify—No. 283 Siamese with Sill Cock. Complete with plugs and chains.

(2½x2½-in. inlets, by 4-in. outlet.)
(2½x2½-in. inlets, by 6-in. outlet.)
(3x3-in. inlets by 6-in. outlet.)

Or specify in place of No. 283, No. 276 Siamese without Sill Cock. Complete with plugs and chains.

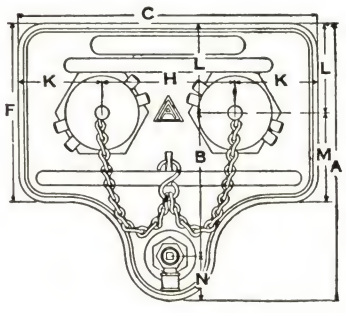
(2½x2½-in. inlets, by 4-in. outlet.)
(2½x2½-in. inlets, by 6-in. outlet.)
(3x3-in. inlets by 6-in. outlet.)

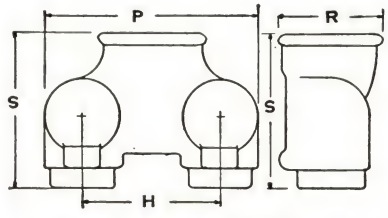
Dimensions—(For 2½x2½x4 in.). Write for larger sizes.

Dimension	A	B	C	D	E	F	H
No. 283, in.....	14¾	7½	15¾	5½	10⅞	9½	7
No. 276, in.....	.....	.....	15¾	5½	10⅞	9½	7

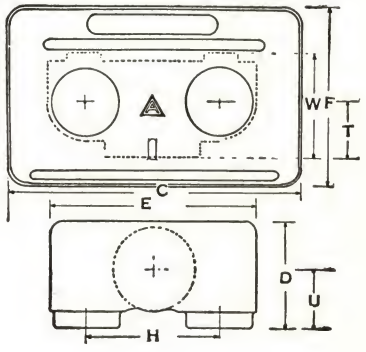
Dimension	K	L	M	N	P	R	S	T	U	W
No. 283, in.....	4⅜	4¾	4¾	2½	11	5¾	8	3 3/16	3⅜	5¾
No. 276, in.....	4⅜	4¾	4¾	2½	11	5¾	8	3 3/16	3⅜	5¾

Fire Department Control Unit—For private high pressure systems. In addition to the regular Siamese, a wall hydrant outlet and exterior valve control will make the private high pressure system in a building available for the fire department. The fire department can pull up to the building, attach one or two leads of hose to the hydrant and with their wrench (which is the same as used on the corner fire hydrants), turn the stem (from the outside) and automatically start the Underwriters' fire pumps in the basement.





Be sure that at least 6 inches is allowed between the bottom of the sill cock and the ground for attaching hose.



Additional Information

Our Data Book "Allen on Interior Fire Protection," containing complete specifications and working drawings on standpipe installation, is yours for the asking. It contains information not heretofore available in print. The various tables are the result of forty-four years' experience together with information from the best architects and engineers in the country. The book is informative rather than purely promotional and should be in your draftsman's hands. Write to W. D. ALLEN MANUFACTURING CO., 566 W. Lake Street, Chicago, Ill., to 69 Warren Street, New York, N. Y., or to the branch offices.

H. J. M. HOWARD MANUFACTURING CO.

Manufacturers of Hose Racks and Fire Protection Devices

148-150 Pierce Street, N. W.
WASHINGTON, D. C.
TELEPHONE: National 8017

Products

FIRE PROTECTION DEVICES of all kinds, including Peerless Swinging Hose Racks, Hose Couplings, Hose Pipes, Unlined Linen Hose, Hose Cabinets.

Also Howard Chemical Fire Extinguishers and Extinguisher Cabinets.

Peerless Swinging Hose Rack

A very important feature of this rack is the fact that the operator can turn on the water before removing the hose. No ordinary force of water can possibly force the hose from the rack; it must be removed by the operator.

Peerless Racks for 1½-in. hose are approved by the Underwriters and will be labeled when so required and ordered.

Specifications

On each floor where indicated, at a height of 6 ft. above the floor, install a 1½-in. brass angle valve with brass milled edge wheel, removable soft disk for cold water, and 50 ft. of 1½-in. labeled Underwriters' linen hose with patent expansion ring couplings and 1½x10-in. hose nozzle with ⅝-in. outlet attached.

Hose to be supported on solid brass Peerless Swinging Hose Rack, as manufactured by the H. J. M. HOWARD MANUFACTURING CO., Washington, D. C.

All metal parts to be brass, heavily nickelplated and polished all over.

(Change length of hose, sizes and finish to suit requirements.)

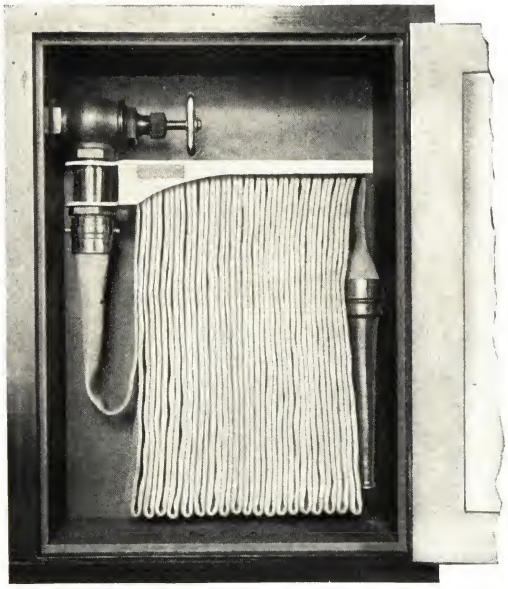
To be incorporated in specifications where cabinets are required:

Each fire hose outfit to be installed in a Howard [steel] [kalamein] [wood] cabinet of proper size to accommodate the outfits herein specified.

State whether cabinets are to be finished with priming coat only or completely enameled.

Cabinets

We make and furnish *all types* of cabinets: steel; kalamein; and wood; with large glass panel doors, two panels or solid steel panel. Cabinet doors of flat metal or hollow type. Flat metal doors are less expensive and much more durable.



INSIDE DIMENSIONS OF CABINETS

Length of hose, ft.	Height, in.	Width, in.	Depth, in.	With extinguisher	
				Width, in.	Depth, in.
50	28	18	7	26	8½
75	30	21	7	29	8½
100	38	22	7	30	8½

Note: Allow ½ in. all around for wall opening.

Literature

Complete catalogued specifications, blue prints or information furnished on application.

FIRE PROTECTION EQUIPMENT

ELKHART BRASS MANUFACTURING COMPANY
ELKHART-INDIANA

SPECIFICATION CHECK LIST

with which is included

INDEX TO THIS CATALOG

Cabinets—(Pages 4 and 5)

Plate Number—Specify: Plate number of desired unit.

Construction—(Page 4)—Specify:
Elkhart construction with new one-piece cold rolled *hollow* door frame.
Hoosier construction of one-piece single thickness door and trim.

Style of Cabinet—(Page 5)—Specify:
Recessed cabinet; Surface type cabinet.

Cabinet Inside Dimensions—Specify inside dimensions indicated under each unit.

Door—(Pages 4 and 5)—Specify: Grille door; D. S. A. glass panel door; Plate glass panel door; Duo panel door; Institutional all-metal door.

Note: *Specify: "Fire Hose" in 1½ in. gilt and red letters or gold or silver leaf letters if desired.*

Hardware—(Page 4)—Specify:
Bronze concealed hinges; Friction catch or lever handle; Lock if desired (see page 5).

Finish—(Page 4)—Specify:
Standard finish; Elkhart Cabinets baked white enamel inside, prime coat outside; Hoosier Cabinets gray prime coat inside and outside.
Any special finish desired.

Valves—(Pages 7 and 8)

Type of Valve—Specify:
Standard Elkhart angle valve.
Elkhart Underwriters' approved and New York City approved angle valve. (Meets Federal Master Spec. 448.)
Standard Elkhart gate valve.

Style of Valve—(Pages 7 and 8)—Specify:
Plate 20—Double female angle valve to be used with rack supporting nipple.
Plate 25—Female-male angle valve to be used with pipe clamp or wall bracket.
Plate 88—Female-male gate valve.
Plate 89—Double female gate valve.

Weights—(Page 8)—Specify:
Standard or extra heavy for Elkhart standard angle valve or gate valve.
150 or 250 lbs. for Elkhart Underwriters' approved valve.

Size—Specify: 1¼, 1½, 2 and 2½ in. for any of our valves.

Finish—(Page 8)—Specify:
Standard finish rough brass body with polished trim.
Polished finish all over.
Nickel, chromium plated or black oxidized finish.

Wheel Handle—(Page 8)—Specify: Standard iron wheel handle; Milled edge brass wheel handle.

Wall Plate—Specify: Stamped brass valve wall plate (indicate finish); Cast brass wall plate (indicate finish).

Note: *In units similar to C-920 with fire department Plate 25, 2½ in. angle valve, specify brass cap and chain to protect local fire department threads.*

Hose Racks—(Pages 2 and 3)

Type of Rack—Specify:
Elkhart, Plate 41—Underwriters' approved, semi-automatic, for 1¼ and 1½-in. linen hose.
Elkhart, Plate 42—Underwriters' approved, non-automatic, for 2 and 2½-in. linen hose.
Elkhart, Plate 45—Standard covered and swinging rack for any size of hose.

Material—(Page 3)—Specify:
Rack to be of heavy steel with galvanized pins.
Rack to be of solid brass construction throughout.

Capacity—(Page 3)—Specify rack to accommodate 25, 50, 75, 100 or 125 ft. of linen hose.

Method of Attachment—(Page 3)—Specify:
Style N, with either brass or iron supporting nipple.
Style P, with pipe clamp, indicate dimension of pipe.
Style W, with wall bracket.
Style C, with combination wall bracket and escutcheon for use with gate valves.

Finish—(Page 2)—Specify: Aluminum or gold bronze finish; red or black lacquer or enamel; nickel, chromium plated or black oxidized finish.

Special Threads—Specify:
Local fire department thread for all 2½-in. nipples.

Note: *Elkhart Plate 45, covered and swinging hose rack meets specifications of New York Board of Standards and Appeals and also Federal Master Specification No. 448, page 17, figure 1.*

Linen Hose—

Grade—Specify:
First quality long fibre unlined linen hose, Underwriters' approved.
Second quality "Flax Tow" unlined linen hose, Underwriters' approved.

Note: *Only first quality Underwriters' approved unlined linen hose meets Government Specification No. 527.*

Sizes—Specify: 1¼, 1½, 2 and 2½ in.

Length—Specify:
25, 50, 75 or 100-ft. lengths in one section.
Hose shall be coupled in sections not to exceed 50 ft. (when required by local ordinance).

Couplings—Specify linen hose to be coupled with respective size of automatic linen hose couplings in any desired finish.
1½ and 2-in. hose may be coupled with 2½-in. reducing couplings for use with 2½-in. valves.

Nozzle—

Size—Specify: Cast brass nozzle, 10 or 12 in. long, same size as hose.

Finish—Specify: Polished brass; nickel, chromium plated or black oxidized finish.

Extinguishers—(Pages 5, 6 and 7)

Types—Specify:
Elkhart 2½-gal. Underwriters' approved soda and acid or foam type fire extinguisher.
Elkhart 1 or 1½-qt. carbon tetrachloride extinguisher —Underwriters' approved.

Finish—Specify: Standard polished copper finish; nickel or chromium plated finish.

Axe—(Page 7)

Weight—Specify:
Standard 4-lb. firemen's axe with pick head.
Six-pound special firemen's axe with pick head.

Finish—Specify: Polished blade, red enamel handle; nickel or chromium plated finish.

Method of Attachment—Specify axes to be supported by Underwriters' brackets.

Spanners—(Page 7)

Size—Specify: 1½ or 2½-in. taber reversible spanner.

Finish—Specify: Galvanized finish; nickel or chromium plated finish.

Method of Attachment—Specify:
Spanner to be supported by Underwriters' bracket.
Spanner to be suspended from valve stem by chain.

Siamese and Wall Hydrant Connections—(Pages 9 and 10)

Type of Siamese or Wall Hydrant—Specify:
Flush type siamese and wall hydrant unit with removable clapper valves.
Old style projecting siamese and wall hydrant unit.

Dimensions—Specify: 2½x2½x4 in.; 2½x2½x6 in.; 3x3x6 in.; 3½x3½x6 in.

Finish—Specify: Polished brass; nickel plated or chromium plated finish.

Thread Protection—Specify: Brass or iron plugs or caps and chains; Easy-off swivel caps.

ELKHART BRASS MFG. COMPANY

Established 1902

Manufacturers of Inside Fire Protection
ELKHART, INDIANA

Products

HOSE CABINETS of Bronze, Steel and White Metal.

HOSE RACKS of Brass and Steel.

HOSE, Linen and Cotton Rubber Lined.

VALVES, COUPLINGS and NOZZLES.

EXTINGUISHERS: Foam, Soda Acid and Carbon Tetrachloride.

SIAMESE and HYDRANT CONNECTIONS.

SPANNERS, AXES and all Complementary Equipment.

Reg. U. S. Pat. Off.

Special Equipment to Specifications

In addition to the standard equipment listed above, illustrated and described on the following pages, special equipment designed for individual conditions is quickly available from our plant. With complete facilities under our own roof, from engineering service on through pattern, foundry, tool and machine departments, we are prepared to deliver special items in a minimum of time and with all the advantages of our thirty years' experience in this field.

Information

The ELKHART BRASS MFG. COMPANY maintains district representatives in many principal cities of the United States and Canada. Special information concerning inside fire protection may be obtained from our representative or the main office at Elkhart, Ind.

Blueprints showing typical siamese installations and riser diagrams, together with a digest of Underwriters' regulations are available and will be furnished free of charge to architects who require them.

Special attention is called to the diagram on page 10 (inside back cover) which presents a typical fire protection system in accordance with the most modern approved practices.

The Company and Its Facilities

For more than thirty years the ELKHART BRASS MFG. COMPANY has been engaged in the development and manufacture of fire fighting equipment. Contacts have been maintained with fire department executives in all parts of the country, and every new development or condition has been closely studied. This company developed the first expansion ring type coupling for unlined linen hose.

As is indicated in connection with the separate items in this catalog, we have worked in conjunction with the National Board of Fire Underwriters and the Factory Mutuals in Boston. A complete and up-to-date file of all federal specifications is maintained by us so that installations where these specifications apply can be checked.

Adequate facilities for handling largest contracts in shortest possible time are maintained in the Elkhart factory, while a complete stock of all standard products listed in this catalog makes possible shipping upon receipt of order.

A photograph of our factory and offices is reproduced upon the back cover of this catalog.

ELKHART COVERED BRASS AND STEEL HOSE RACKS

Swinging Type—With Non-detachable Pins

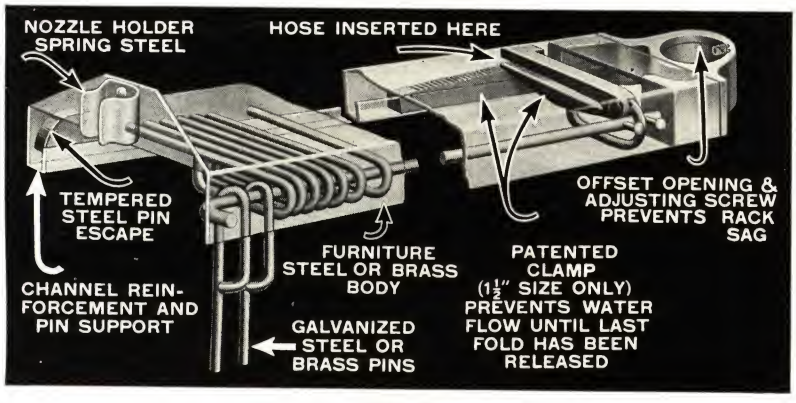


Plate 41

Plate 41 (For 1¼ or 1½ in. Linen Hose)
National Board of Fire Underwriters
Factory Mutual
Board of Standard and Appeals, New York, N. Y.

Plate 42 (For 2 and 2½ in. Linen Hose)
National Board of Fire Underwriters
Factory Mutual
Board of Standard and Appeals, New York, N. Y.

Plate 45 (For Any Size Linen Hose)
Board of Standard and Appeals, New York, N. Y.
Factory Mutual

Construction

To the left is a self-explanatory phantom view of our Plate 41 Underwriter approved semi-automatic hose rack.

To assure yourself of its superiority we recommend that you compare it impartially, point for point, with any competitive hose rack.

Carefully thought out in every detail, even to the adjusting screw which prevents loaded racks from sagging, this rack instantly recommends itself to discriminating users.

Our standard Plate 45 hose rack is identical in every respect to the illustration, except that it does not have the patented clamp. For other than Factory Mutual installations.

Finish

Aluminum bronze, gold bronze, or red lacquer are standard finishes. Dead black or white enamel optional. Also finished in nickel, brass, chromium, and flat black plate, solid brass-polished and lacquered, and to any specifications.

Method of Attachment

Style (N)—Supporting nipple, brass or iron, for angle valve.
Style (P)—Pipe clamp.
Style (W)—Wall bracket.
Style (C)—Combination wall bracket and escutcheon for gate valve.

Elkhart Covered Hose Rack, Plate 45

Approved by the Board of Standards and Appeals; also Factory Mutual with semi-automatic feature.

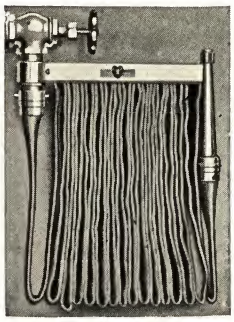


Plate 45

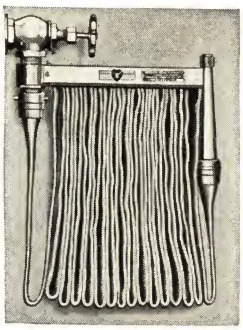
For 1¼, 1½, 2 and 2½-in. linen hose. Plate 45 hose rack is similar in construction to Elkhart Underwriters' racks, Plates 41 and 42, but does not have either the semi-automatic feature or the Underwriters' label.

We invite comparison of our covered type of hose rack with other racks of similar appearance.

The body, together with the channel for supporting the pins, is formed from one piece of heavy furniture steel, which not only provides a very strong pin support but reinforces the entire rack. The solid top protects the hose from dust and controls its release. We have also given special attention to finish. The result is a handsome and efficient rack, acceptable in all installations where an Underwriters' label is not required.

Elkhart Underwriters' Labeled Hose Racks

Semi-Automatic Hose Rack, Plate 41 (Patented)—Similar in appearance to Plate 45. For 1¼ and 1½-in. unlined linen hose. Rack is sturdily built of one piece of pressed steel fastened to cast back.



Plates 41 and 42

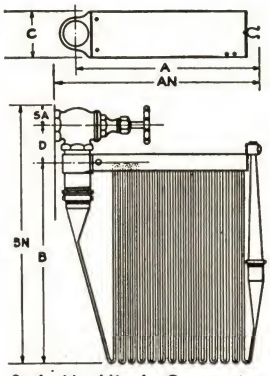
The semi-automatic feature of this rack permits one to open the valve at once in case of fire and drag the hose by the nozzle right to the flames, as the last fold of the hose between clamp holds back 150 lb. water pressure. This feature makes the semi-automatic type of hose rack decidedly superior to non-automatic racks from which the hose must be entirely removed before the valve may be opened, causing a delay in reaching the fire that may prove disastrous.

Another advantage of this type of rack is that nothing serious can happen if the valve is opened accidentally or maliciously. It is therefore the correct type to specify for school and college buildings, etc.

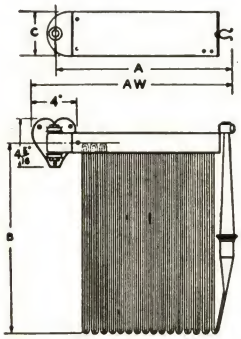
Non-Automatic Hose Rack, Plate 42—For 2 and 2½-in. unlined linen hose. Rack is identical in construction to Plate 41 but without the semi-automatic feature. Fully approved and labeled.

Racks and Reels for Cotton Rubber Lined Hose

For warehouses, factories, maritime improvements, and similar installations, cotton rubber lined hose is recommended. As even treated rubber will crack and vulcanize when abruptly creased, basket racks or reels must be provided in place of covered hose racks. Our Elk Improved Racks, Plates No. 20-21-22-23, and Swinging Hose Reels, Plates 30 and 31, are fabricated expressly to take care of this need. Fully illustrated in our general catalogue, we anticipate sending you one by return mail in answer to your inquiry.



Style N—Nipple Connection



Style W—Wall Bracket

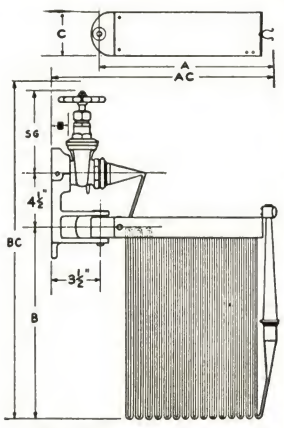
DIMENSIONS OF ELKHART UNDERWRITERS' LABELED AND UNLABELED HOSE RACKS

Plate Nos. 41, 42 and 45 with Standard Weight Valves

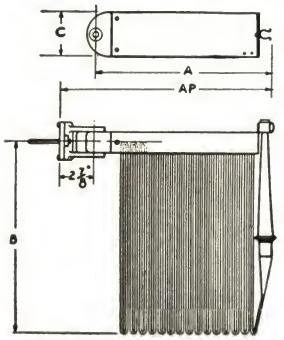
Capacity of rack	Valves and hose, in.	Dimensions shown on diagrams, in inches											
		A	AC	AN	AP	AW	B	BC	BN	C	D	†SA	†SG
50 ft., 15 pins	1¼, 1½	16	19½	18	18⅞	18	20	32½	26¼	4¼	2¾	2½	7
	2	16½	20	19	19½	18⅛	20	33½	26½	5¼	3	3	8
	2½*	17	20½	20	20	18½	20	35	27½	6	4	3⅝	9½
75 ft., 19 pins	1¼, 1½	18	21½	20	20⅞	20	24	36½	30¼	4¼	2¾	2½	7
	2	18½	22	21	21⅜	20½	24	37½	30½	5¼	3	3	8
	2½*	19	22½	22	21⅞	21	24	39	31½	6	4	3⅝	9½
100 ft., 23 pins	1¼, 1½	20	23½	22	22⅞	22	26½	39	32¾	4¼	2¾	2½	7
	2	20½	24	23	23⅜	22½	26½	40	33	5¼	3	3	8
	2½*	21	24½	24	23⅞	23	26½	41½	34	6	4	3⅝	9½
125 ft., 24 pins	1¼, 1½	20	23½	22	22⅞	22	31½	44	37¾	4¼	2¾	2½	7
	2	20½	24	23	23⅜	22½	31½	45	38	5¼	3	3	8
	2½*	21	24½	24	23⅞	23	31½	46½	39	6	4	3⅝	9½

*Special 1½-in. rack with 2½-in. nipple for use with 2½-in. valve and reducing coupling for 1½-in. hose, same dimensions except width C is 4½ in.

†Dimensions in this table are for standard weight valves only. Complete valve dimensions are shown on page 7.



Gate Valve Escutcheon



Style P—Pipe Clamp

ELKHART CONSTRUCTION HOSE CABINETS
New One-piece, Rolled, Hollow Door Frame

Construction

Elkhart Cabinets are made of heavy rust-resisting furniture steel. Door and trim are made from special *one-piece hollow rolled tubing.* The corners being mitered and electrically butt-welded together, are as strong as a section of the frame itself, while the seams are imperceptible. Compare this one-piece door and frame with other so-called "one-piece tubings" which, in reality, are only two pieces fitted and welded together like a box. The new one-piece frame actually reinforces the glass rather than the glass stiffening the door frame.

Dust proof construction, concealed bronze hinges, ball and spring catches (or lever handles if desired), polished plate or D.S.A. glass complete this modern fire hose cabinet. Cabinets to any dimension can be furnished on order. Standard dimensions are listed completely under each unit.

Hardware

Bronze Hinges—Bronze hinges of special design are made strong enough to permit a man weighing 200 pounds to swing on the door without breaking or even sagging. They are so anchored that they cannot turn out of place. As these hinges permit the door to be opened a full 180 degrees, unobstructed space is left for rapid removal of hose.

Unlike ordinary butt hinges, the finish is not scraped or marred on them in opening the doors. Nickel plating being unnecessary, they are permanently finished like the rest of the trim which makes them scarcely noticeable.

Friction Catch—The usual friction type catch has a tendency to wear and, in time, partially lose its hold. We have perfected a friction catch of the ball bearing type in which a tempered steel spring exerting pressure against the ball automatically takes up the wear and provides the proper tension at all times. There is nothing about it to get out of order and no projecting parts to mar the cabinet finish.

Lever Handle—If preferred can be substituted for friction catch.

Finish

As we do not recommend finishing a cabinet all over before it is installed, our standard finish is white baked enamel inside, prime coat outside. Cabinets being of considerable bulk and weight, their finish is invariably damaged either in transit or while installing. The inside of the box, not being exposed, however, can be finished in baked enamel of any specified color.

Whenever a color scheme is to be utilized throughout an entire building, is is desirable for the architect to submit a sample of the respective color or finish. In this way, at a slight additional cost, hose rack installation, including racks and valves, can be cleverly brought into harmony with the decorative scheme.

Special Cabinets

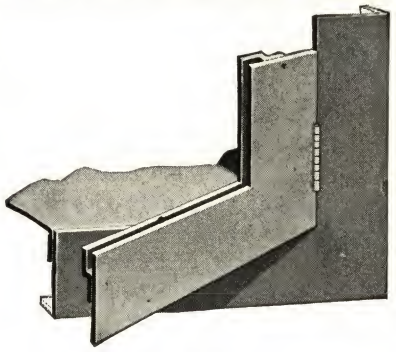
To meet an increasing demand for bronze and white metal fire hose cabinets, it is now possible to specify in either metal both our Elkhart or Hoosier construction cabinets. It is also possible to supply any of our cabinets with steel box having bronze, white metal, or aluminum door and trim. Where price of cabinet is an item to be considered, it is suggested that our standard construction hose cabinet be specified having any metal preferred for door and trim.

Grille Doors

We are occasionally called upon to furnish ornamental cabinets and your attention is directed to the cabinet at the left having aluminum door and trim, and an ornamental grille. In hotel lobbies, bank foyers and other conspicuous places where hose rack installations are required, a cabinet can be made to enhance the architectural beauty of its environment by similar ideas. If additional information along these lines is desired, we will be glad to submit suggestions.

HOOSIER CONSTRUCTION HOSE CABINETS

As a sturdy cabinet of simpler construction, we manufacture a hose cabinet having 16-gauge sheet steel box and 12-gauge door. One-piece door and trim. Cabinet door, by opening full 180 degrees, does not obstruct rapid removal of hose. No joints or rivets on front of cabinet, and with door fitting in rabbet flush with frame, this substantial cabinet is dustproof. Hardware of door consists of two nickel-plated five knuckle butt hinges on smaller cabinets, with three hinges on all cabinets exceeding 34¾ in. in height (inside dimension). A nickel-plated handle is standard on every cabinet of this type. This cabinet accommodates D.S.A. or plate glass panel.



Any of the styles shown on succeeding pages can be furnished in this construction. Made in same sizes as standard Elkhart Construction Cabinets, although special sizes of any dimensions can be furnished in this construction without loss of time.

The standard finish is one heavy prime coat, inside and outside.

Types and Styles of Elkhart and Hoosier Cabinets

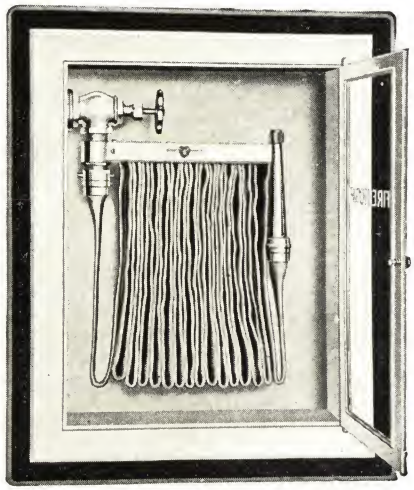
Institutional Cabinet

Institutional Cabinet

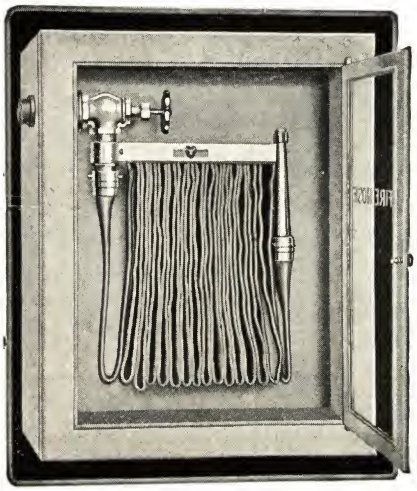
In certain institutions (insane asylums, prisons, etc.) it is best that the hose be made inaccessible except by janitor's key. For this purpose, our "Institutional" cabinet has been found eminently satisfactory by architectural authorities. A solid steel panel door, concealed hinges, and with Yale or Corbin lock effectively prevent play of hose except by attendant of building. Furnished in every size as hereinafter described. This type of cabinet is largely used in Government buildings.

Standard Cabinet

On the right is shown our standard cabinet recessed into the wall with only 1¼ in. trim projecting from the plaster. Ninety per cent of all installations being of recessed type, all of our standard units are so illustrated.



Standard Cabinet



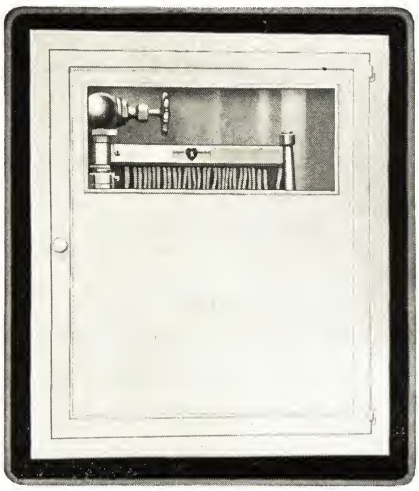
Surface Type

Surface Type

Any Elkhart cabinet can be made up in this style which is necessary where the depth of the wall is not sufficient to recess the cabinet in the usual way. Door is furnished with D.S.A. or plate glass panel or with duo panel as desired. Trim 1½ in. wide. For outside dimensions add 3¾ in. to inside measurements.

Duo-Panel

The duo panel door, Style "D," having steel section at the bottom and plate glass panel at top, not only affords protection against breakage of glass, but also conceals over half of the installation. Made for every size, it can be furnished on any type of cabinet at the architect's discretion.



Style "D"

ELKHART 2½-GALLON FIRE EXTINGUISHERS AND CABINETS

Extinguishers

Elkhart soda and acid and foam type extinguishers are labeled and listed by the Underwriters' Laboratories while the soda and acid extinguisher is also approved by the United States Department of Commerce Steamboat Inspection Service, and Factory Mutual Fire Insurance Companies.

Fire department insurance regulations require one Underwriters' approved 2½ gallon soda and acid extinguisher for every 2000 feet of floor space.

Extinguisher Cabinets

Adding greatly to the appearance of a building, extinguishers placed in cabinets also are more likely to be properly charged and serviced.

Made in either Elkhart or Hoosier construction, these extinguisher cabinets are provided with either D.S.A. or plate glass panel, or duo panel doors as shown. Cabinet hardware is identical to that installed on larger hose cabinets. All dimensions carefully worked out on adjacent line drawings.

Plate 950
Plate glass panel

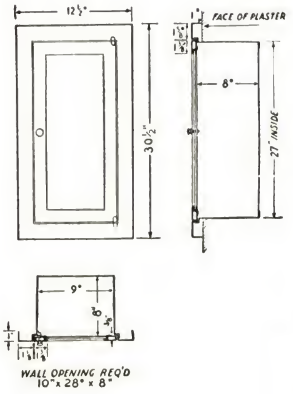
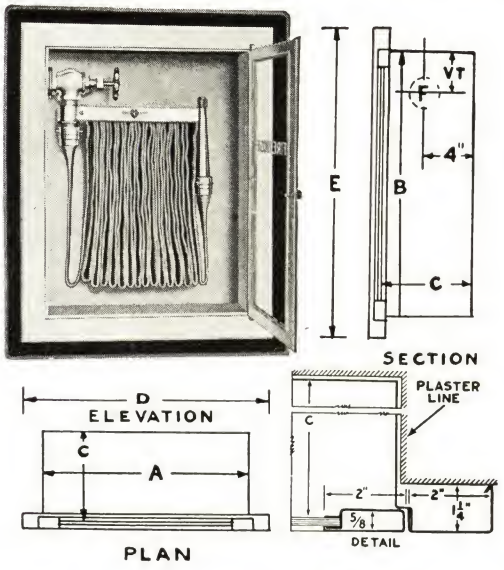


Plate 950
Style "D" panel

HOSE UNIT WITH ONE ANGLE VALVE (PLATE C-910)



For This Unit Specify

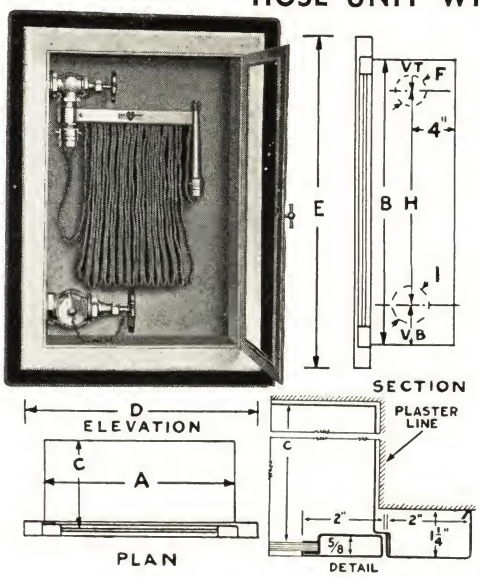
Elkhart standard cabinet, plate C-910.
Elkhart angle valve, plate No. 20 or plate 20-U.
Elkhart covered hose rack, plate No. 41 or 45, Style N with nipple.
The specified length of Underwriters' labeled linen hose of the proper size.
Elkhart polished brass expansion ring couplings and 12-in. plain nozzle.

Note: In buildings not over four stories high 1½-in. valve and 1½-in. hose are recommended. In buildings five or more stories high, a 2½-in. valve with local fire department thread should be installed to which 1½-in. linen hose can be attached by means of 2½x1½-in. reducing coupling, plate 335.

Important: For specification instructions, see page 1.

Hose capacity, ft.	Hose and valve size, in.	Glass, in.	Cabinet dimensions shown in diagram, in.						Valve opening (F), in.	Leave rough opening, in.	
			A	B	C	D	E	VT		Width	Height
50	1½, 2, 2½	18x28	20¾	30¾	7½	25½	35½	3½	2, 3, 3	21½	31½
75	1½, 2, 2½	20x30	22¾	32¾	7½	27½	37½	3½	2, 3, 3	23½	33½
100	1½, 2, 2½	22x32	24¾	34¾	7½	29½	39½	3½	2, 3, 3	25½	35½
125	1½, 2	22x36	24¾	38¾	7½	29½	43½	3½	2, 3	25½	39½

HOSE UNIT WITH TWO ANGLE VALVES (PLATE C-920)



For This Unit Specify

Elkhart cabinet, plate C-920.

Elkhart 1½-in. Angle Valve, plate No. 20 or plate No. 20-U.

Elkhart 2½-in. Angle Valve, plate No. 25 or plate No. 25-U with cap and chain.

Elkhart plate No. 45 or plate No. 41 hose rack as required by architect's specifications, Style N.

The specified length of 1½-in. Underwriter labeled linen hose.

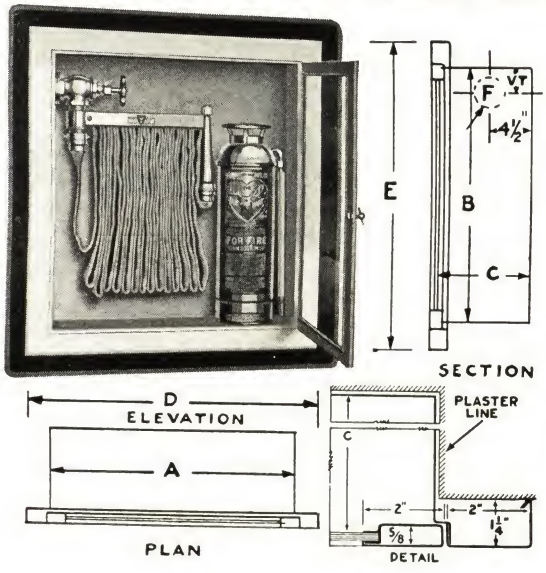
Elkhart 1½-in. expansion ring couplings.

Elkhart plain brass nozzle 1½ in. x 12 in. x ½ in.

Important: For specification instructions, see page 1.

Hose capacity, ft.	Hose and valve size, in.	Glass, in.	Cabinet dimensions shown in diagram, in.					Valve center, in.			Valve opening, in.		Leave rough opening, in.	
			A	B	C	D	E	VT	H	VB	F	I	Width	Height
50	1½, 2½	18x28	20¾	30¾	8½	25½	35½	3	22¾	5	2	3	21½	31½
75	1½, 2½	20x30	22¾	32¾	8½	27½	37½	3	24¾	5	2	3	23½	33½
100	1½, 2½	22x36	24¾	38¾	8½	29½	43½	3	30¾	5	2	3	25½	39½

HOSE UNIT WITH ONE ANGLE VALVE AND 2½-GAL. FIRE EXTINGUISHER (PLATE C-915)



For This Unit Specify

Elkhart cabinet C-915.

Elkhart angle valve, plate No. 20 or plate 20-U of the size required.

Elkhart Style N hose rack, plate No. 45 or plate 41 as required by the specifications.

The specified length of the Underwriters' labeled linen hose of the size required.

Elkhart expansion ring couplings and 12-in. nozzle.

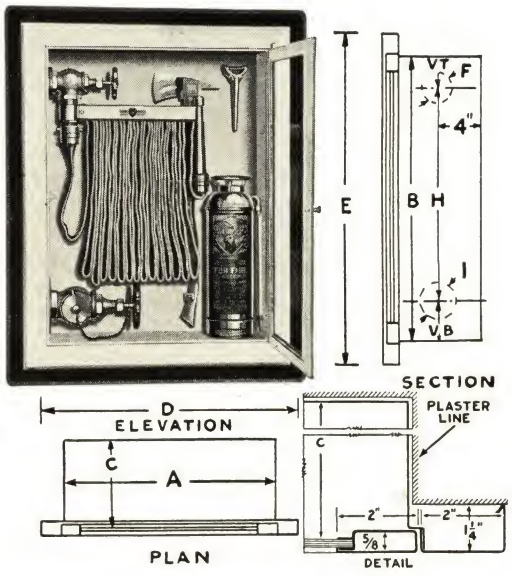
Elkhart 2½-gal. extinguisher.

For complete description of Elkhart steel hose cabinets see preceding pages.

Important: For specification instructions, see page 1.

Hose capacity, ft.	Hose and valve size, in.	Glass, in.	Cabinet dimensions shown in diagram, in.						Valve opening (F), in.	Leave rough opening, in.	
			A	B	C	D	E	VT		Width	Height
50 75 100	1¼, 1½ 2, 2½	30x32	32¾	34¾	8½	37½	39½	6½ 5 3½	2 3	33½	35½

HOSE UNIT, CHICAGO STANDARD, WITH TWO ANGLE VALVES AND EQUIPMENT (PLATE C-901)



For This Unit Specify

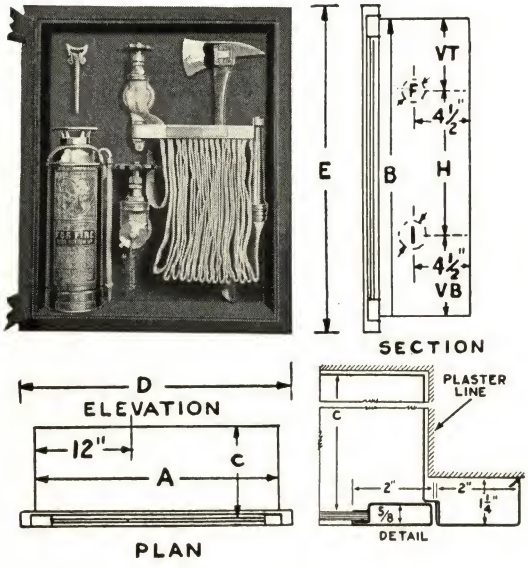
Elkhart cabinet, plate C-901.
Elkhart 1½-in. approved angle valve, plate 20-U for 150 or 250 lb. pressure as required.
Note: If necessary to reduce pressure use 1x1½-in. Underwriters' valve instead of straight 1½-in.
Elkhart 2½-in. approved angle valve, plate 25-U, for 150 or 250 lb. pressure with local fire department thread, and with bronze cap and chain.
Elkhart semi-automatic Underwriters' approved hose rack, plate 41, Style N with 1½-in. nipple.
The specified length of 1½-in. Underwriters' labeled linen hose with Elkhart expansion ring couplings.
Elkhart 1½x12x½-in. plain nozzle with lugs.
Elkhart 2½-gal. Underwriters' approved fire extinguisher complete with charge.
Fireman's pick head axe with Underwriters' bracket No. 3.
Elkhart taber spanner with Underwriters' bracket No. 4.

(For Same Unit with One Valve C-916)

Important: For specification instructions, see below and page 1.

Hose capacity, ft.	Hose and valve size, in.	Glass, in.	Cabinet dimensions shown in diagram, in.					Valve center, in.			Valve opening, in.		Leave rough opening, in.	
			A	B	C	D	E	VT	H	BV	F	I	Width	Height
50 75 100	1½, 2½	28x36	30¾	38¾	8½	35½	43½	3	30¾	5	2	3	31½	39½

HOSE UNIT, WITH TWO GATE VALVES AND EQUIPMENT (PLATE C-900)



For This Unit Specify

Elkhart cabinet C-900.
Elkhart 2½-in. gate valve, standard weight or extra heavy with cap and chain.
Elkhart 2½-in. extended type escutcheon, plate 588.
Elkhart 1½-in. gate valve, standard weight or extra heavy with ¼-in. drip cock.
Elkhart 1½-in. combination wall bracket and escutcheon, plate 500, which fits back of valve and supports the rack.
Elkhart Underwriters' approved semi-automatic hose rack, plate 41.
Enough specified length of 1½-in. Underwriters' labeled linen hose with Elkhart expansion ring couplings.
Elkhart 1½x12x½-in. plain nozzle with lugs.
Fireman's pick head axe with bracket, No. 3.
2½-in. taber spanner with bracket, No. 4.
Elkhart 2½-gal. Underwriters' approved fire extinguisher.

Important: For specification instructions, see below and page 1.

Hose capacity, ft.	Hose and valve size, in.	Glass, in.	Cabinet dimensions shown in diagram, in.					Valve center, in.			Valve opening in.		Leave rough opening, in.	
			A	B	C	D	E	VT	H	VB	F	I	Width	Height
50 75 100	1½, 2½	28x36	30¾	38¾	8½	35½	43½	8	19¾	11	2	3	31½	39½

ELKHART VALVES

Plate 88

Bronze Hose Gate Valves

Made of high grade bronze with weight and design closely following Underwriter's requirements.

Have stationary stem and adjustable double discs.

Reducing valves 1x1¼ in. or 1x1½ in. should be used instead of straightway 1½-in. valves where pressure exceeds 80 pounds. Furnished with drip cock when so specified.

Chicago Pattern Valves

Largely used in connection with basket type racks and hose reels, for equipment of industrial plants, docks, etc.

Sizes: 1, 1¼, 1½, 2 and 2½ in.

GATE VALVE DIMENSIONS

Size Valve, in.	Regular Weight					Extra Heavy		
	1x1¼ or 1½	1¼	1½	2	2½	1x1½	1½	2½
Radius of swing, mounted, in.	5½	6½	7	8	9½	6½	7	9½
Radius of swing, demounted, in.	2¼	2½	3	3½	4½	2½	3	4½
Distance face to face, in.	2¾	3	3¼	3½	4½	3½	3⅜	4¾
Distance with cap and chain, in.	3¾	4	4¼	4½	5½	4½	4⅜	5¾
Diameter of hand wheel, in.	3	4	4	4½	5	3	4	5
Over-all Height, in.	6½	7½	8⅜	9⅝	11⅜	7½	8⅜	11⅜

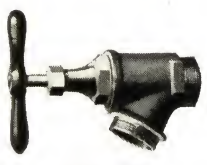


Plate 85

ELKHART VALVES FOR FIRE PROTECTION EQUIPMENT

Underwriter and New York Angle Valves

Approved by:

National Board of Fire Underwriters — *Board of Standards and Appeals, New York, N.Y.*

Body—Of special Underwriter alloy, our body has been found considerably heavier than competitive valves.

Stuffing Box—Ample space provided for adequate packing.

Stem—With heavy thread, our stem is made of a wear resisting alloy, analyzing 90% copper, 6.5% tin, 1.5% lead, 2% zinc.

Plate 20U
Female
Plate 25U
Male

Gland Follower—Beveled construction which insures firm pressure on packing.

Disc—Heavy Jenkin's type rubber discs used in all valves.

Joints—Accurately machined to allow repacking of valve when open and under pressure.

Wheel Handle—Arrow instantaneously indicates which way to turn wheel.

Plate 20
Female
Plate 25
Male

Elkhart Pattern Angle Valves

Made of high grade brass, specially designed for inside fire protection installations. All have full waterways and are furnished with renewable leather or rubber discs.

This valve is handsome in design and very durable. While always tight under pressure, it opens easily.

Standard weight valves are tested to 300 pounds. Extra heavy to 500 pounds pressure.

Standard finish is rough brass body, finished trimmings, iron wheel handle. Also furnished with body finished all over, and with nickel chromium, and dead black plating, and with milled edge brass wheel.

DIMENSIONS OF ELKHART AND UNDERWRITER PATTERN ANGLE VALVES

Type of Valve	Elkhart Plate 20, 25 Valves						Underwriters' Approved			
Weight	Regular Weight				Extra Heavy		Regular, 150 lbs		Ex. H'y, 250 lbs	
Size, in.	1¼*	1½*	2	2½	1½	2½	1½*	2½	1½*	2½
Radius of Swing, in.	2¼	2½	3	3⅝	2¾	4	3⅛	4	3⅛	4⅛
Distance—Center to Face of Outlet, in.	2	2¼	2½	3¼	2½	3¾	2¾	3½	2¾	3¾
Same—With Cap and Chain, in.	3	3¼	3½	4¼	3½	4¾	3¾	4½	3¾	4¾
Diameter Hand Wheel, in.	3¾	3¾	4⅝	5¾	3¾	5¾	4¼	6¼	4¼	6¼
Height, Overall, in.	7¼	7½	9¼	11	8	13¼	10⅛	12¼	10⅛	13½

**Note:* 1x1¼ and 1x1½-in. Reducing Valves approximately same dimensions.

STANDPIPE AND HYDRANT UNITS

All Types—Siamese Connections

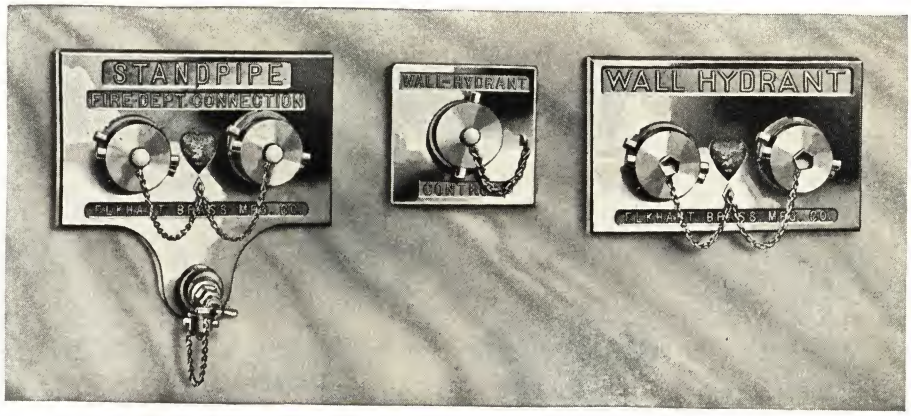
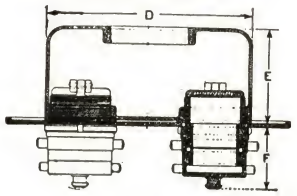
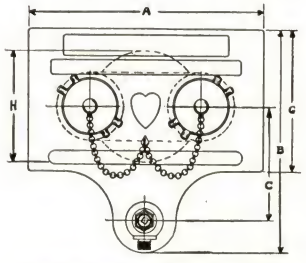


Plate 165 **Plate 164** **Plate 163**

Plate 166
Same design as Plate 165 but without sill cock





DIMENSIONS, PLATES 163, 165 AND 166
4x2½x2½ In. Size

A	B	C	D	E	F	*G	H
16	15	7⅝	12	6¼	4¼	9½	5½
6x2½x2½ In. Size							
16	15	7⅝	12	6½	4¼	9½	7½

*Height of body in wall.

Both can be furnished with pipe coming in from bottom, instead of back of body. Blue prints on request.

Plates 163, 164, 165 and 166

The three connections illustrated above comprise a complete private high pressure fire department unit. The standpipe connection shown at the left is connected to the fire department pumper which increases pressure in the hose outlet standpipe. The wall hydrant, along with the wall hydrant control, functions exactly as does a city hydrant connection, getting its pressure from Underwriter pumps in the basement. The hydrant control is merely an elongated stem of a 4-in. gate valve inside the building which automatically operates the basement fire pumps. In short, the standpipe connection serves to get water under pressure into a building, while the wall hydrant connection takes water under pressure out of the building. This unit is, as clearly recognized by engineers, an indispensable feature of modern fire fighting.

We will be glad to send a diagram of a typical installation upon request.

Flush type siamese and hydrant connections take a minimum of space on a crowded sidewalk. The body is built into the wall during construction. The wall plate is attached when desired by simply screwing in the bronze inlet nipples to which the independent clapper valves are attached.

This feature of construction is very important as it eliminates a serious drawback of many flush type siamese connections. Should any trouble develop, the clapper valves can be easily removed for repairs. Where the clappers are permanently attached to body of siamese, they are inaccessible as the body cannot easily be removed after it is once built in.

Combination Wall Plate Siamese with Sill Cock (Plate 155)

Made of highly polished bronze. Fitted with two 2½-in. fire department inlets and 4 or 6-in. outlet. Has double clapper valves, plugs and chains, also one ¾ or 1-in. outlet at bottom for sprinkling hose. Complete with hose cap, chain and key.

Plate 155 Siamese Outlet | Plate 154 Valve Control | Plate 153 Wall Hydrant

DIMENSIONS

Greatest length	19 in.
Greatest width	12½ in.
Stands out from wall	10½ in.
Center of pipe opening to center of sill cock—	
With 4-in. pipe	9⅝ in.
With 6-in. pipe	10 in.

Plate 156

Wall Plate Siamese (Plate 156)

Same siamese as plate 155 without the sill cock.

DIMENSIONS

Greatest height	11⅛ in.
Greatest width	12½ in.
Stands out from wall	10½ in.

Boston and Philadelphia Siamese

This siamese meets all requirements and has been fully approved by city authorities of Boston. Made of bronze, straight pattern, compact design requiring minimum of space. Has two or three 2½-in. inlets as required, each with automatic clapper valve.

Plate 167

This siamese is also acceptable to Philadelphia city authorities, and is largely used there, with 3-in. screw thread on center inlet and 2½-in. Jones connections on the two outside inlets.

Standard sizes are:
2½x2½x4-in.
2½x2½x2½x6-in.

New York City Siamese

Bearing the calendar number of the New York Board of Standards and Appeals, this siamese with independent gravity clapper valves, is of a very rugged construction throughout. Furnished with either galvanized iron plugs and chains or easy off swivel caps. Round or rectangular escutcheon according to architect's option.

Plate 9

Standard sizes are:
3x3x4-in.
3x3x5-in.
3x3x6-in.

Typical Sprinkler Siamese

Used by many sprinkler companies, this combination siamese (Plate 12) with escutcheon and easy off swivel caps is made with either bronze body, trim, and escutcheon or red enameled iron body with bronze swivels. Has two independent gravity clapper valves.

Standard sizes are:
2½x2½x4-in.
2½x2½x6-in.

Plate 12

Roof Manifolds

Completing the fire line standpipe, this roof manifold equipped with Elkhart Underwriters' approved, Plate 25U 2½-in. bronze angle valve affords fire department access to water on roof. Valves are threaded to local fire department threads, while working pressure of valve is determined by amount to which they are subjected. Siamese body is made of cast bronze. Valves equipped with brass or iron caps and chains.

Standard sizes are:
2½x2½x4-in.
2½x2½x2½x6-in.
2½x2½x2½x8-in.

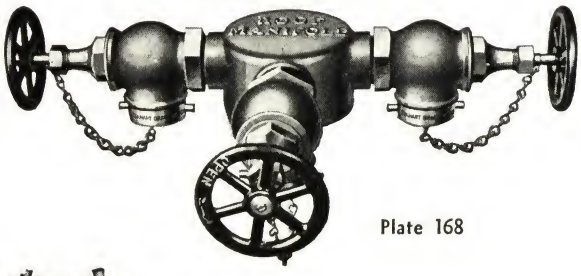


Plate 168

Plate 15

Sidewalk Siamese

Plate 15 shows a standpipe connection with 90 degree siamese used where the inlet pipe comes through the sidewalk. The complete connection consists of a polished brass sleeve to cover the pipe, heavy brass escutcheon and polished brass siamese No. 10 with caps and chains to fit 3, 4 or 6-in. standpipe with 2½-in. inlets and has two clapper valves. Contractor's name can be put in the recess in the escutcheon. Length of sleeve 18 ins. unless otherwise ordered.

Combination Air Inlet and Siamese

As an example of special casting work which we are often called upon to furnish, a combination fresh air inlet and siamese connection is here shown. In this case, according to specifications, a special aluminum alloy was used. Now available as a standard item, it is designed to meet all building code regulations.

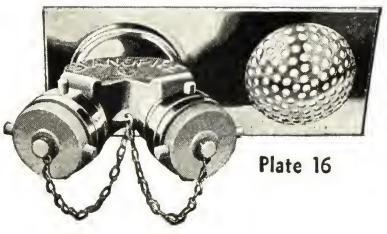


Plate 16

Automatic Ball Drip

In some cities the regulations require a ½-in. automatic ball drip between inside check valve and siamese.

It closes against pressure, but automatically opens when pressure is removed, draining this portion of the pipe, and thus prevents freezing.

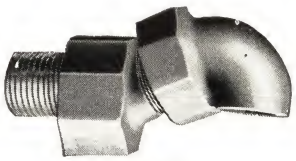
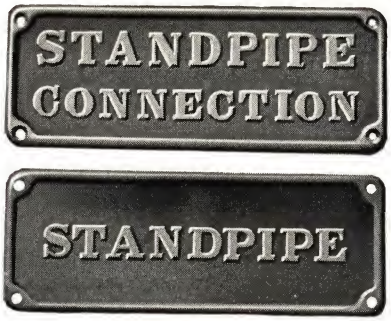


Plate 501

Our Plate 502, straight type, is approved by the Board of Standards and Appeals for use in New York City. Similar in appearance to Plate 501, it is required in nearly all eastern seaboard municipalities.

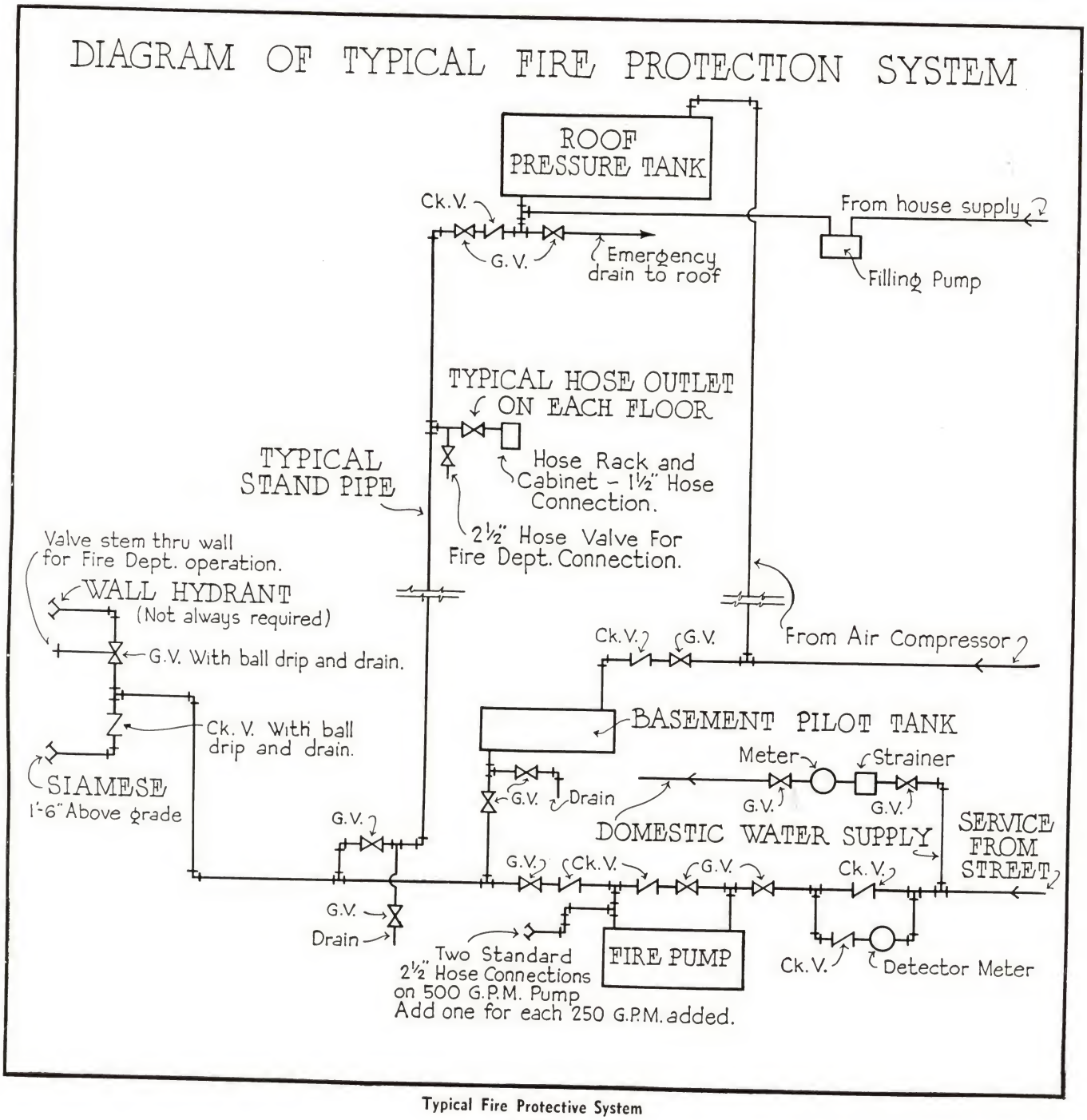
Standpipe Plates



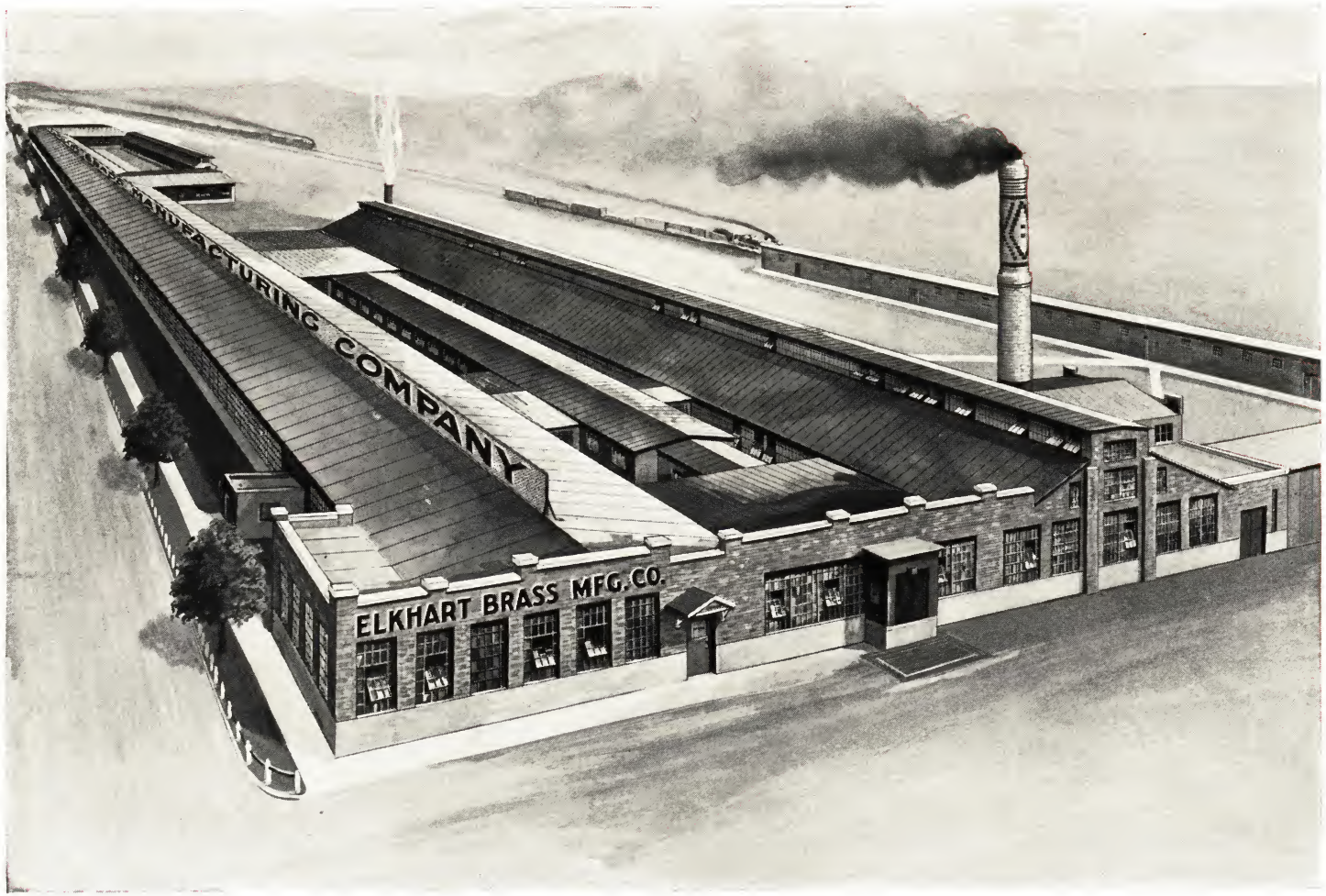
Size: 11½x4½ in.

Plates similar to those shown can be furnished with special lettering in any specified size.

Made of either bronze or red enameled iron, these individual escutcheons are often used to more clearly designate different wall connections.



Typical Fire Protective System


MANUFACTURING COMPANY
ELKHART BRASS MFG. CO.

WIRT & KNOX MFG. CO.

Manufacturers of Fire Hose Racks and Cabinets

2355-2366 Sedgley Avenue, PHILADELPHIA, PA.

Products

WIRT'S DE LUXE and PLATE AA STEEL HOSE CABINETS; WIRT'S "ROYAL" HOSE RACK.

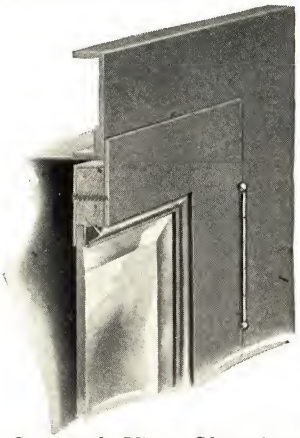
Also a most complete line of Fire Fighting Equipment for all types of buildings, including Hose Carts, Hose Reels, Extinguisher Cabinets, Siamese, Valves, Couplings, Nozzles, Hose House Equipment, all kinds of Fire Hose and special Fire Fighting Apparatus.

Wirt's De Luxe Cabinet

In the design and construction of the De Luxe Fire Hose Cabinet we have taken into consideration the most important factor—safeguarding the fire hose equipment—assuring its perfect manipulation during an emergency. Although made in several different types, including full plate glass door and two-panel steel door, the one recommended is our Plate T with two-panel door, the lower panel of steel and upper panel of polished beveled plate glass with the lap door. (See sectional view.)

Although the De Luxe Cabinet can be furnished with the flush type door we strongly recommend the lap door as the advantages are very pronounced.

All De Luxe cabinets are constructed with trim and door front cut from one solid piece of No. 12 gauge sheet steel, no corner seams, welds or brazing. The doors are built up to ¾ in. thick with heavy steel covered wood, similar to kalamein but with heavy wrought steel No. 12 gauge front, No. 16 gauge back, *not* lightweight so-called furniture steel—so there is no rattle when door is opened and closed. Door in addition to fitting into the cabinet, has a flange or lap which laps over the box part of the cabinet, thus forming a double protection from dust and moisture. This door will not sag because of its construction and three heavy ball head hinges. Trim has ¾-in. return bend.



Sectional View Showing Sturdy Construction of Wirt's De Luxe Cabinet

Very light gauge or furniture steel not used in Wirt's cabinets

Width of door trim 2½ in., width of box trim 2½ in., door lap ½ in. over trim.

Box portion of cabinet formed of No. 18 gauge steel, except larger sizes which are No. 16 gauge. Door hinged on heavy ball head brass hinges and equipped with brass pull knob and bullet catch. Plate glass held in place by ½ in. hollow steel moulding.

Plate T. Wirt's De Luxe Fire Hose Cabinet

Door hinging: all hinges on right-hand side as illustrated, unless otherwise ordered. As door swings clear of opening the standard hinging can be used under almost all conditions.

Inlet holes are scorified on both sides of cabinet, either side can be used. The standard placing of holes is C/L 4 in. down from the top (inside) and 4 in. from back.

Clearance between door and trim ½ in. when door is open. If trim is set on face of plaster ½-in. clearance obtained is enough for most marble wainscoting. Trims can be narrowed if ordered special.

DIMENSIONS OF WIRT'S DE LUXE CABINETS

No.	Length of hose, ft.	Size linen hose, in.	Inside dimensions of cabinet, in.			Recess, in.		
			Width	Height	Depth	Width	Height	Depth
7T	50		21	27½	8	22½	29	7⅞
8T	75		21	35½	8	22½	37	7⅞
9T	100		28	33	8	29½	34½	7⅞
*7TX	50 With	1¼, 1½, 2 or 2½	29	27½	8½	30½	29	8⅜
*8TX	75 extin-		29	35½	8½	30½	37	8⅜
*9TX	100 guisher		36	33	8½	37½	34½	8⅜
Type E or F Extinguisher Cabinet			12	27	8½	13½	28½	8⅜

*These cabinets are made to take a 2½-gal. soda and acid fire extinguisher in addition to the hose, making a very complete outfit.

Note: If so specified Nos. 7T, 8T and 9T cabinets can be made 6 in. in depth where 1½-in. valve is used and 6½ in. in depth where 2-in. valve is used, otherwise regulation depth of 8 in. will be furnished.

De Luxe Cabinet should be placed in wall before the finishing coat of plaster is applied and plaster worked up to edge of the cabinet, allowing about ⅜ in. to extend beyond the finished plaster line.

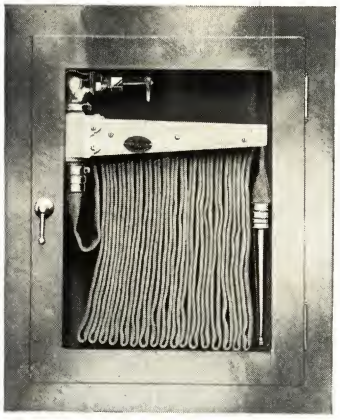


Plate AA. Wirt's Steel Cabinet

Wirt's Steel Hose Cabinets (Type AA)

These cabinets are neat in design, harmonizing with any style of architecture.

Trim and door are made of No. 12 gauge steel and box portion of No. 18 gauge.

There are no joints on face of door or trim and there is no rattle when door is opened and closed. Door has a flange or lap which laps over the box part of the cabinet, thus forming a great protection from dust and moisture.

DIMENSIONS OF PLATE AA STEEL CABINETS

No.	Length of hose, ft.	Size linen hose, in.	Inside dimensions of cabinet, in.			Recess, in.		
			Width	Height	Depth	Width	Height	Depth
7S	50		21	27½	7½	22½	29	7¾
8S	75	1¼,	21	35½	7½	22½	37	7¾
9S	100	1½, 2	28	33	7½	29½	34½	7¾
*7RX	50 With	or 2½	29	27½	8	30½	29	8¼
*8RX	75 extin-		29	35½	8	30½	37	8¼
*9RX	100 guisher		36	33	8	37½	34½	8¼
Special residence size for Royal rack only	25 linen hose	1	12¼	16½	4¼	13¼	17½	4½

*These cabinets are made to take a 2½-gal. soda and acid fire extinguisher in addition to the hose, making a very complete outfit.

Note: If so specified, Nos. 7S, 8S and 9S cabinets can be made 5½ in. in depth where 1½-in. valve is used, and 6 in. in depth where 2-in. valve is used, otherwise regulation depth of 7½ in. will be furnished.

Wirt's "Royal" Hose Rack As Used in De Luxe Cabinets and Plate AA Cabinets

The Royal Rack is a covered top rack and was the first on the market. This feature, originated by us, has been copied by most all other makers of hose racks—the advantages of the covered top are well known.

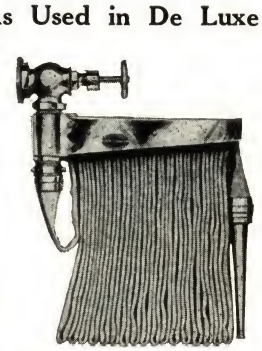


Plate A. Royal Rack

Estimates and Information

Complete details, specifications, estimates, blue prints, catalogues will gladly be furnished on application.

See copy of our Folder "C" in your files. A1A-29e2.

JOHN SIMMONS CO.

Fire Extinguishing Equipment

102-110 Centre Street, NEW YORK, N. Y.

Products

FIRE EXTINGUISHING EQUIPMENT, for the protection of hotels, office buildings, apartments, theatres, factories and mills, including Hose Cabinets, Hose Racks, Siamese Connections and Fire Extinguishers of all types.

Also Hose, Hose Couplings, Valves, Nozzles, Spanners, Axes, Crowbars, Fire Hooks, Fire Pails, Sprinkler Heads and Hydrants.

Organization and Service

The JOHN SIMMONS Co. have specialized in the Fire Fighting Equipment field for the past 50 years and are thoroughly versed in the specifications of the National Board of Fire Underwriters as well as requirements of local fire department and fire prevention bureaus.

A competent Engineering Department will co-operate with architects planning and selecting apparatus.

Simmons Hose Cabinets

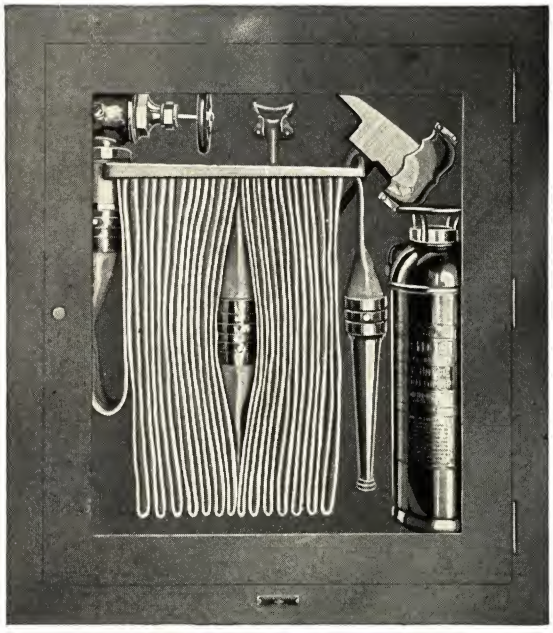
Simmons Hose Cabinets are neat, compact, strong and rigid in construction and made of sheet steel with plate glass door, brass hardware and automatic door catches. Can also be made in wood or with brass door and frame and finished to match any trim. Cabinets are finished with factory prime coat paint or any desired finish can be furnished at slight additional cost.

No. 127 Hose Cabinet—With Extinguisher and Axe

This cabinet is largely specified by architects and engineers for apartment houses, office buildings, theatres and schools. Made from sheet steel with D.D.A. glass door, brass hardware and automatic door catch. It is furnished complete with Josico hose rack, 2½-gal. fire extinguisher, pick-head fire axe and spanner.

No. 126 Hose Cabinet—Without Extinguisher and Axe

This cabinet is similar to our No. 127 less the fire extinguisher, axe and spanner. Furnished with Josico hose rack.



No. 127 Hose Cabinet

Specifications

No. 127 Hose Cabinet—Furnish (and install) as designated on plans:

A Simmons Sheet Steel No. 127 Hose and Extinguisher Cabinet constructed of No. 16 gauge sheet steel with No. 12 gauge steel trim and door having [D.D.A. glass panel] [¼-in. polished plate glass panel] lettered FIRE HOSE; concealed hinges; concealed catch and pull handle. Cabinet to be finished with [four coats baked enamel] [factory prime coat paint—finish to be applied by others].

Equipment—Furnish (and install) one 2½-gal. [nickelplated] [polished copper] [chromium plated] Josico No. 168 [Soda-Acid] [Foam Type] Fire Extinguisher complete with charge, and one [pick] [flat] head Fire Axe with necessary brackets securely mounted.

Note: For remainder of equipment see specifications of equipment in Hose Cabinet No. 126.

No. 126 Hose Cabinet—Furnish (and install) as designated on plans:

A Simmons Sheet Steel No. 126 Hose Cabinet constructed of No. 16 gauge sheet steel with No. 12 gauge steel trim and door having [D.D.A. glass panel] [¼-in. polished plate glass panel] lettered FIRE HOSE; concealed hinges; concealed catch and pull handle. Cabinet to be finished with [four coats baked enamel] [factory prime coat paint—finish to be applied by others].

Equipment—Furnish (and install):

One [2½] [2] [1½] [1¼] in. [nickelplated] [chromium plated] [polished body] [rough body] Simmons brass angle hose valve with [brass] [red iron] wheel.

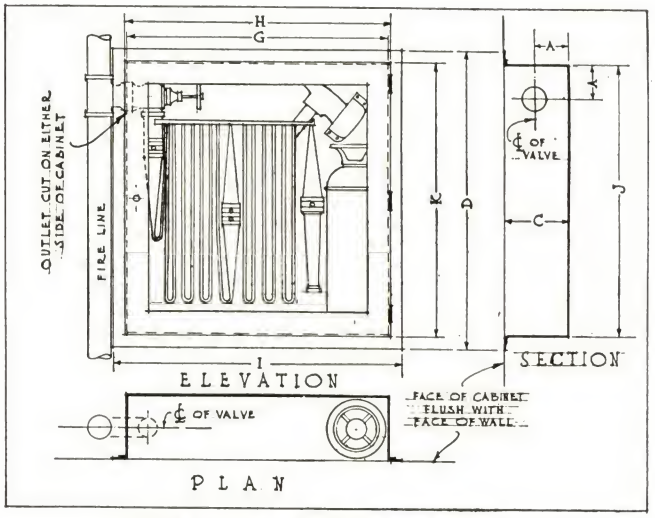
One Josico No. 130 [aluminum finish on iron] [enameled iron] [nickelplated iron] [chromium plated iron] [polished brass] [nickelplated brass] hose rack with rack nipple.

One [50] [75] [100] ft. length [2½] [2] [1½] [1¼] in. Underwriters' [Green] [Yellow] labeled, unlined, linen fire hose.

One [2½x15] [2½x12] [2x11] [1½x10] [1¼x10] in. [brass] [iron] hose nozzle.

Note: Finish on coupling and nozzle to be (polished brass) (match finish on the [rack] [valve]).

One Galvanized Tabor hose spanner.



Detail of No. 127 Hose Cabinet

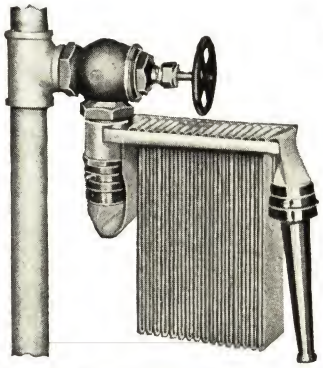
DIMENSIONS OF SIMMONS HOSE CABINETS

Hose capacity, ft.	Hose and valve, size, in.	Glass, in.	Cabinet dimensions shown in diagram, in.								Valve opening, in.	Leave rough opening, in.	
			A	C	D	G	H	I	J	K		Width	Height
No. 127 Hose Cabinet—With Extinguisher and Axe													
50	1¼, 2, 2½	22½x24½	4⅛	8½	31½	30	30½	32½	28	28½	2, 3, 3	30¾	28¾
75	1¼, 2, 2½	31½x24½	4⅛	8½	40½	30	30½	33½	37	37½	2, 3, 3	30¾	37¾
100	1¼, 2, 2½	28½x24½	4⅛	8½	37½	33	33½	36½	34	34½	2, 3, 3	33¾	34¾
No. 126 Hose Cabinet—Without Extinguisher and Axe													
50	1¼, 2, 2½	22½x14½	4	8	31½	20	20½	23½	28	28½	2, 3, 3	20¾	28¾
75	1¼, 2, 2½	31½x14½	4	8	40½	20	20½	23½	37	37½	2, 3, 3	20¾	37¾
100	1¼, 2, 2½	28½x17½	4	8	37½	23	23½	26½	34	34½	2, 3, 3	23¾	34¾

Josico Swinging Hose Racks

No. 130 Nipple Attachment Type—Chief among the features of this hose rack are neat appearance, durability and simplicity of operation. It is very compact and requires less wall space than the average hose holding device on the market. It is accurately and strongly constructed of either cast gray iron heavily galvanized, or brass.

No. 205 Nipple Attachment Sheet Steel Covered Type—Designed to meet the demand for a covered rack, retaining the features of our Josico No. 130 rack and having in addition a cover for protection against dust or damage to the top folds of the hose.



No. 130 Josico Nipple Attachment Type

No. 205 Josico Nipple Attachment Covered Type

No. 131 Pipe Clamp Type—Rack of same construction and features as No. 130 above but is equipped with pipe clamp attachment. Clamp can be furnished to fit any size pipe from 1¼ up to 4 in. Larger size clamp furnished at additional charge. Also equipped with plates for hanging on wall.

Specifications for Hose Racks

No. 130 Nipple Attachment Type—Furnish (and install) as designated on plans:

One [2½] [2] [1½] [1¼] in. [nickelplated] [chromium plated] [polished body] [rough body] Simmons brass angle hose valve with [brass] [red iron] wheel.

One Josico No. 130 [aluminum finish on iron] [enameled iron] [nickelplated iron] [chromium plated iron] [polished brass] [nickelplated brass] hose rack with rack nipple.

One [50] [75] [100] ft. length [2½] [2] [1½] [1¼] in. Underwriters' [Green] [Yellow] labeled, unlined, linen fire hose.

One [2½x15] [2½x12] [2x11] [1½x10] [1¼x10] in. [brass] [iron] hose nozzle.

Note: Finish on coupling and nozzle to be (polished brass) (match finish on the [rack] [valve]).

One Galvanized Tabor hose spanner.

No. 131 Pipe Clamp Type—Same as for No. 130 rack, except: One Josico No. 131 [aluminum finish on iron] [enameled iron] [nickelplated iron] [chromium plated iron] [polished brass] [nickelplated brass] hose rack with [wall plate] [pipe clamp].

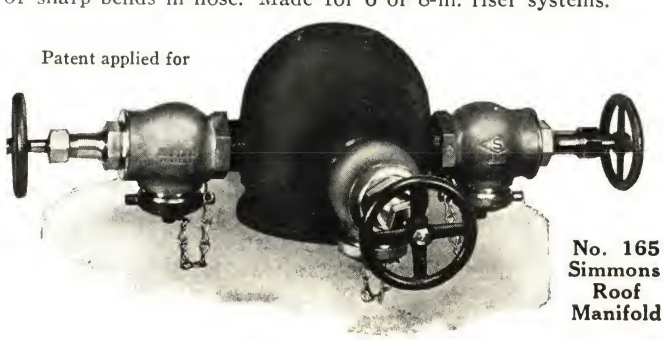
Note: Specify size of pipe that clamps are to fit.

Fire Department Hose Outlet Manifold

Designed for use on the top of the standpipe riser on roof or on any setback for ease and efficiency in fighting roof fires or fires in adjoining buildings. Equipped with three outlets having approved type hose valves attached thereto.

Outlets spaced 90° apart for achieving the maximum efficiency in laying a line of hose in any direction with a minimum of sharp bends in hose. Made for 6 or 8-in. riser systems.

Patent applied for

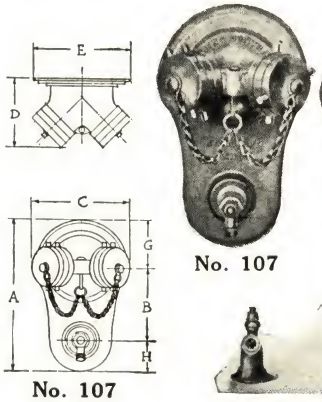


No. 165 Simmons Roof Manifold

Siamese Connections

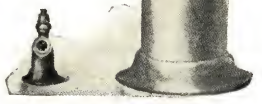
No. 107 Wall Type—Accurately and neatly made of brass, rough or polished. Used for standpipe and sprinkler work. Plates can be made with different lettering. Approved by National Board of Fire Underwriters and New York Fire Department.

No. 106 Sidewalk Type—Used for standpipe coming through sidewalk. Made with double checks, complete with plugs and chain. Neatly made of brass with either rough body, painted with finished trimmings, finished all over, bronzed to match sample or any other finish required. Guaranteed tested to 300 lb. Approved by the New York Fire Department.



No. 107 Detail

No. 107



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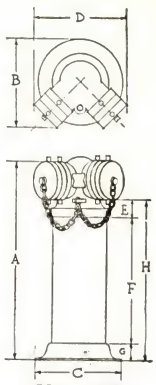


No. 106 Detail

Specifications for Siamese Connections

No. 107 Wall Type—Furnish (and install) as designated on plans:

A Simmons No. 107 wall type polished brass Siamese connection with [polished brass] [galvanized iron] plugs and chains.

A Simmons Siamese sill cock and polished brass combination Siamese and sill cock name plate, made to fit [4] [5] [6] [8] in. iron pipe.

Note: Specify if sill cock is not required.

No. 106 Standpipe Type—Furnish (and install) as designated on plans:

A Simmons No. 106 sidewalk 90° type polished brass Siamese connection with [polished brass] [galvanized iron] plug and chain; also covering tube [specify length] and polished brass name plate, made to fit [4] [5] [6] [8] in. iron pipe.

Note: Specify whether sill cock is required or not.

DIMENSIONS OF SIAMESE CONNECTIONS IN INCHES

Size of Siamese	Plate No.	A	B	C	D	E	F	G	H
4x2½x2½	106 107	23 16⅝	9⅝ 9 3/16	9¾ 8¾	8 3/16 7 3/8	1 9¾	18	⅝ 4⅞	19⅝ 2 9/16
4x3x3	106 107	23½ 16⅝	6¾ 9 3/16	9¾ 10⅞	11 8¾	1 9¾	18	⅝ 4⅞	19⅝ 2 9/16
5x3x3	106 107	23½ 17⅝	12½ 9 3/16	11¾ 10¾	10⅝ 9	⅞ 11¾	18	⅝ 5⅞	19½ 2 9/16
6x2½x2½	106 107	23⅝ 17⅝	10⅞ 9 3/16	11¾ 8⅞	9⅞ 7½	1½ 11¾	18	⅝ 5⅞	20⅛ 2 9/16
6x3x3	106 107	24 17⅝	12¼ 9 3/16	11¾ 11¾	10¾ 10	1⅛ 11¾	18	⅝ 5⅞	19¾ 2 9/16

No. 168 Josico Fire Extinguisher (Soda and Acid Type)

This 2½-gal. open bottle style owes its widespread popularity to the special attention and supervision given its construction. Body consists of heavy jacketed copper cylinder, specially riveted. All parts carefully finished. Guaranteed tested 350-lb. pressure.

It is thoroughly in accordance with specifications of Underwriters' Laboratories, Inc., besides having the approval of leading fire authorities throughout the country.

For ordinary occupancy one Josico No. 168 Fire Extinguisher is required for every 2500 sq. ft. of floor area. Installation must be such that one extinguisher is available within 35 ft.

PHILGAS SERVICE

PHILFUELS COMPANY
SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY

General Motors Building, DETROIT, MICH.

BARTLESVILLE, OKLA., Phillips Building NEW YORK, N. Y., 80 Broadway

REAL GAS—AND AN EXACT DUPLICATION OF CITY GAS SERVICE
For Homes and Businesses Beyond Gas Lines

What Philgas Is

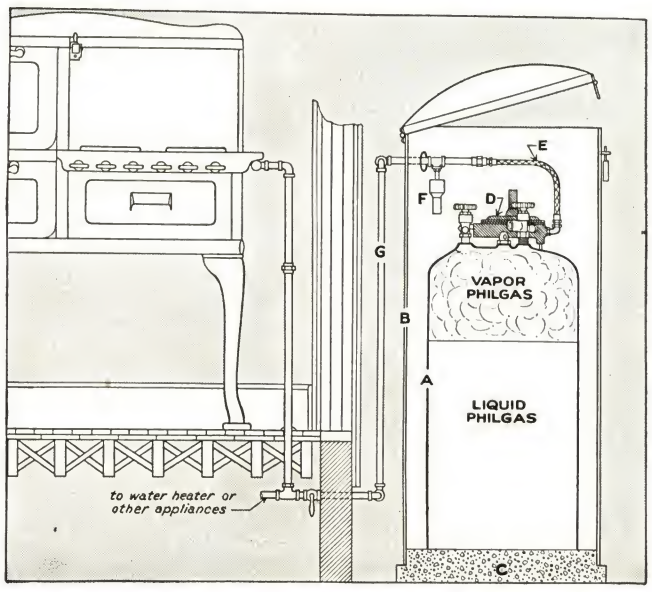
Philgas is real gas—natural gas—compressed and purified in special plants as it comes from the Oklahoma and Texas wells of the Phillips Petroleum Company.

Philgas is a member of the hydro-carbon series and is known commercially as propane (C_3H_8).

It is a gas at all temperatures down to —44° F., at atmospheric pressure.

When placed under nominal pressure, the gas is compressed to a liquid state —and as such, is shipped and distributed.

When the appliance valve is open, the condensed gas automatically vaporizes and goes into the lines and gas appliances as a gas—not as a liquid.



A Typical Philgas Installation

Philgas Installation

Installation is very simple. It consists of a steel cylinder (A) inside of a cylindrical metal cabinet (B), located outside customer's home or place of business. The entire installation stands on a concrete base (C). Resting on top of the steel cylinder is a regulator (D) which maintains a constant, low pressure on gas entering the house. From the regulator the gas passes through flexible hose (E), over the mercury seal (F) which is a low pressure safety guard, and thence through standard gas piping (G) to appliances inside the house. The metal cabinet is kept under lock and key.

As gas is consumed in range or heater, more Philgas automatically resumes its natural gaseous state in cylinder, passes through regulator and gas piping into appliance burners. Nothing to wear out or get out of order.

The equipment is entirely automatic in operation and requires absolutely no attention from the customer. Additional equipment required for unusually large gas loads is installed by Philgas Service without extra cost.

Piping and labor incident to installing Philgas Service is done by PHILFUELS COMPANY employees, and the cost of same is covered by the initial charge for Philgas Service within the limitations in respect to extra piping and other unusual conditions set forth in the Philgas Service Agreement.

Convenience and Dependability

Philgas Service provides a convenience now considered a necessity—a dependable, uninterrupted gas service for cooking, water heating, laundry hot plates and many other gas appliances—in homes and business enterprises located beyond the city gas mains.

Philgas Service is an *exact duplication* of city gas service. The customer uses Philgas and the gas appliances just as if connected with city gas lines—never has to order fuel, or manipulate equipment. There are no tanks to change and a continuous, dependable gas supply is maintained by Philgas Service without interrupting the use of gas, without requiring the attention of the user, and without entering the customer's home or place of business.

To carry the parallel of city gas service to completion, the user of Philgas is billed at monthly intervals for the exact amount of gas consumed—*after* it is burned.

Back of Philgas Service

Back of Philgas Service is a complete unified, financially responsible and nationally known organization—Phillips Petroleum Company and its liquefied petroleum gas subsidiary PHILFUELS COMPANY—which handles Philgas through its own facilities from the gas well to the ultimate consumer.

How Philgas Service Functions

Philgas is compressed natural gas shipped in special tank cars to the local Philgas distributing stations. From the distributing stations Philgas is delivered at regular intervals in special tanks trucks to the customer's installation. There the cylinder containing the unused Philgas is weighed—the difference between the previous weight and present weight being the exact amount of gas consumed. The gas supply is then replenished from the tank truck. Again the Philgas container is weighed and weight recorded.

This service is performed without any attention from the customer and without interrupting the use of the gas at any time. The gas is always ready at the turn of a valve.

Quickly Available

Philgas can be installed on reasonable notice. The installation requires only a small amount of piping from the container to the appliances. All necessary installation work is done by specially trained PHILFUELS COMPANY employees who know how to do the work correctly and in a workmanlike manner.

At certain seasons of the year installation work is exceptionally heavy and it is well to make arrangements for an installation as far in advance as possible. The local Philgas station can give you exact information in regard to time required for installations.

Applications of Philgas

The uses of Philgas are as varied as are the applications of gas heat. Among the great variety of common appliances Philgas is used for are:

- Cooking ranges
- Hot water heaters
- Gas-fired refrigerators
- Laundry hot plates, mangles
- Coffee urns
- Restaurant ranges
- Melting pots
- Bunsen burners
- Steam tables
- Singeing and drying torches
- Radiant type heaters
- Clothes pressing machines

Approved Appliances

All appliances used with Philgas must be approved by the PHILFUELS COMPANY in order to insure maximum efficiency for the user. Philgas, being much higher in B.t.u. content than manufactured or ordinary natural gas, requires special adaptations in orifice and burner assembly to be used economically. In other respects the appliances are similar in appearance and in operation to regular city gas appliances.

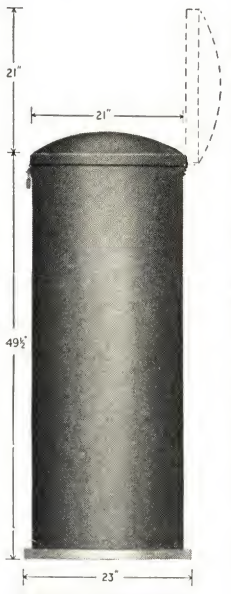
A production model of each Philgas-approved appliance has been tested in the laboratory and in actual use to insure the purchaser complete satisfaction. Consult the local Philgas office before any appliances are specified.

Underwriters' Standard Listing

Philgas Service equipment has been tested and listed as "Standard, Class A" by the Underwriters' Laboratory of the National Board of Fire Underwriters, and consequently has no effect on insurance rates.

Philgas Installation Costs

Philgas Service costs only $36.50 cash (or can be installed on a budget plan with a $5.00 down payment). For this charge PHILFUELS COMPANY delivers and installs all Philgas equipment necessary for supplying Philgas continuously to the pipe leading to the customer's appliances. This charge also gives the customer, only, right to use this equipment at its original location so long as Philgas is used therein.



Cabinet Dimensions

Philgas Operating Costs

As with city gas the cost of operation depends exactly on amount of gas used by customer. Considering efficiency of the approved appliances, Philgas on a heat value or B.t.u. basis compares to approximately $2.00 city gas of average 530 B.t.u. content, or to electricity at 2¢ per kw. hr. Thousands of satisfied users have found Philgas operating costs to be equal or less than those of much less convenient fuels.

Philgas Specifications

(1) Dimensions of cylindrical cabinet: Height of cabinet (closed), 53 in.; outside diameter of concrete base, 23 in.; outside diameter of cabinet, 21 in.; height of cabinet (open), 72 in.

(2) Cabinet must be placed outside of building and on top of ground.

(3) Cabinet cannot be completely enclosed and should be placed at least 5 ft. from any basement or foundation openings.

(4) Where Philgas is to be used for several appliances or where large gas loads are anticipated, consult the local Philgas office as to requirements for multiple installations.

(5) If cabinet is placed in recess in the wall, height of recess opening must be at least 75 in. in order to permit the lid of container to be opened and scales inserted for weighing operation. Consult local Philgas station regarding width of recess, which depends on whether multiple installation is required.

(6) Equipment must be placed so as to be reached by 50 ft. of hose from the nearest point to which delivery truck can approach.

(7) Roads leading to the installation must be of such character as to be easily accessible to the truck twelve months of the year.

(8) Any piping inside the building done by other than PHILFUELS COMPANY employees must be fitted with special compounds and the work done as specified by the local Philgas manager.

(9) PHILFUELS COMPANY reserves the right to locate Philgas equipment on customer's premises so as to require a minimum of piping to the points of use, but should any customer desire a location other than the point selected by the PHILFUELS COMPANY, his request will be granted upon payment of the additional expense incurred. This information is set out in detail in the Philgas Agreement.

(10) Philgas container is originally painted sage brush green, but can be painted by the user in any color desired.

(11) Philgas container may be masked with shrubbery if desired.

WHERE PHILGAS CAN BE OBTAINED

Philgas Service is supplied in many districts east of the Mississippi River. Each distributing station serves a district within a radius of approximately 25 miles from the central plant. Below are listed the stations now in operation, together with general description of locations. Call or write any central, division or district office for exact information on territory served.

Near New York (Southwest)
PHILFUELS COMPANY
Box 502, Bound Brook, N. J.
Telephone: Bound Brook 1111

Near New York (West)
PHILFUELS COMPANY
Box B, Haskell, N. J.
Telephone: Pompton Lakes 896

Near New York (North)
PHILFUELS COMPANY
Box 587, Mount Kisco, N. Y.
Telephone: Mt. Kisco 1319

Near Bridgeport, Conn.
PHILFUELS COMPANY
Box 76, Derby, Conn.
Telephone: Derby 472

Near Hartford, Conn.
PHILFUELS COMPANY
Box 227, Windsor, Conn.
Telephone: Windsor 791

Near New Haven, Conn. (East)
PHILFUELS COMPANY
Box 299, Westbrook, Conn.
Telephone: Saybrook 555

Near New London, Conn.
PHILFUELS COMPANY
Box 271, Groton, Conn.
Telephone, New London 2-3808

Near Providence, R. I.
PHILFUELS COMPANY
Box 160, Washington, R. I.
Telephone: Coventry 8

Near Madison, Wis.
PHILFUELS COMPANY
Box 608, Madison, Wis.
Telephone: Badger 6499

Near Boston, Mass.
PHILFUELS COMPANY
Box 99, South Sudbury, Mass.
Telephone: South Sudbury 200

Near Baltimore, Md.
PHILFUELS COMPANY
Box 63, Reisterstown, Md.
Telephone: Reisterstown 218

Near Washington, D. C.
PHILFUELS COMPANY
Box 272, Rockville, Md.
Telephone: Rockville 304

Near Albany, N. Y.
PHILFUELS COMPANY
Box 1188, Albany, N. Y.
Telephone: Albany 6-3644

Near Utica, N. Y.
PHILFUELS COMPANY
Box 836, Richfield Springs, N. Y.
Telephone: Richfield Springs 137

Near Cleveland, Ohio
PHILFUELS COMPANY
Box 491, Hudson, Ohio
Telephone: Hudson 40

Near Detroit, Mich.
PHILFUELS COMPANY
Box 94, Pontiac, Mich.
Telephone: Pontiac 4154

Near Indianapolis, Ind.
PHILFUELS COMPANY
Box 166, Maywood, Ind.
Telephone: Belmont 3399

Near Toledo, Ohio
(Uses different distribution system)
PHILFUELS COMPANY
Box 145, West Toledo Station,
Toledo, Ohio
Telephone: Lawndale 7488

PYROFAX DIVISION

CARBIDE AND CARBON CHEMICALS CORPORATION
(UNIT OF UNION CARBIDE AND CARBON CORPORATION)

Carbide and Carbon Building

30 East 42nd Street,
NEW YORK, N. Y.

Pyrofax Gas Service for Locations Not Served with City Gas

Where Used

Pyrofax Gas Service supplies gas for cooking and other domestic purposes to country and suburban homes which are not served with city gas. It is also suitable for schools, colleges, industrial plants, hotels, hospitals and other institutions.

What Pyrofax Is

Pyrofax is a compressed hydrocarbon gas (not a liquid) and is supplied in steel cylinders in such highly condensed form, that one cylinder holds the equivalent of approximately 5000 cu. ft. of city gas; smaller cylinders are also available. Two cylinders are furnished with each installation; one is in reserve while the other is in use.

Pyrofax burns on standard gas burning appliances.

Pyrofax Equipment

The Pyrofax Equipment consists of an enameled steel cabinet, controlling equipment and connections for two cylinders of Pyrofax Gas.

Type A Pyrofax Equipment

The cabinet is 55½ in. high, 36 in. wide, and 18 in. deep, and is placed outside the house on a concrete foundation. Standard gas pipe ½ or ¾ in. is used to convey Pyrofax as a gas (not a liquid) to the appliances.

Installation of Pyrofax Equipment

The installation may be made by your own plumber or by our local distributer. Complete instructions are furnished with every Pyrofax Outfit.

Standard Appliances Will Operate With Pyrofax

Leading types of gas ranges are built at the factory expressly for Pyrofax and are guaranteed to give efficient, economical operation.

Laundry stoves, room heaters, water heaters, hot plates, or any other appliance can be supplied. In large homes and institutions, standard hotel equipment can be used.

Underwriters' Approval and Insurance

Pyrofax is listed as "standard" by the National Board of Fire Underwriters. This means that a Pyrofax installation does not increase the insurance rate.

Installation and Operating Costs

Complete Pyrofax Units, consisting of Pyrofax Gas Ranges and equipment, cost $99.50 and up.

The cost of cooking with Pyrofax for a family of four averages $4.00 to $5.00 per month. If other appliances are used, or if the family is larger, the cost is proportionately greater.

Specifications for Architects' Use

The following should be included in the plumbing specifications under the gas piping section:

This contractor shall supply and install, where shown on the architect's plans, one Type "A" Pyrofax Gas Equipment complete with outside cabinet as manufactured by CARBIDE AND CARBON CHEMICALS CORPORATION of 30 East 42nd Street, New York, N. Y.

Gas piping shall be of the sizes shown and located as indicated on the detail drawings. Piping shall be connected by this contractor [by the local Pyrofax dealer] to the fixtures and all necessary adjustments on these fixtures for burning Pyrofax Gas shall be made by this contractor [by local Pyrofax dealer].

All appliances specified elsewhere in the specifications should be ordered adapted for use with Pyrofax Gas.

Gas Distribution

CARBIDE AND CARBON CHEMICALS CORPORATION and associated companies maintain more than 600 plants, warehouses and sales offices throughout the United States and Canada to serve thousands of Pyrofax users.

Write to the PYROFAX DIVISION, CARBIDE AND CARBON CHEMICALS CORPORATION, 30 East 42nd Street, New York, N. Y., for the name of the nearest dealer and nearest distributing station.

TIRRILL GAS MACHINE CORPORATION

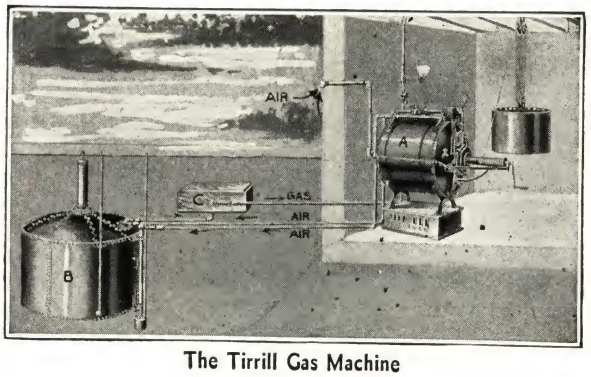
ESTABLISHED 1864

50 Church Street, NEW YORK, N. Y.

The Tirrill Gas Machine

Generates and delivers a steady supply of economical *non-poisonous* gasoline gas that burns smokelessly with a brilliant white or blue flame as desired, and without odor. It is suitable for all industrial purposes and cooking, heating and lighting purposes in residences, laboratories, colleges, hospitals, hotels, schools and factories.

Materials—The entire plant is constructed of the best quality galvanized armco ingot iron with bronze bearings and brass fittings, all joints riveted and heavily soldered and all thoroughly tested and proven tight.



The Tirrill Gas Machine

Operation—Machine consists of three simple units: air pump, gas generator, mixer.

The air pump or meter (A) furnishes the necessary air and pressure to deliver the gas. This pump is operated by a suspended weight, water wheel or electricity as desired.

The gas generator (B), with inside carburetor and float, acts as a gasoline reservoir and mixes air with the gasoline vapor forming gas.

Mixer (C) functions to thoroughly mix or equalize the gasoline vapor from the generator with a given quantity of air from the air pump, thus insuring a supply of smokeless, uniform gas of high quality.

Advantages of Tirrill Gas Machines

Safety—Mixes gas outside of building (underground); makes gas containing fresh oxygen, therefore non-poisonous; produces and distributes gas noiselessly; requires no heat to operate; no dangerous gas pressures.

Is listed by the National Board of Underwriters as Standard Class "A" equipment.

Simplicity—Easily installed and operated; complete instructions with each machine; any gas fitter can install. Requires no attention beyond refilling of generator tank once or twice each year.

Efficiency—Gives positive, continuous service, gas being automatically made as needed, and none is stored; variations in temperature do not affect efficient operation.

Durability—Only the highest grade materials and workmanship are employed; once installed the system requires *no upkeep or repairs.*

Industrial Installations—Where power is available, an exhaust blower, which may be installed in any part of the building, is used in place of air pump "A."

Tirrill's Electric "Equalizing" Air Pump

Tirrill's New Electric "Equalizing" Air Pump can be placed anywhere and only takes up a space of 26x17½ in.—weighs 203 lbs. This equipment is compact, simple and safe, and with the Tirrill Gas Generator and Mixer makes a very complete, efficient and dependable gas machine.

This new electrical air pump is an engineering achievement for simplicity and ruggedness, and is equipped with a $\frac{1}{10}$ hp. motor especially designed and built for this particular duty.

The motor has the combined qualities of high electrical efficiency and endurance.

CAPACITIES AND SIZES OF TIRRILL MACHINES

Machine No.	2	3	4	5	6	7	8
Gas delivered per hr. cu. ft.	300	400	550	850	1100	1500	2200
Gas pressure ... in.	2	2½	2½	2¾	3¼	3½	4
Equalizing pressure							
Air pump (A):							
Length ... in.	56	64	70	75	86	97	154
Height ... in.	45	47½	47½	57	61	61	87
Diameter ... in.	29	35	35	42	48	48	56
Weight box:							
Height ... in.	24	24	24	24	24	24	30
Diameter ... in.	26¼	34½	39½	44	52½	60¼	75¼
Generator (B):							
Height (with dome) ... in.	68	69	70	80	82	82	96
Diameter ... in.	45	53	59	65	75	75	100
Capacity ... bbl.	4	5	6	10	14	14	25
Mixer (C):							
Height ... in.	12	14	14	14	15	15	18
Diameter ... in.	42	46	46	46	52	52	65
Shipping weight ... lb.	1222	1500	1775	2260	3475	3840	4470

Suggested Specifications

The contractor shall furnish a gas plant for making gasoline gas as manufactured by the TIRRILL GAS MACHINE CORPORATION, 50 Church Street, New York, N. Y., and having a capacity of at least .... cu. ft. of gas per hour, to be operated by [weight, hand operated], [weight with hand and automatic electric rewind] [water wheel] [electric air pump].

Generator and mixer shall be buried in the ground outside building and from 10 to 30 ft. or more from it, to conform with fire insurance regulations and to be in accordance with installation specifications furnished by maker with each machine.

All joints shall be made absolutely tight and long screws shall be used for joining the pipes to the apparatus to permit disconnection, if necessary.

All pipes connecting the air pump, storage tank and equalizing chamber shall be buried in the ground, having a slight pitch or drain toward the generator.

CRANE CO.

Plumbing Fixtures, Valves, Fittings and Heating Supplies

CRANE CO. GENERAL OFFICES

836 South Michigan Avenue, CHICAGO, ILL.

NATIONAL EXHIBIT ROOMS: ATLANTIC CITY

WORKS

CHICAGO, BRIDGEPORT, BIRMINGHAM, CHATTANOOGA, TRENTON, NORTH TONAWANDA, MONTREAL and ST. JOHNS, QUE.

BRANCH HOUSES

ABERDEEN, S. D.
ABERDEEN, WASH.
ALBANY
ALBUQUERQUE
ANDERSON, IND.
ASHEVILLE
ATLANTA
ATLANTIC CITY
AURORA
BALTIMORE
BEAUMONT
BILLINGS
BINGHAMTON
BIRMINGHAM
BOSTON
BRIDGEPORT
BROOKLYN
BUFFALO
CAMDEN
CANTON
CASPER
CEDAR RAPIDS
CHARLESTON
CHARLOTTE
CHATTANOOGA
CHICAGO
CICERO
CINCINNATI
CLEVELAND
COLUMBUS
CORPUS CHRISTI
DALLAS
DAVENPORT
DENVER
DES MOINES
DETROIT
DULUTH
EAST CHICAGO
EL PASO
EVANSTON
EVANSVILLE
FARGO
FLINT
FORT SMITH
GRAND ISLAND
GRAND JUNCTION
GRAND RAPIDS
GREAT FALLS
GREENSBORO
GREENVILLE
HARLINGEN
HARRISBURG
HARTFORD
HEMPSTEAD
HOLLYWOOD
HOUSTON
HYANNIS
INDIANAPOLIS
JACKSON, MICH.
JACKSON, MISS.
JACKSONVILLE
JERSEY CITY
JOLIET
KANSAS CITY
KNOXVILLE
LEXINGTON
LIMA
LINCOLN
LITTLE ROCK
LOCKPORT
LONG BEACH
LOS ANGELES
MACON
MADISON
MANKATO
MASON CITY
MEMPHIS
MIAMI
MIAMI BEACH
MILWAUKEE
MINNEAPOLIS
MOBILE
MUNCIE, IND.
MUSKOGEE
NASHVILLE
NEWARK
NEW HAVEN
NEW ORLEANS
NEW YORK
NORFOLK
NORRISTOWN
OAKLAND
OGDEN
OKLAHOMA CITY
OMAHA
OSHKOSH
PASADENA
PATCHOGUE
PATERSON
PHILADELPHIA
PHOENIX
PITTSBURGH
POCATELLO
PORTLAND, ME.
PORTLAND, ORE.
PROVIDENCE
PUEBLO
READING
RENO
RICHMOND
ROCHESTER
ROCKFORD
SACRAMENTO
SALT LAKE CITY
SAN ANTONIO
SAN BERNARDINO
SAN DIEGO
SAN FRANCISCO
SANTA ANA
SANTA BARBARA
SAVANNAH
SEATTLE
SHREVEPORT
SIOUX CITY
SIOUX FALLS
SOUTH BEND
SPOKANE
SPRINGFIELD, ILL.
SPRINGFIELD, MASS.
SPRINGFIELD, MO.
STAMFORD
ST. LOUIS
ST. PAUL
SYRACUSE
TACOMA
TAMPA
TERRE HAUTE
TRENTON
TUCSON
TULSA
UTICA
WASHINGTON
WAUKEGAN
WEST PALM BEACH
WHITE PLAINS
WICHITA
WILKES-BARRE
WILMINGTON
WINONA
WORCESTER
YAKIMA
YOUNGSTOWN

For our pages on Water Heaters, Water Softeners, Water Systems and Gas Fired Boilers, see Manufacturers' Index

THE CRANE LINE

Completeness

The completeness of the Crane line is the result of 76 years' experience. The background shared by all Crane products is one of three-quarters of a century's pioneering in the development of materials that bring sanitation and comfort to the home. This development has been logical. Starting with valves, fittings, and piping materials—the foundation of any efficient plumbing system—it brought these to a high state of perfection before it started to make fixtures.

Its entrance into the field of fixture making, several years ago, was the starting point of a revolutionary advance in this art. Today, the complete line of appointments manufactured by CRANE CO. mirrors every sound advance. Several of these are explained in the next column, the fixtures themselves being described in the pages which follow.

Acid Resisting Enamel

An improvement in enamel that enables it to withstand the discoloration of fruit juices and ordinary acids —that insures the fixture's permanently glistening beauty.

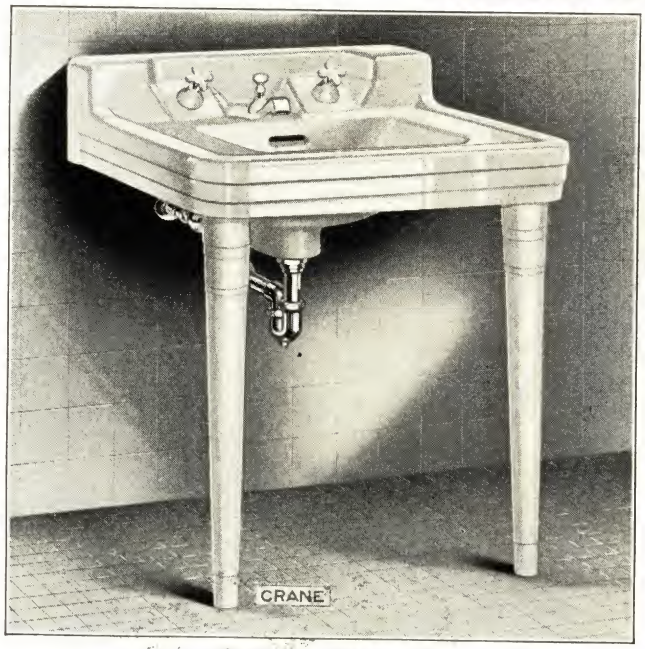
Color

CRANE CO. pioneered in the cause of color for the bathroom. Today its line offers personal taste the widest latitude in the choice of color and decorative schemes.

Chromium Plate

This is an assurance that exposed metal parts will need no burnishing or cleaning. Very superior to nickel, this new finish is unaffected by climate, and is resistant to tarnish.

VITREOUS CHINA LAVATORIES



C 175-B1 (Patented)

Lavatory: Crane *Corwith* vitreous china lavatory with raised integral spout, 4-in. high back, panels for supply valves, rectangular basin with splash lip; supported on vitreous china legs and enameled brackets.

Trimmings: B1 *Securo* integral spout compression supply and quick draining direct lift waste fixture with renewable seats.

Supplies: ⅜-in. angle supplies with stops.

Trap: 1¼-in. brass "P" trap.

Finish: Nickel plated or chromium plated.

Size of lavatory .....in. 27x22 30 x24
Size of basin.....in. 17x12 18½x13

If wanted with metal spout instead of integral spout, specify C 175-N1.

C 255-M10

Lavatory: Crane *Norwich* vitreous china pedestal lavatory with rectangular basin, splash lip and enameled brackets.

Trimmings: M10 *Securo* metal spout compression supply and quick draining direct lift waste fixture with renewable seats.

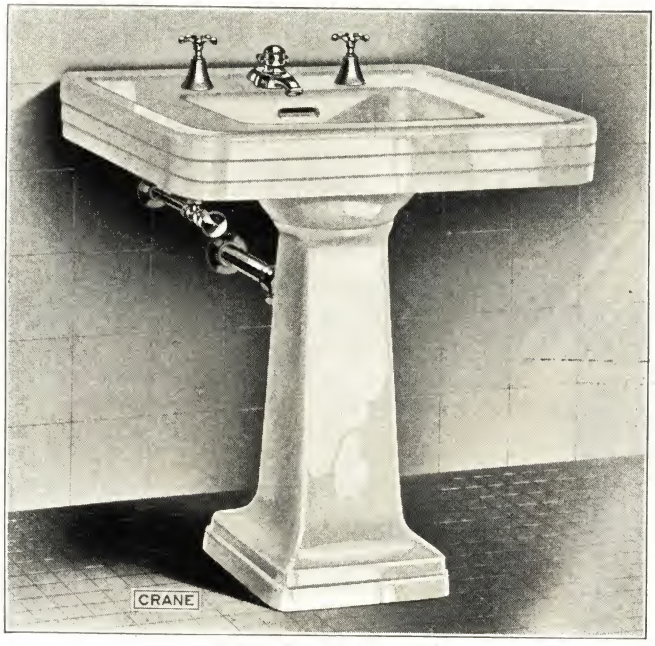
Supplies: ⅜-in. angle supplies with stops.

Trap: 1¼-in. brass "P" trap.

Finish: Nickel plated or chromium plated.

Size of lavatory .....in. 24x21 27x22 30x24
Size of basin .....in. 16x11 17x12 18x13½

If wanted with oval basin, specify C 256-M10 *Ipswich.*



C 220-L3 (Patented)

Lavatory: Crane *Corwith* vitreous china pedestal lavatory with rectangular basin, splash lip and enameled brackets.

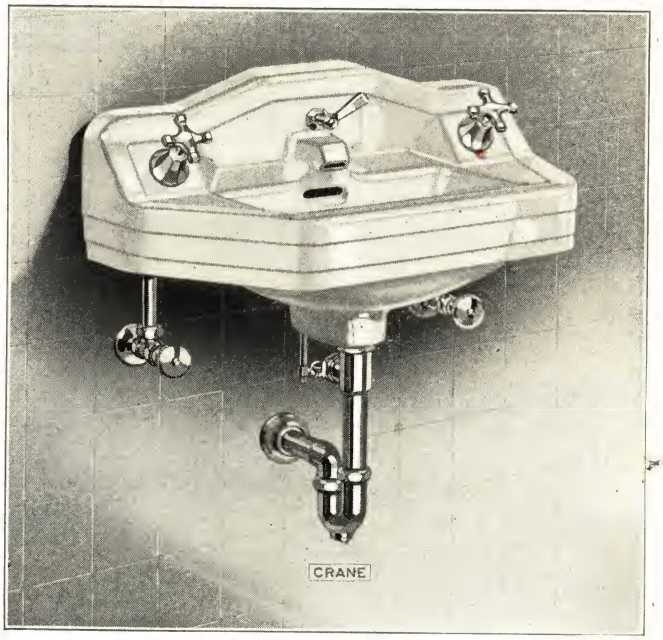
Trimmings: L3 Lever Action *Securo* metal spout compression supply and quick draining, direct lift waste fixture with renewable seats.

Supplies: ⅜-in. angle supplies with stops.

Trap: 1¼-in. brass "P" trap.

Finish: Nickel plated or chromium plated.

Size of lavatory.in. 24x21 27x22 30x 24 33x 24 36x 24
Size of basin ...in. 16x11 17x12 18½x13 18½x13 18½x13



C 640—Design 40

Lavatory: Crane *Cromwell* vitreous china lavatory with raised integral spout, 5¼-in. high back, panels for supply valves, rectangular basin with splash lip.

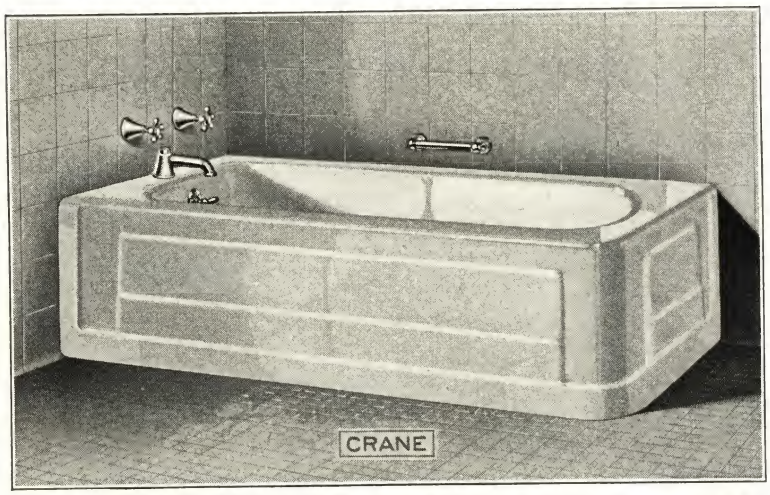
Trimmings: Chromium plated Design 40 Octagonal integral spout compression supply fixture with renewable seats; chromium plated Design 40 Octagonal pop-up waste through back.

Supplies: ⅜-in. chromium plated angle supplies with stops.

Trap: 1¼-in. chromium plated brass "P" trap.

Size of lavatory.....in. 26x14
Size of basin.....in. 16x 9¾

ENAMELED BATHS



C 3205-LF51—Left-hand Corner, Left-hand Outlet (Illustrated)
C 3205-RF51—Right-hand Corner, Right-hand Outlet

C 3205-LF51
C 3205-RF51

Bath: Crane *Marshall* enameled corner bath with slope end.

Fixture: F51, ¾-in. concealed compression supply fixture with through-rim spout and renewable seats; 2-in. *Accesso* concealed pop-up waste and overflow.

Finish: Nickel plated or chromium plated.

Dimensions:

Nominal size	ft.	5½
Length over all	in.	68
Width over all	in.	36¼
Depth inside	in.	17

Marshall, Corwith, and *Tarnia* baths are furnished in regular or acid-resisting white or colored enamel. Where colored baths are specified CRANE Co. recommends all-metal trimmings in chromium plated finish.

C 3308-LD71
C 3308-RD71

Bath: Crane *Corwith* enameled recess bath with slope end.

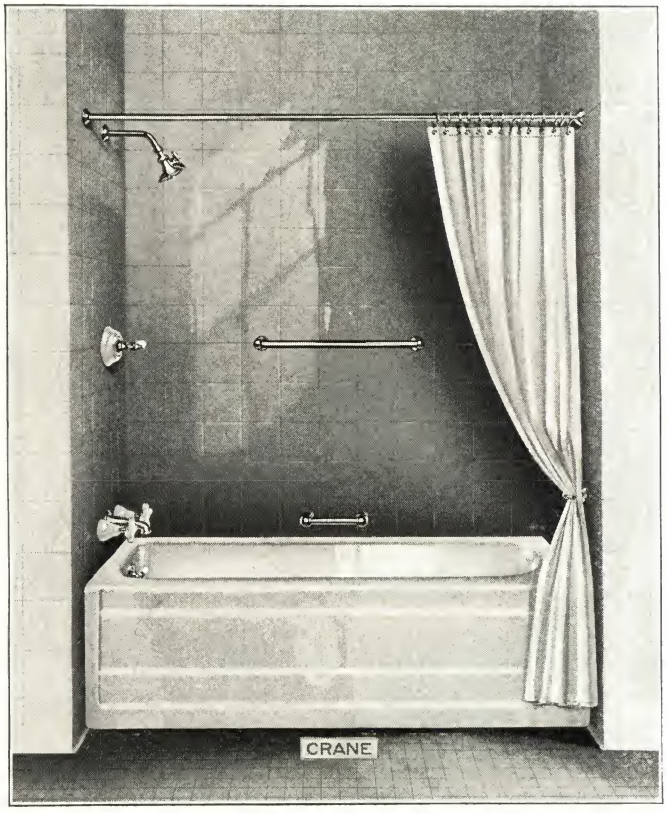
Fixture: D71, ½-in. concealed mixing valve shower and compression overrim supply fixture with 6-in. spout and renewable seats; shower head with removable face, integral volume regulator and adjustable ball joint; 1½-in. *Accesso* concealed pop-up waste and overflow.

Curtain: 8-oz. white duck curtain; 1-in. O.D. brass straight curtain rod with snap and hold back hooks.

Finish: Nickel plated or chromium plated.

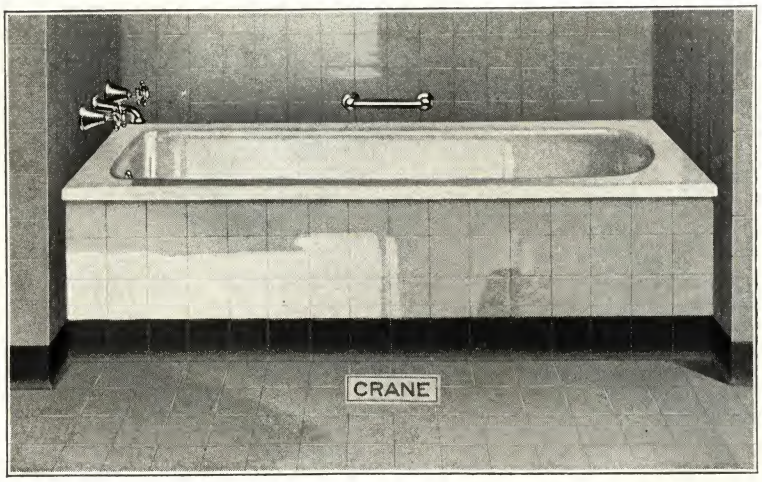
Dimensions:

Nominal sizes	ft.	4½	5	5½	6
Length over all	in.	54	60	66	72
Width over all	in.	30½	30½	30½	30½
Depth inside	in.	17	17	17	17



C 3308-LD71—Left-hand Outlet (Illustrated)
C 3308-RD71—Right-hand Outlet

C 3336-F30—Left-hand Outlet (Illustrated)



C 3336-F30

Bath: Crane *Tarnia* enameled reversible bath with slope end.

Fixture: F-30, ½-in. concealed compression overrim supply fixture with renewable seats; 1½-in. concealed connected waste and overflow with beaded chain and solid rubber stopper.

Finish: Nickel plated or chromium plated.

Dimensions:

Nominal sizes	ft.	5	5½	5½	6
Length over all	in.	60¾	67	67½	73½
Width over all	in.	32	32	36¼	32
Depth inside	in.	17	17	17	17

Note: Tarnia bath is illustrated with tile, but no tile is furnished.

SHOWERS

C 4360-B

C 4360-B
(Patented)

Mixing Valve: Crane ½-in. concealed mixing valve with renewable seats.

Stops: ½-in. concealed screw-driver stops with renewable seats.

Head: 4-in. brass shower head with adjustable ball joint, removable face and ½-in. I.P.S. & W. bent arm to wall.

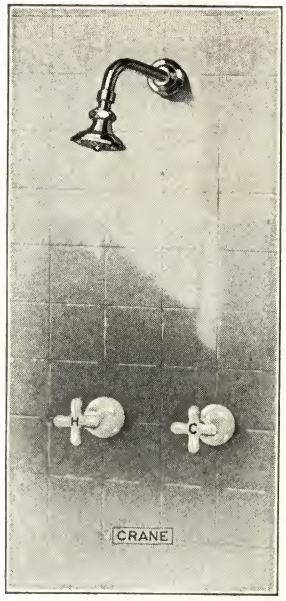
Finish: Nickel plated or chromium plated.

C 4400-B

Valves: Crane ½-in. concealed by-pass pattern supply valves with renewable seats.

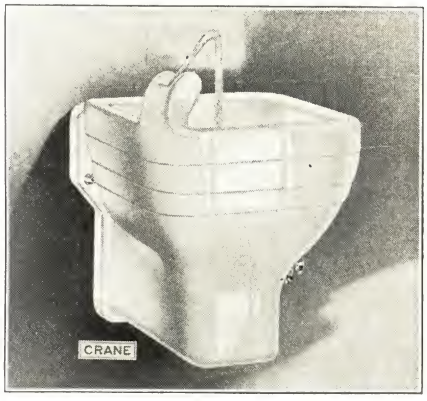
Head: 4-in. brass shower head with adjustable ball joint, removable face and ½-in. I.P.S. & W. bent arm to wall.

Finish: Nickel plated or chromium plated.



C 4400-B

VITREOUS CHINA DRINKING FOUNTAINS



C 9055

C 9055

Fountain: Crane *Corwith* vitreous china wall drinking fountain with integral strainer and raised integral angle stream non-squirting bubbler.

Supply: Supply fittings with *Crane Automatic Stream Regulator, Triumph* ball-bearing self-closing valve with renewable seat and screw-driver stop with ⅜-in. female iron pipe inlet.

Waste: 1¼-in. galvanized "P" trap.

Screws: Brass screws with cap nuts and washers.

Finish: Nickel plated or chromium plated.

Width, over all	in.	12
Projection, wall to front	in.	13
Depth of receptor, inside	in.	3

The Crane *Corwith* vitreous china wall drinking fountain is the latest addition to the *Corwith* group. Being 12 in. wide and projecting only 13 in. from the wall, it is ideal for installation where space is a factor.

The *Crane Automatic Stream Regulator,* regularly furnished with all Crane drinking fountains, is of the balanced valve, diaphragm type and automatically maintains a constant height drinking stream under varying water pressures. It is so designed that all water entering it is delivered to the bubbler without affecting the height of the drinking stream regardless of the variation in pressure under which the water is supplied. No water is discharged into the waste line to maintain this constant height drinking stream.

The raised integral angle stream non-squirting bubbler is located above the rim of the receptor, therefore, the possibility of contaminating the water supply through back-siphonage is eliminated. A lip guard prevents the lips from touching the china spout and a protecting hood prevents saliva or foreign matter from falling back into it. The china spout is arranged with a non-squirting feature, so constructed that fingers cannot be placed directly upon the supply spout. This bubbler conforms with the requirements of the American Public Health Association and is approved by the Chicago Department of Health.

C 9260

Fountain: Crane *Cristal* vitreous china recessed drinking fountain with raised integral angle stream non-squirting bubbler.

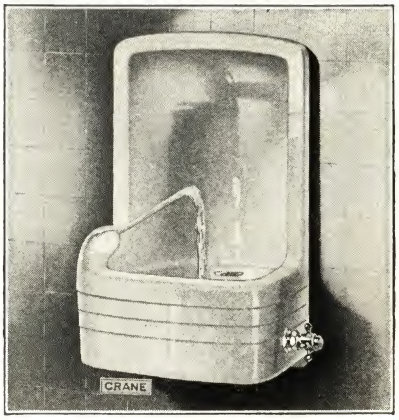
Supply: Supply fittings with *Crane Automatic Stream Regulator, Triumph* ball-bearing self-closing valve with renewable seat and screw-driver stop with ⅜-in. female iron pipe inlet.

Strainer: Brass open strainer with 1¼-in. O.D. tailpiece.

Screw: Brass supporting screw with cap cut and washer.

Finish: Nickel plated or chromium plated.

Width, over all	in.	14
Height, over all	in.	26
Projection, wall to front	in.	7
Recess in wall	in.	4½

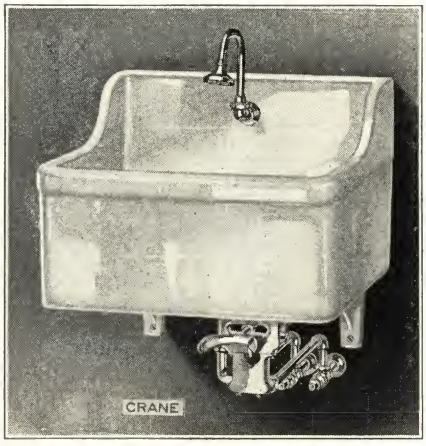


C 9260

CRANE HOSPITAL SERVICE

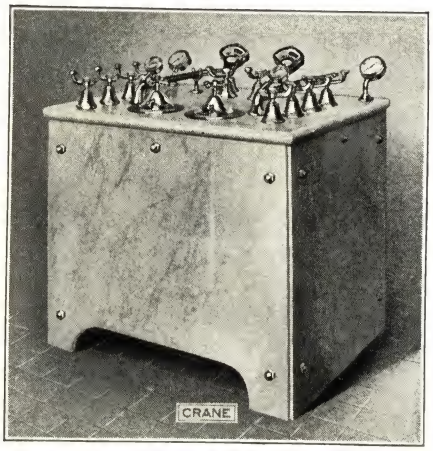
The Hospital Plumbing Fixtures illustrated below are representative of the complete Crane service to hospitals.

You are urged to refer to Crane Hospital Service No. 620-C for illustrations of the complete line. In it you will find that plumbing and heating fixtures, valves, fittings, and specialties for each department from the boiler room to hydrotherapeutic room are discussed. Floor plans by leading architects, typical installations in famous institutions are illustrated.

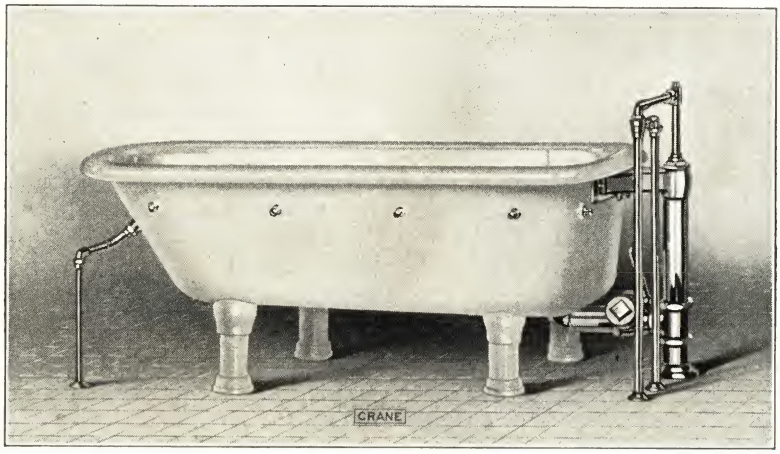


C 5650—"Mayo" Wash-up Sink

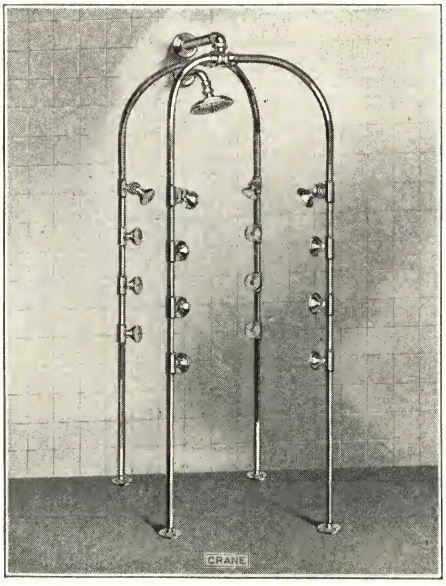
C 6330-A—Hydro-Sitz Bath



C 6101—Italian Marble Control Table



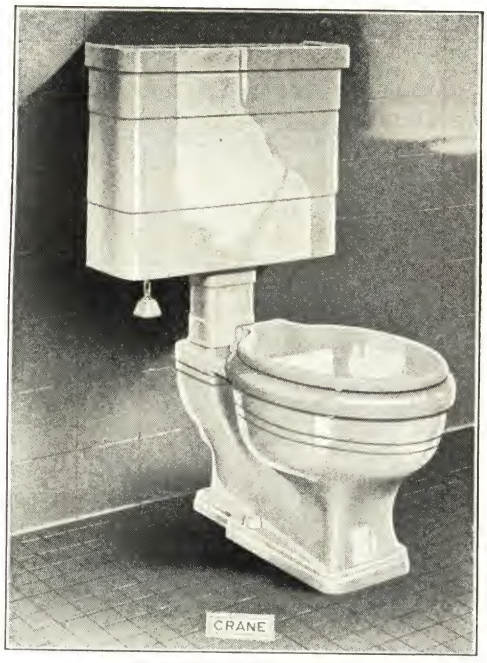
C 6262-A—Continuous Flow Bath



C 6351—Hydrotherapeutic Shower

C 7130—"Mt. Sinai" Service Sink

VITREOUS CHINA CLOSETS



C 10380 (Patented)

Closet: Crane *Corwith* vitreous china quiet-acting siphon jet closet with 11x16-in. elliptical rim opening.
Tank: Corwith vitreous china extra large back supply tank with shelf cover, quiet-acting flush and float valves with integral stop and straight china flush connection.
Seat: All white closed front elliptical seat and cover with concealed hinge.
Bolt caps: Square china bolt caps.

C 10554

Closet: Crane *Santon* vitreous china siphon jet closet with 10x15-in. elongated rim opening.
Tank: Ipswich 8-gal. vitreous china back supply tank with shelf cover, integral stop and offset china flush connection.
Seat: All white closed front elongated seat and cover with concealed hinge.
Bolt caps: China bolt caps.

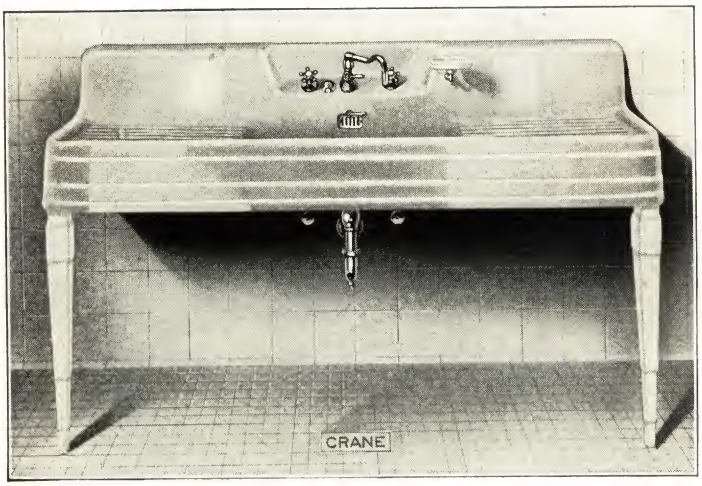
C 10570

Closet: Crane *Santon* vitreous china siphon jet closet with 10x15-in. elongated rim opening.
Valve: Water Controlled flushing valve with 1-in. straight-way stop.
Seat: Ebony finish hard rubber open front elongated seat with moulded rubber check hinge.
Bolt caps: China bolt caps.
Finish: Nickel plated or chromium plated.

C 10312

Closet: Crane *Rapidway* vitreous china top inlet blowout wall closet with jet and 10x15-in. elongated rim opening.
Valve: Water controlled flushing valve with 1-in. angle stop.
Seat: Ebony finish hard rubber open front elongated seat with moulded rubber check hinge.
Hanger: Hanger unit for iron pipe.
Finish: Nickel plated or chromium plated.
Rapidway closets require a minimum of 15 lbs. water pressure at the valve.

ENAMELED SINKS



C 19168-PA (Patented)

C 19168-PA

Sink: Crane *Corwith* enameled double drainboard apron sink with 8-in. back, 8-in. apron and 8-in. deep sink; concealed hangers and enameled legs.

Fixture: ½-in. chromium plated concealed compression double supply fixture with swinging spout, transfer valve, concealed hose with 1½-in. rubber bound spray, and renewable seats.

Waste: Chromium plated pop-up waste and overflow with large removable cup strainer.

Soap Dish: Removable china soap dish with chromium plated brackets.

Supplies: ½-in. chromium plated angle supplies with stops.

Trap: 1½-in, chromium plated brass "P" trap.

Dimensions:

Nominal overall sizes	in.	60x24	74x24
Length over all	in.	60¾	73¾
Width over all	in.	24¼	24¼
Size of sink (inside)	in.	22x18	26x18

C 19176-SD

Sink: Crane *Corland* enameled double drainboard apron sink with 8-in. back, 8-in. apron and 8-in. deep sink; concealed hangers and enameled legs.

Faucet: ½-in. *Agilis* quick compression double faucet with swinging spout, china soap dish, transfer valve, hose with spray, renewable seats, and china hose rest.

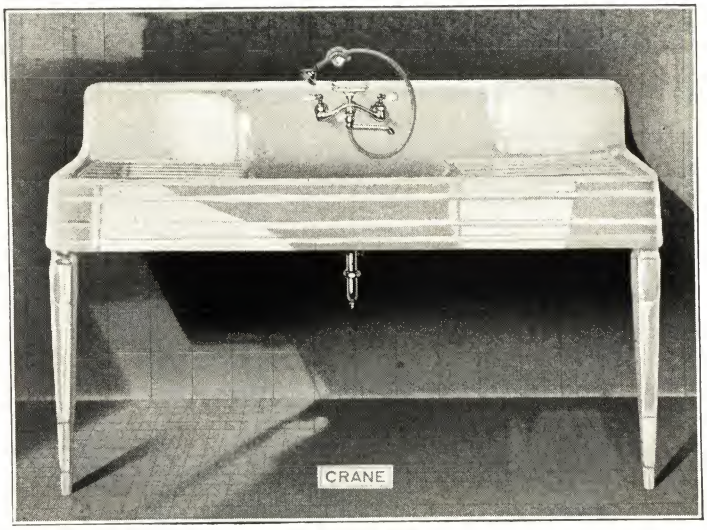
Waste: Chromium plated *Dual* hand operated waste with large removable cup strainer.

Trap: 1½-in. brass "P" trap.

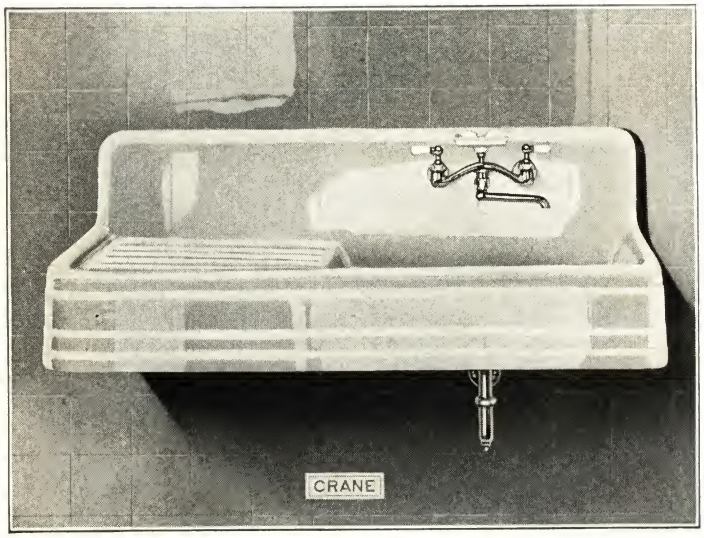
Finish: Nickel plated or chromium plated.

Dimensions:

Nominal over-all sizes	in.	60x24	74x24
Length over all	in.	60⅝	74⅝
Width over all	in.	24¼	24¼
Size of sink (inside)	in.	22x18	26x18



C 19176-SD



(Patented)

C 19179-LJD—Left-hand Drainboard (Illustrated)
C 19179-RJD—Right-hand Drainboard

C 19179-LJD
C 19179-RJD

Sink: Crane *Corland* enameled single drainboard apron sink with 8-in. back, 8-in. apron and 8-in. deep sink; concealed hangers.

Faucet: ½-in. *Agilis* quick compression double faucet with renewable seats, swinging spout and china soap dish.

Waste: Chromium plated *Dual* hand operated waste with large removable cup strainer.

Trap: 1½-in. brass "P" trap.

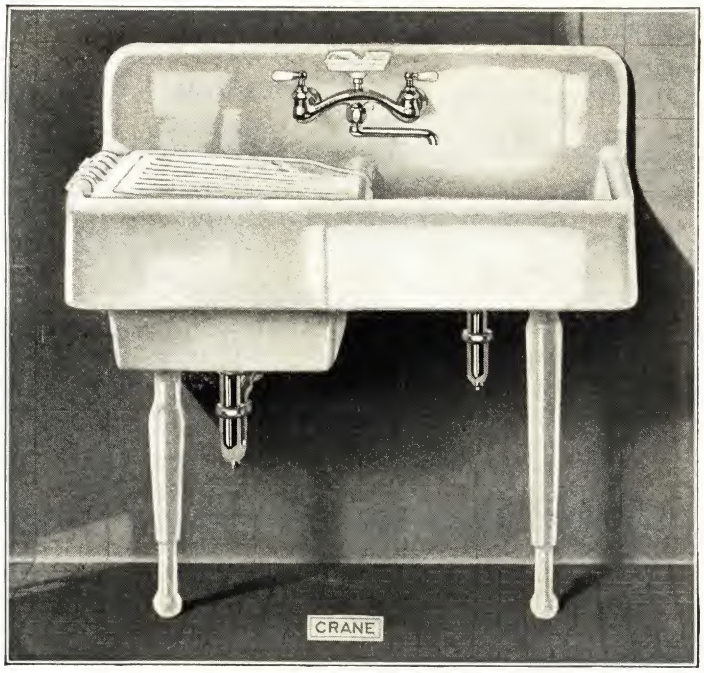
Finish: Nickel plated or chromium plated.

Dimensions:

Nominal over-all sizes	in.	42x22	52x24
Length over all	in.	42¾	52¾
Width over all	in.	22¼	24¼
Size of sink (inside)	in.	20x16	26x18

Corwith and *Corland* sinks are furnished in regular or acid resisting white or colored enamel. Where colored sinks are specified, CRANE Co. recommends all metal trimmings in chromium plated finish.

ENAMELED COMBINATION SINK AND LAUNDRY TUB



C 21110-LD—With Left-hand Tub (Illustrated)
C 21110-RD—With Right-hand Tub

C 21110-LD
C 21110-RD

Sink and Tub: Crane regular enameled combination sink and laundry tub with 8-in. back, 8-in. apron and 8-in. deep sink; concealed hangers and painted legs.

Faucet: ½-in. *Agilis* quick compression double faucet with swinging spout, soap dish, and renewable seats.

Waste: Dual hand operated waste with large removable cup strainer in sink; waste plug with stopper in tub.

Traps: 1½-in. brass "P" traps.

Drainboard: Interchangeable acid-resisting enameled steel drainboard.

Finish: Nickel plated or chromium plated.

Furnished in regular or acid resisting enamel.

Dimensions:

Nominal size....in.	36x22	42x22	50x22
Length over all....in.	36½	42½	50½
Width over all....in.	22¼	22¼	22¾
Depth of tub, (inside)....in.	14	14	14

ENAMELED LAUNDRY TUB

C 21191

Tub: Crane enameled two-compartment laundry tub with 8-in. back, painted legs and concealed hangers.

Faucet: ½-in. *Agilis* quick compression double faucet with swinging spout, china soap dish, and renewable seats.

Chainstays: Brass chainstays with chains.

Waste: Brass waste plugs with stoppers; 1½-in. brass continuous waste.

Trap: 1½-in. brass "P" trap with female I.P. outlet.

Wringer Base: Hardwood wringer base.

Finish: Nickel plated or chromium plated.

Furnished in regular or acid resisting enamel.

Dimensions:

Nominal size....in.	52x26
Length over all....in.	52½
Width over all....in.	26¼
Height of apron....in.	5½
Depth (inside)....in.	14
Size of tubs, (inside)....in.	23x22

C 21191

190 BRANCHES AND SALES OFFICES TO SERVE YOU

The fixtures shown on these pages give only a small idea of the comprehensiveness of the Crane line, for this contains complete groups of appointments especially designed for the requirements of institutions, public buildings, hotels, clubs, homes, trains, and ships.

The completeness of this line, the high degree of engineering skill that has been developed by CRANE Co., and its vast manufacturing resources have been made available throughout the world by the maintenance of 190 branches, sales offices, and exhibit rooms.

No matter what your plumbing problem may be, at the nearest Crane Branch you will find the materials and the knowledge to solve it. If it is inconvenient for you to visit a branch, you are urged to write CRANE Co.

THE CONOVER COMPANY

140 South Dearborn Street, CHICAGO, ILL.

DISTRICT OFFICES

NEW YORK, N. Y., 101 Park Ave. (Architects Bldg.) PHILADELPHIA, PA., 1700 Walnut St. BOSTON, MASS., 115 Chauncy St.

FACTORY REPRESENTATIVE OFFICES

DETROIT, MICH., 402 Book Bldg. SPRINGFIELD, MASS., 8 Hillman Court PROVIDENCE, R. I., 412 New Industrial Trust Bldg.

THE CONOVER ELECTRIC DISHWASHER SINK

For residences and apartments

Conover Dishwashers

THE CONOVER COMPANY specializes in the manufacture of household electric dishwashers, and has been a pioneer in the development of practical electric dishwashers for the home. Besides the electric dishwasher sinks described here and sold exclusively by plumbing contractors supplied by accredited plumbing supply wholesalers, THE CONOVER COMPANY manufactures portable electric dishwashers which are sold exclusively through the electrical trade.

Prices, Installation Estimates, etc.—For prices and installation estimates, apply to plumbing contractors; for catalogues, installation blue prints and color samples, write to THE CONOVER COMPANY.

Operation

The Conover washes, rinses and dries dishes quicker and cleaner than they can be done by hand.

Principles—The Conover dishwashing unit is the impeller type. The elements of the dishwashing job are: Abrasion, by millions of globules of softened soapy water thrown against the dishes with great force by the impeller; the melting of greases and dissolving of sugars by hot water; and the removal of food particles, floated off in the soap emulsion.

Ease—The Conover Electric Dishwasher Sink is easily operated. The flexible rubber-plated dishracks are easily loaded. The water is measured automatically and softened as it flows into the dishwasher. Two tablespoonfuls of ordinary soap flakes and a teaspoonful of water softener are used, producing a creamy suds. The dishes are washed for five minutes in hot soapsuds. Soiled water is drained at the turn of a lever and then dishes are rinsed for one minute with softened hot water and for one minute with clear hot water. The dishes are then so hot that they dry almost immediately when the cover is opened.

Endorsement

All Conover models are approved by Good Housekeeping Institute and Delineator Institute. The Conover is endorsed by thousands of satisfied users.

Distinctive Features

Self-cleansing—Conover Dishwasher requires no hand cleansing.

Rubber-plated Dishracks—Insure quiet operation and avoid chipping of dishes.

Large Flexible Capacity—Holds 55 pieces of china and glassware plus silverware.

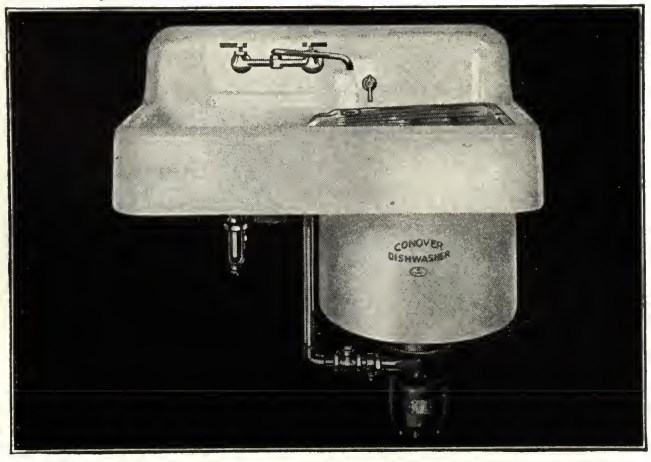
Sliding Drainboard Top of Chrome Alloy Stainless Steel—Gives use of Drainboard at all times, and makes loading easier. Retains luster and matches chrome fittings.

Rotary Pump Discharge—Centrifugal pump directly connected to impeller wash and rinse water into sink for draining through regular sink outlet.

Automatic Overflow Water Measuring System—Excess water overflows through pump discharge into sink, giving easily visible indication that the correct amount of water is being used.

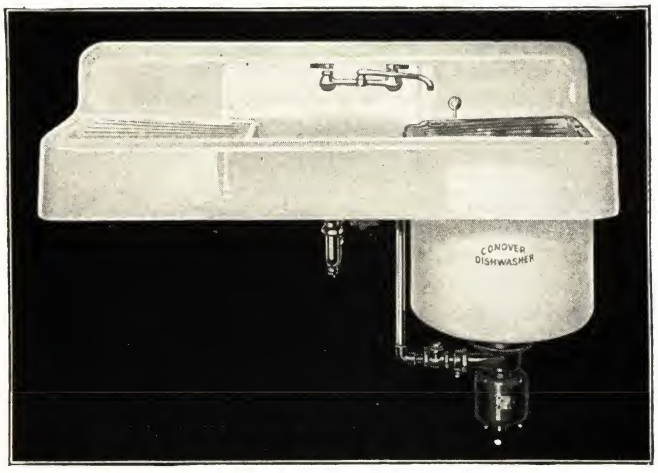
No Gears or Belts—The impeller and pump are attached directly to the motor shaft.

Only One Trap Required—All sink models of the Conover Electric Dishwasher drain directly into the sink. Only one trap, set at regular height for an ordinary sink, is required. There can be no drainage back into the dishwasher.



Model SD-501R Single Drainboard

Specifications—Conover Model SD-501 (R or L) 43x25-in. Combination Electric Dishwasher and single drainboard 3-8s apron style sink; finished in porcelain enamel, either regular or acid-resisting in white, green, ivory or blue; with wall hangers; impeller type dishwasher; rotary pump discharge; automatic overflow water measuring system; low starting current ¼ hp., 110 volt, 60 cycle a-c. motor; direct drive; rubber-plated dishracks and stainless steel sliding drainboard-dishwasher cover; unit equipped to install with single ordinary "P" or "S" trap at regular height; switch and wiring intact on machine. Weight ready to hang, 335 lb. (9-in. swing spout mixing faucet, sink strainer, trap and legs extra)



Model SD-503R Double Drainboard

Specifications—Conover Model SD-503 (R or L) 62½x25½-in. Combination Electric Dishwasher and double drainboard 3-8s apron style sink; finished in porcelain enamel, either regular or acid-resisting in white, green, ivory or blue; with wall hangers; impeller type dishwasher; rotary pump discharge; automatic overflow water measuring system; low starting current ¼ hp., 110 volt, 60 cycle a-c. motor; direct drive; rubber-plated dishracks, stainless steel sliding drainboard-dishwasher cover, and stationary enamel drainboard; unit equipped to install with single ordinary "P" or "S" trap at regular height; switch and wiring intact on machine. Weight ready to hang, 460 lb. (9-in. swing spout mixing faucet, sink strainer, trap and legs extra)

VARIANTS AND SIZES

Finish—All models are furnished in regular or acid-resisting vitreous enamel in white, green, ivory or blue.

Location of Dishwasher Unit—All models are furnished with the dishwasher unit on either the right or left side as one faces the sink. The letter R after the model number denotes dishwasher is at the right; L denotes dishwasher at left.

Motor—A ¼-hp. 110-volt, 60-cycle a-c. split-phase reactor type motor is supplied as standard equipment on all models. This motor meets utility companies' requirements for low starting current. Motors of other current specifications can be supplied as specified at a slight additional cost. Switch and wiring are completely intact on machine with outlet box and 34-in. of flexible cord to plug into wall socket under sink. BX can be attached directly to Conover outlet box if this is a local requirement.

Sink Strainer—Ordinary sink strainer is standard on all models. Sinks cast to take a double strainer can be supplied.

Three-water Faucet—Sinks can be furnished drilled for three-water faucets.

DIMENSIONS IN INCHES

Model	Length, in.	Width, in.	Size of metal drainboard, in.	Tank diameter, in.	Sink size, in.	Sink depth, in.	Back, in.	Front, in.
SD-501	43	25	19x19½	21	17x20½	7½	8	8
SD-502	43	25	19x19½	21	17x20½	7½	flat rim	flat rim
SD-503	62½	25½	19x19½*	21	17x20½	7½	8	8

*Model SD-503 also has a stationary enamel drainboard 18x19½ in.

DESCRIPTION OF PARTS

(1) *Hot Water Control* on sink mixer faucet.
(2) *Cold Water Control* on sink mixer faucet.
(3) *9-in. swing spout for use at the* sink and for filling the dish washer.
(4) *Ventilator and Water Inlet* to dishwasher tank for adding water softener and water through the drainboard.
(5) *Drain Valve Control Lever* for emptying wash and rinse water.
(6) *Rubber-plated Cup and Glass Rack.*
(7) *Rubber-plated Upper Dishrack* for small flat dishes, such as: bread and butter plates or tea saucers.
(8) *Silver Rack* for supporting the silverware in a vertical position. Easily removed and loaded.
(9) *Rubber-plated Lower Dishrack* for large dishes, such as: soup plates, dinner plates, salad plates, sauce dishes, etc.
(10) *Aluminum Bronze Impeller* which rotates at high speed, picking up hot sudsy water and throwing it over the fronts and the backs of the dishes. Direct drive, non-leakable unit, no gears or belts to require service.
(11) *Movable Drainboard* of highly polished chrome alloy, stainless steel. Easy to keep clean—retains luster. Acts as cover for dishwasher as well as work space on the sink.

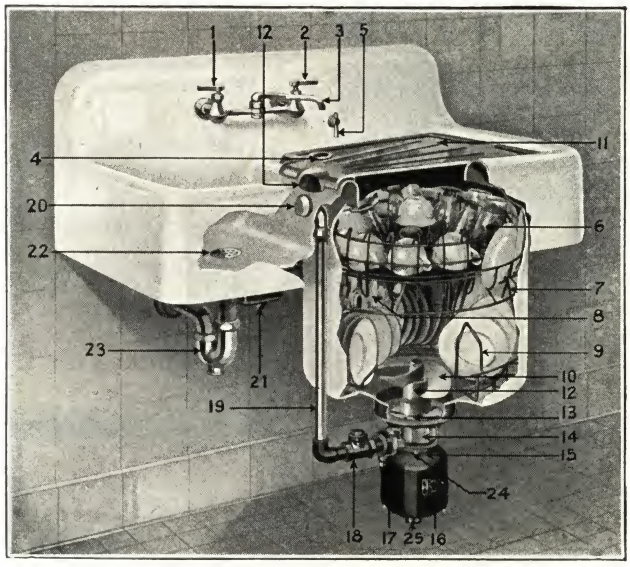
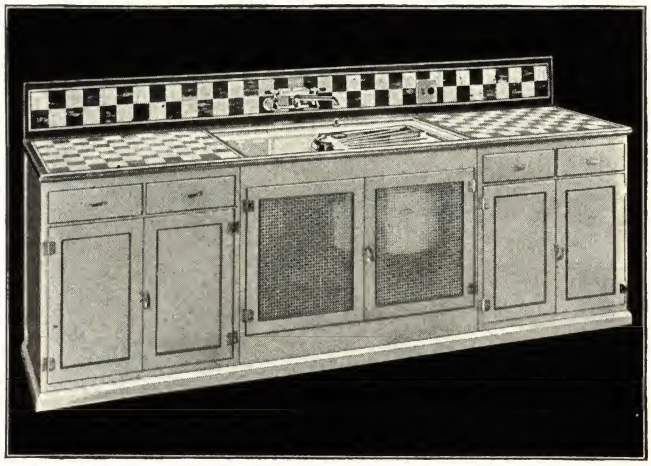


Diagram and Schedule

(12) *Overflow Measuring Device* which automatically controls the amount of water used for the washing and rinsing operations, the excess water being pumped out of the dishwasher tank into the sink.
(13) *Drain Holes* through which the dishwasher tank is drained when the drain lever, No. 5, is turned to the open position.
(14) *Rotary Centrifugal Ejector* for emptying the wash and rinse waters from the dishwasher tank.
(15) *Rubber Cushions* between motor and tank for the prevention of noise.
(16) *¼ Hp. Motor* for driving impeller and ejector. When ordering specify current, volts, and cycles required.
(17) *Emergency Drain Plug.*
(18) *Horizontal Check Valve* prevents the waste water from sink backing into dishwasher.
(19) *Chrome Plated Vertical Drain Tube.*
(20) *Outlet Cover of chrome-alloy stainless steel* to prevent water splashing when being discharged into the sink.
(21) *Motor Toggle Switch* (meets Underwriters' requirements).
(22) *Ordinary Sink Strainer.*
(23) *Ordinary Sink Trap.*
(24) *Oil Hole for Upper Motor Bearing.*
(25) *Oil Hole for Lower Motor Bearing.*

Model SD-502R Flat Rim Style

Specifications—Conover Model SD-502 (R or L) 43x25-in. Combination Electric Dishwasher and flat rim sink; finished in porcelain enamel, either regular or acid-resisting in white, green, ivory or blue; impeller type dishwasher; rotary pump discharge; automatic overflow water measuring system; low starting current ¼ hp., 100 volt, 60 cycle a-c. motor; direct drive; rubber-plated dishracks and stainless steel sliding drainboard-dishwasher cover; unit equipped to install with single ordinary "P" or "S" trap at regular height; switch and wiring intact on machine (but wall switch may be used if desired). Weight ready to hang, 215 lb. (9-in. swing spout mixing faucet, sink strainer and trap extra)



Model SD-502R Typical Installation

This is a typical Conover flat rim sink installation with stock cabinet bases and linotile covered maple work tops. The sink is supported on a wooden cradle on which is screwed 2x$\frac{3}{16}$-in. steel strips. The sink edge is encased in an extruded rubber gasket, and the work top, which is recessed on the bottom to fit the sink, is drawn down on the gasket by means of screws through the steel strips. This prevents any leakage at the junction of sink and work top. Model SD-502 is equally appropriate for cabinet installations with glazed and unglazed porcelain tile, plastic cement, rubber-tile or metal work tops. Blue prints of installation details can be obtained from THE CONOVER COMPANY

THE D. A. EBINGER SANITARY MFG. CO.

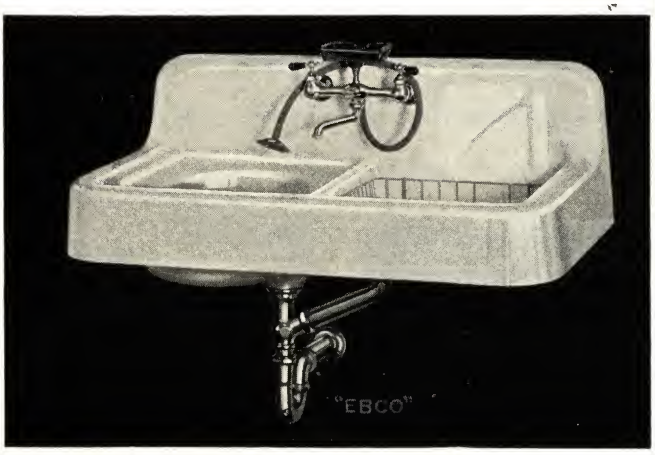
Manufacturers of "Ebco" Dish Washing Sinks

COLUMBUS, OHIO

Product

"Ebco" Dish Washing Sink.

For "Ebco" Wash Sinks and Sanitary Drinking Fountains, see Manufacturers' Index.



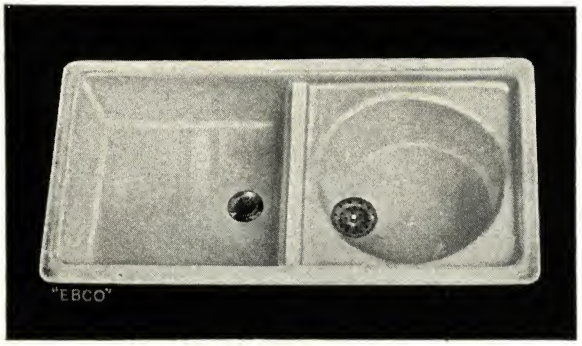
"Ebco" Two-compartment Sink

Model L-151 round compartment at left.
Model R-152 round compartment at right.
Furnished with or without legs and in white or colors. Equipped with lift waste

"Ebco" Dish Washing Sink

Tested and Approved by Good Housekeeping Institute 2705 Good Housekeeping Magazine

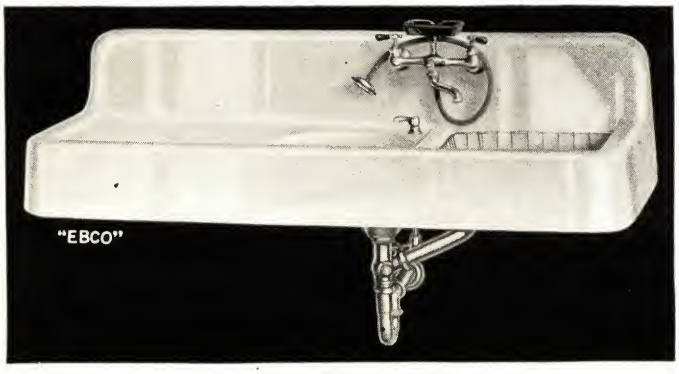
Washing dishes, preparing fruits, vegetables and meats and numerous other kitchen duties are not the tedious, tiresome tasks when performed with the aid of the built-in dish pan of the "Ebco" Kitchen Sink. Beautiful in design and an assortment of colors: green, autumn brown, orchid, blue, old ivory, black and white, durable vitreous enamel or "Ebco" acid resisting enamel. Duo strainer, twin waste combination and wire drain basket complete an ensemble of utility features unsurpassed in any other kitchen sink.



"Ebco" Flat Rim Model

Model LR-141 Size 39¼x20⅛ in.
Model LR-131 Size 30x18 in.

A flat rim model "Ebco" Dish Washing Sink has been especially designed for tiled-in kitchen and kitchen cabinets. Finished in high grade vitreous enamel, white or colors. Also furnished with "Ebco" acid resisting enamel if desired. Equipment includes twin waste combination No. 111 and draining basket No. 105 for LR-141 and No. 104 for LR-131. Equipped with lift waste.

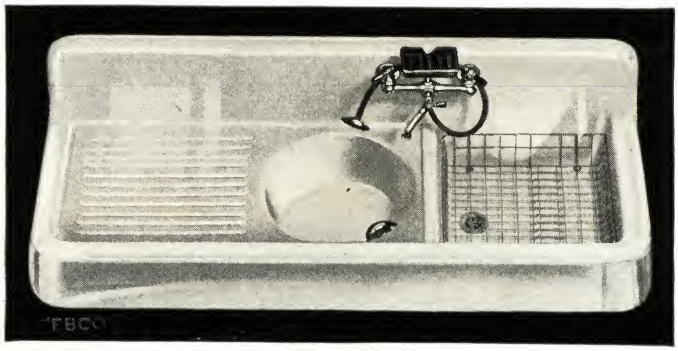


View of Model L-163

Dimensions

Length—60 in. Width—23 in. Height of back—8 in.
Dish Washing compartment—15½ in. diam., 8½ in. deep.
Draining compartment—17½x18 in., 7 in. deep.
Drainboard—17½ in. wide, 19 in. long.

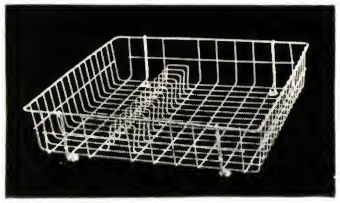
The model pictured above, L-163, is equipped with Duo waste outlet. The round compartment outlet has a special pop-up plug, and the square compartment has a waste strainer which is removable for easy cleaning and to prevent clogging. Note safety overflow feature in that the dividing wall between round and square compartments is below level of sink rim. Models with backs are obtainable with or without legs and with right or left dish pan.



Top View of Model L-165

Duo Strainer Twin Waste Combination

With lift plug No. 111



Draining Basket

Fits square compartment of sink

Catalogues

Write for catalogues on Circular Wash Sinks, Drinking Fountains, Steel Toilet Partitions, Kitchen Sinks, Water Coolers for mechanical refrigeration.

GENERAL PORCELAIN ENAMELING & MFG. CO.

OFFICE AND FACTORY
4135 Parker Avenue
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Member of Porcelain Enamel Institute

Veribrite

ONE-PIECE PORCELAIN ENAMELED SINK TOPS

ANY SIZE

Built for Any Space

No matter what grouping of kitchen cabinet units you may require—for new kitchens or old — Veribrite One-piece Porcelain Enameled Sink Tops are made to your order and can be fitted for any layout up to 132 inches in length. Splasher backs and ends of any height may be specified.

ANY COLOR

Modern Range of Colors

Use any tint or combination of colors in your kitchens. Veribrite Sink Tops are available in any color of the rainbow.

Colors cost no more than glistening white.

ANY STYLE

Styled to Harmonize

Veribrite Sink Tops, enameled with stainless porcelain on heavy gauge armco iron, are in harmony with any architectural style. *Cleanliness, Lasting Beauty and Durability* are outstanding features. No crevices to catch or hold dirt or mar the beauty of the finished installation.

Write us for descriptive literature, specification forms and name of nearest distributor.

THE INTERNATIONAL NICKEL COMPANY, INC.

Monel Metal and Nickel and Allied Products

EXECUTIVE OFFICES
67 Wall Street
NEW YORK, N. Y

MINES AND SMELTER: Copper Cliff, Ont., Canada
ROLLING MILL AND REFINERY: Huntington, W. Va.
REFINERY: Port Colborne, Ont., Canada
FOUNDRY: Bayonne, N. J.

For Our Other Products, see Manufacturers' Index
For Distributers, see our page on Metals

INCO MONEL METAL
TRADE-MARK

MONEL METAL STANDARDIZED KITCHEN SINKS

Architects have long employed Monel Metal for many purposes, such as ornamental metal work, institutional and hotel equipment, and custom-built domestic service equipment. The same properties that make Monel Metal so desirable for these uses are now available in a full line of standardized kitchen sinks, designed by Gustav Jensen and manufactured on a quantity basis at prices within reach of modest purses.

Properties of Monel Metal

Monel Metal possesses an exclusive combination of properties which make it well suited to sink construction. It possesses the strength and toughness of steel and is extraordinarily durable, resisting all corrosive agencies found in the home. It cannot rust and is solid clear through with no coating to chip, crack or wear off.

Appearance and Finish

Monel Metal has the appearance of fine old silver, which harmonizes with practically all colors. It retains its soft, mellow lustre indefinitely with ordinary cleaning. The satin finish standard on these Monel Metal sinks has been especially created to meet the demands of domestic service. It is reflective but not mirrorlike, lustrous but not too shiny—neither too bright nor too dull. No matter what decorative treatment is used, these attractive Monel Metal sinks harmonize perfectly with their surroundings.

Construction

Sinks are of one-piece construction—solid, one-piece bowl invisibly welded to drainboards, splash-back and apron. 16-gauge U. S. Standard (.062 in.) Monel Metal is used throughout. The entire sink is reinforced with a welded steel framework sufficiently strong to take care of any strains. The metallic sound ordinarily associated with metal fixtures is eliminated by a ½-in. layer of sound-deadening material fastened to drainboards and splash-back and a special sound-deadening compound laid over the entire underbody.

Exclusive Features

Monel Metal construction permits use of a ½-in. rim around the drainboard, compared to the 2⅞-in. rim on ordinary sinks. The actual drainboard working surface is thereby increased by as much as 31%.

Recessed combination crumb cup and stopper of 20% Nickel Silver, located to catch drip of faucets. Sound-deadened and ribbed drainboards that are easy on fine china and glassware and minimize dish breakage. Adjustable wall brackets. These are some of the exclusive advantages offered by standardized Monel Metal sinks.

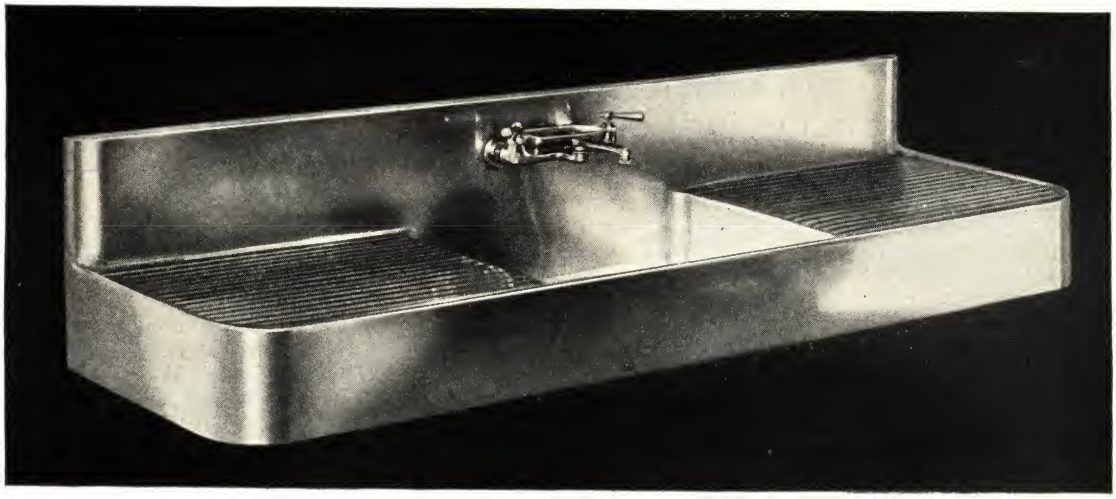
The Models—Six Sizes

On the following page is shown a range of models and sizes to meet normal requirements—double drainboard, single drainboard, and corner sinks.

Where to Buy

INCO standardized Monel Metal sinks are displayed and distributed throughout the United States and Canada by plumbing supply jobbers and plumbing contractors.

Also refer to our pages covering built-in cabinets with Monel Metal Sinks.



Double Drainboard Model Monel Metal Sink

Double Drainboard Model Monel Metal Sinks

Made in two models:
INCO S720—nominal size, 21x72 ins.
INCO S600—nominal size, 21x60 ins.

Model No.	Apron, 7 ins.		Bowl, 7 ins.	Back, 8 ins.
	Actual over all, ins.		Length of bowl, ins.	Length of drainboard, ins.
	width	length		
S720	21¼	72	25	23½
S600	21¼	60	20	20

Single Drainboard Model Monel Metal Sinks

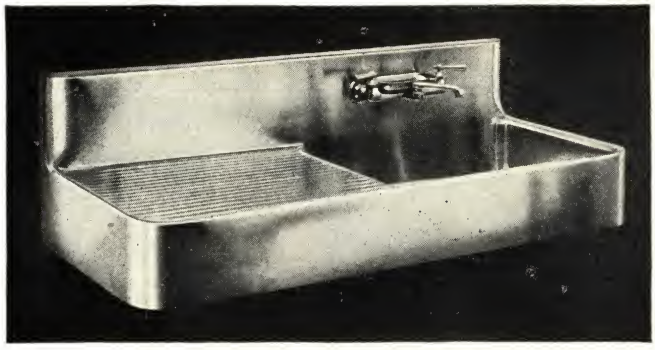
Made in four models:
INCO S495L, drainboard at left, nominal size, 21x50 ins.
INCO S495R, drainboard at right, nominal size, 21x50 ins.
INCO S410L, drainboard at left, nominal size, 21x41 ins.
INCO S410R, drainboard at right, nominal size, 21x41 ins.

Model No.	Apron, 7 ins.		Bowl, 7 ins.	Back, 8 ins.
	Actual over all, ins.		Length of bowl, ins.	Length of drainboard, ins.
	width	length		
S495L	21¼	49½	26	23½
S495R	21¼	49½	26	23½
S410L	21¼	41	21	20
S410R	21¼	41	21	20

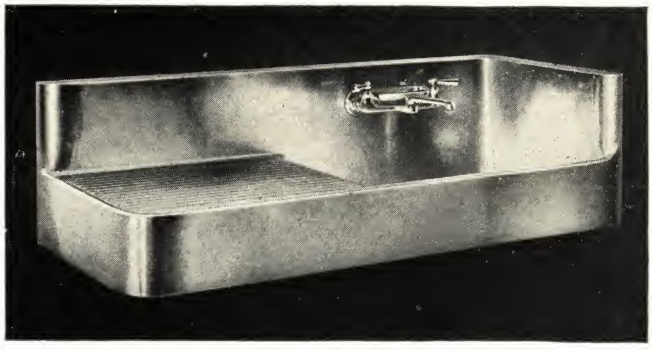
Single Drainboard Corner Model Monel Metal Sinks

Made in four models:
INCO S5075L, drainboard at left, nominal size, 21x51 ins.
INCO S5075R, drainboard at right, nominal size, 21x51 ins.
INCO S4225L, drainboard at left, nominal size, 21x42 ins.
INCO S4225R, drainboard at right, nominal size, 21x42 ins.

Model No.	Apron, 7 ins.		Bowl, 7 ins.	Back, 8 ins.
	Actual over all, ins.		Length of bowl, ins.	Length of drainboard, ins.
	width	length		
S5075L	21¼	50¾	27¼	23½
S5075R	21¼	50¾	27¼	23½
S4225L	22¼	42¼	22¼	20
S4225R	22¼	42¼	22¼	20



Single Drainboard Model Monel Metal Sink



Single Drainboard Corner Model Monel Metal Sink

20% NICKEL SILVER SINK FITTINGS

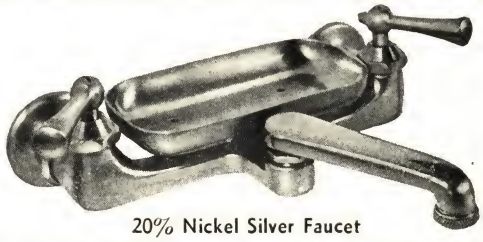
Combination Crumb Cup, Strainer and Stopper

A combination crumb-cup, strainer and stopper made of 20% Nickel Silver is standard equipment on the Monel Metal standardized sink. A turn of the cup seats the stopper firmly making the sink a water holding receptacle which can be used in place of a dishpan. The entire fixture sets below level of sink-bottom, giving full effectiveness to working area of bowl. All solid matter is caught in cup which can be removed for emptying. Water drain is extra large. Drain connection and trap are not supplied with sink.

20% Nickel Silver Combination Crumb Cup, Strainer and Stopper

Special Faucet

A special faucet made of 20% Nickel Silver, matching Monel Metal in color and finish has been designed for use with INCO standardized Monel Metal Sinks. The standard faucet is of the single swing spout type (illustrated). Like the sink itself, the solid white metal of these faucets wears indefinitely.



20% Nickel Silver Faucet

ZAHNER MANUFACTURING CO.

Manufacturers of All-metal Sinks

1213-1215 Walnut Street, KANSAS CITY, MO.

PRODUCTS DISTRIBUTED THROUGH PLUMBING SUPPLY JOBBERS

Products

ALL-METAL KITCHEN and PANTRY SINKS—99% pure solid nickel; also of monel metal or Allegheny metal (no wood backing).

Also Metal Cabinets.

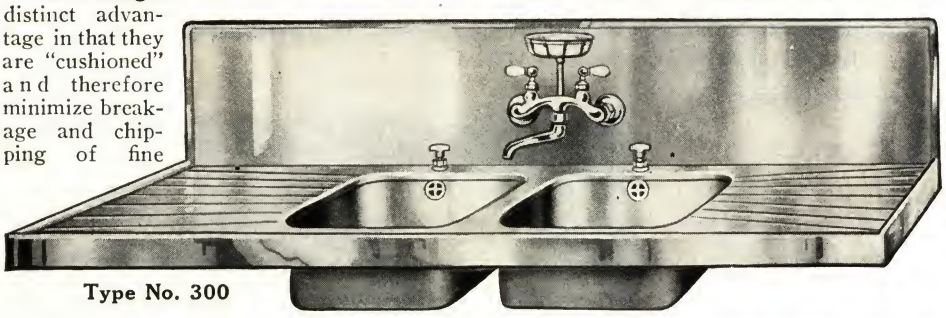
For our page on Shower Bath Doors, see Manufacturers' Index.

ZAHNER KANSAS CITY U.S.A. IS FOR QUALITY

TRADE-MARK

All-metal Sinks

Advantages—The metal drainboards and basins have a distinct advantage in that they are "cushioned" and therefore minimize breakage and chipping of fine china and crystal. No dish pan is required since the basins are of the most convenient size and shape for washing purposes.



Type No. 300

Material—Material is of heavy polished monel metal, 99% pure solid nickel or Allegheny metal. All stainless metals. Non-corrosive and everlasting.

Note: Specify whether sink wanted is to be of monel metal, 99% pure solid nickel or Allegheny metal.

Construction—All sinks are supported on rigidly constructed rectangular angle iron frames at sides and ends with cross angle braces under drainboards and between bowls. Over angle frames are heavy galvanized reinforcing plates for drainboards.

The bottoms of bowls are likewise reinforced with heavy galvanized plates. No wood backing or supports are used, thus eliminating shrinkage or warpage and deterioration in construction. Pop-up wastes, overflows, faucets, legs and brackets are of nickel plated brass. May be had chromium finish; if so wanted, so specify.

Drainboards and Splashbacks—Drainboards and splashbacks are made of one piece of metal. Drainage ribs are substituted for the customary grooves to facilitate ease of cleaning and rapidity of drainage. The entire drainboard pitches toward the basin.

Note: Any sink may be obtained with right, left, or both ends with splasher to fit in corner or between walls. Splashbacks may be arranged with flanges to turn up back of wall tile or may be eliminated entirely to take tile splashback if desired. They may also be constructed to accommodate piping between the splashback and the face of the wall. If required, so specify.

Basins or Bowls—Basins are made with extra large rounded vertical re-entrant angle. Basin bottoms are specially formed for quick positive drainage. All joints at drainboards and bottoms are locked and sweated tight with solder.

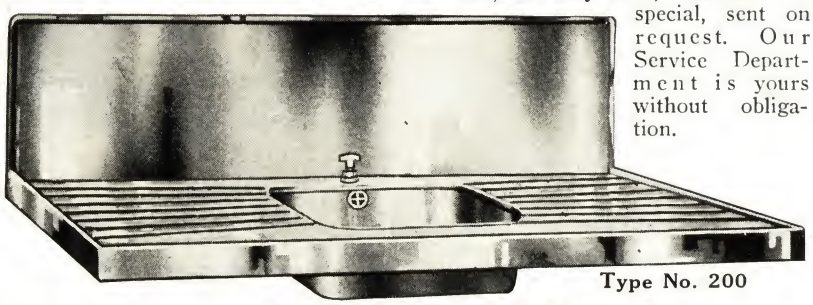
Standard Sizes—Any type, 6, 7, 8, 9, 10 and 12 ft. long x 24 in. (may be had any special size). All bowls for single-bowl sinks are 18x24x7 in. All bowls for two-bowl sinks are 15x18x7 in. All splash backs for type Nos. 200, 300, 400, 500, 550 and 600 are 12 in. high and lay flat against wall; for types Nos. 420, 440, 460, 480, 620, 640 and 660, are 8 in. high. All aprons are 8 in. except on Type Nos. 200 and 300 which are built to set over cabinets. Splashers or aprons may be had any size to fit any requirements.

Type Nos. 200 and 300 are used where it is desired to have cabinets under (see detail below). May be had any special size to meet any requirement.

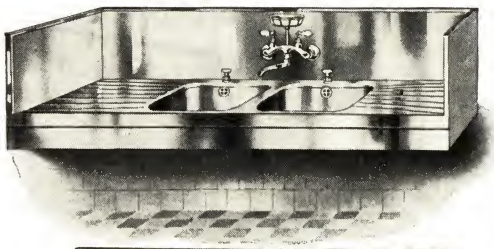
Wood Cabinets—For Types No. 200 and No. 300 sinks, build cabinets the customary way but without any tops or obstructions for bowls, and 1 in. less in depth than sink specified. For a 36-in. over-all working height build cabinets 34⅜ in. high. Sink apron overlaps cabinets ⅝ in.

Outlets—Pop-up valves with constant overflow are standard. Hand duo-strainers or lever control duo-strainers may be had; if so wanted, so specify.

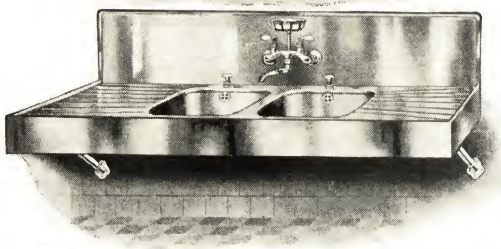
Catalogue and Blue Prints—Catalogue showing other types of sinks for kitchens, pantries, recreation rooms, hospitals, domestic science, scullery, etc.; also detailed blue prints, showing roughing-in measurements, etc., of any size, standard or special, sent on request. Our Service Department is yours without obligation.



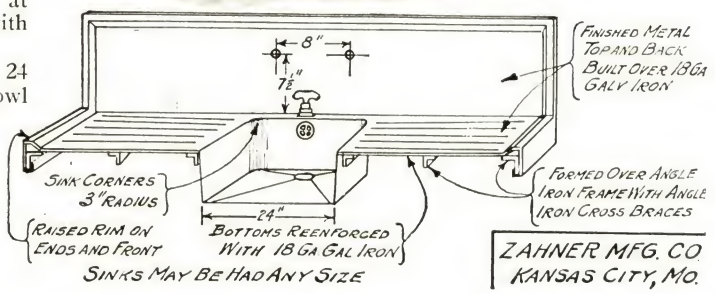
Type No. 200



Type No. 640



Type No. 400



THE D. A. EBINGER SANITARY MFG. CO.

Manufacturers of "Ebco" Wash Sinks

COLUMBUS, OHIO

Product

"Ebco" Circular Wash Sink.

For "Ebco" Dish Washing Sinks and Sanitary Drinking Fountains, see Manufacturers' Index.

"Ebco" Circular Wash Sink

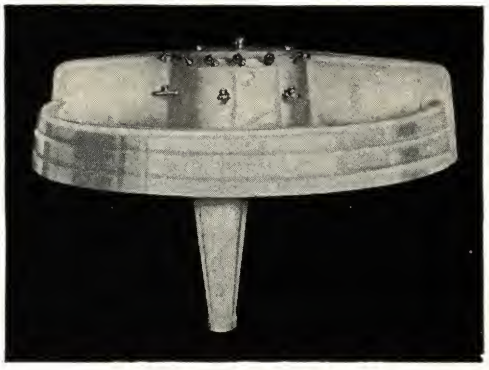
Conserves Floor Space—Space in factories is valuable. The circular wash sink requires considerably less space than the rectangular sink or individual basins. It reduces washing time because it is conveniently accessible from all sides.

Individual Control and Conserves Water—Each spray head is controlled by a valve integral with the spray which results in water economy, as only the actual users are being supplied. The total flow of water is only ½ gal. per minute through each spray. The concentrated spray insures a real wash.

Automatic Pressure Regulation and Temperature Control—The combination shown is typical of the water control apparatus on all "Ebco" models. Automatic pressure control insures uniform flow with one or ten users. The temperature control is simple and dependable. Removable strainers stop all foreign material. Check valves positively prevent circulation between hot and cold lines. These features are included on "Ebco" models.

Complete Washup Possible without Splash—The individual spray heads are 8½ in. above the rim of the receptor, permitting the users to wash their heads and shoulders without difficulty, and without splash or water drip to the floor. The extra deep receptor, 10 in., the automatic pressure control and general shape of the receptor insures a non-splash fixture.

Finish and Equipment—The receptor, column and pedestal are vitreous enameled in white or colors. Soap tray and liquid soap container finished in black vitreous enamel. All fittings of highest grade red brass chrome plated; 2-in. trap is galvanized. Water tempering valve (when specified); check valves and strainers for both hot and cold supplies and automatic pressure regulating valves are standard equipment on all models.



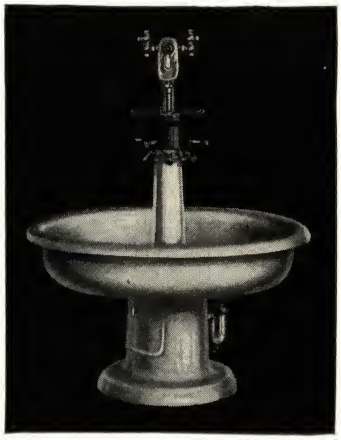
"Ebco" Semi-circular

For narrow washrooms, halls or other limited spaces. 60-in. width for 6 persons. 36-in. width for 3 persons. Individual spray heads, temperature control, automatic pressure regulation same as on all full round "Ebco" models

Model D-245 White Vitreous Enameled Model D-245 G Gray Vitreous Enameled

Without liquid soap container.

Model D-255 is similar but includes liquid soap container and soap valves



Model D-251

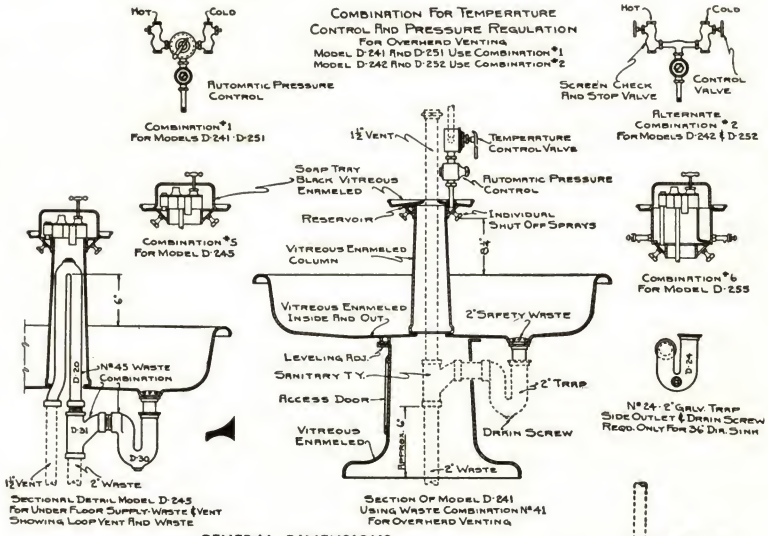
Similar to D-241 but includes liquid soap container and soap valves

Model D-241

Patented, December 2, 1924, April 6, 1926. Other patents pending.

For overhead supplies and overhead vent.

This model does not have liquid soap container



GENERAL DIMENSIONS

Persons	Diam. receptor, in.	Diam. base, in.	Depth receptor, in.
6	36	22	8
8	48	27	10
10	54	27	10

Height, floor to top receptor, 30 in.

Note: Special height for juveniles, 24 in., on order.

BRADLEY WASHFOUNTAIN CO.

Manufacturers of Fixtures for Group Washing

2209 West Michigan Street, MILWAUKEE, WIS.

REPRESENTATIVES IN ALL PRINCIPAL CITIES IN THE UNITED STATES AND CANADA

Products

BRADLEY WASHFOUNTAINS, "5-IN-A-GROUP" SHOWERS, COMBINATION SHOWER AND DRESSING ROOM UNITS, DRINKING FOUNTAINS, PLAYGROUND SHOWERS and FOOTFOUNTAINS.

Bradley Washfountains

Where Used — Bradley Washfountains are expressly designed to meet the modern need for group washing facilities and are in widespread use throughout the world among industrial plants of all kinds, schools, institutions, railroads, airports, printing establishments, department stores, and office buildings—in fact, wherever it is desired to accomplish group washing efficiently and economically.

Bradley Foot Controlled Washfountain

Rapidly growing in popularity because of valuable water saving accomplished by foot control. Type "D" with accommodations for ten (10) users is illustrated

Advantages—

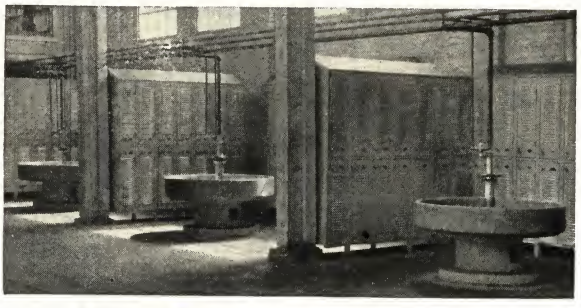
(1) 25% saving in floor space.
(2) 70 to 80% saving in water consumption.
(3) Reduced installation costs.
(4) Economy in maintenance.
(5) Maximum sanitation.
(6) Savings in janitor labor.
(7) Durability and long life assured by homogeneous cast marble and stone construction.

Construction and Materials—Each type of Bradley Washfountain may be had in any of the following materials: Standard Marmorite, White Marmorite, Tinted Marmorite, Granito and Bradstone. Marmorite is a marble composition with all the durable and beautiful qualities of genuine marble. Granito is basically a non-porous, highly abrasive stone product of a practical color and attractive appearance. Bradstone is a new Bradley material. It, too, is a precast stone composition; however, unlike the other materials, it is neither ground nor polished.

Certain types of Bradley Washfountains may also be obtained in high grade porcelain and enameled iron.

Durability—The modern Bradley Washfountain is effectively reinforced with steel, and is scientifically impregnated, thereby changing the chemical structure of the binder to an insoluble material, highly resistant to wear and to the action of ordinary cleaning agents.

Bradley Push-up Type Liquid Soap Dispenser



A Typical Bradley Washfountain Installation

Equipment—Standard equipment for all Bradley Washfountains includes chromium plated cake soap tray and Bradley mixing valve which regulates temperature without affecting the volume of water. Special soap dispensers, thermostatic mixers, and sectional sprayheads can be supplied if desired.

Sizes and Types—Bradley Washfountains are available in both circular and semi-circular models. Circular units may be obtained in 54, 36 and 32-in. diameter sizes. The 54-in. fixtures accommodate ten users and the 32 and 36-in. units, six persons. Semi-circular models are available in 54 and 32-in. diameter sizes and have capacities of 6 and 3 users, respectively.

Type "A" Circular—Both supply and vent connections from below. Particularly popular because all piping connections are concealed. 54, 36 and 32-in. diameter sizes.

Type "B" Circular—Both supply and vent connections from above. 54, 36 and 32-in. diameter sizes.

Type "C" Semi-circular—(Illustrated at right) For narrow or irregular washrooms where it is necessary to install fixtures against wall. Water supply and vent connections through wall or floor. 54 and 32-in. diameter sizes.

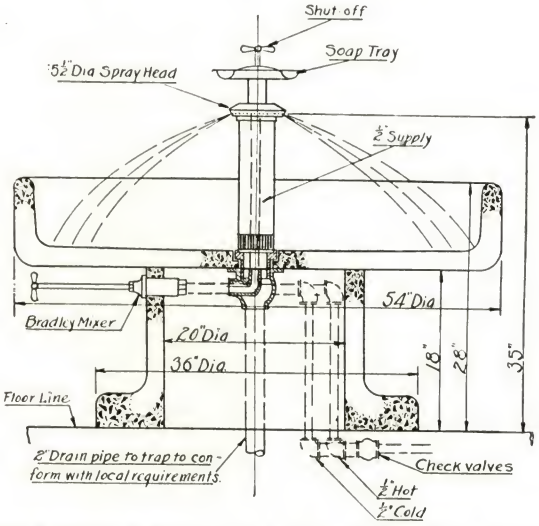
Type "D" Circular—(See center above) Similar to Type "A" with added feature of foot control of water flow, assuring maximum sanitation and water saving. 54, 36 and 32-in. diameter sizes.

Type "F" Semi-circular—Similar to Type "C" but with foot control of water flow. Supplies through wall or floor, waste through floor only, in 54-in. size. Supplies through wall only, waste through wall or floor in 32-in. size. 54 and 32-in. diameter sizes.

Type "O" Circular—Vent connections from below and supplies from above. Especially desirable for remodeled washrooms. 54, 36 and 32-in. diameter sizes.

Type "C" Bradley Washfountain

Popular number; other wall-type models available



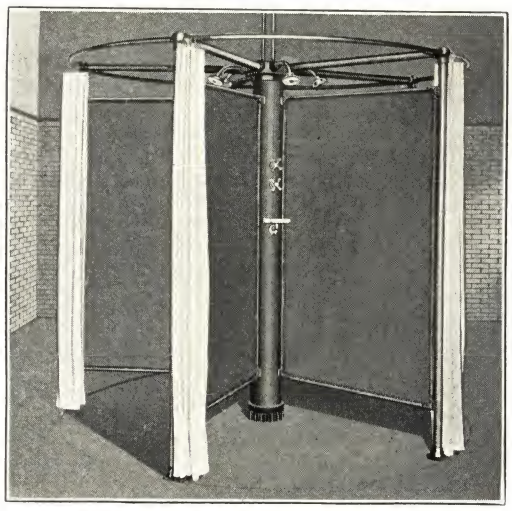
Typical Roughing-in Drawing for a 54-in. Type "A" Washfountain

Illustrating simplicity of design, ease of installation and location of drain at *center* of bowl. Check valves may be placed at any convenient and accessible location in the horizontal supply lines to each fountain

Bradley "5-In-A-Group" Showers

The Bradley "5-In-A-Group" Shower, a circular, self-contained fixture accommodating 5 users at one time is especially popular for use in industrial establishments, schools, institutions, gymnasiums, and clubhouses where it is necessary to provide bathing facilities for a group of people in the most efficient, sanitary and economical manner.

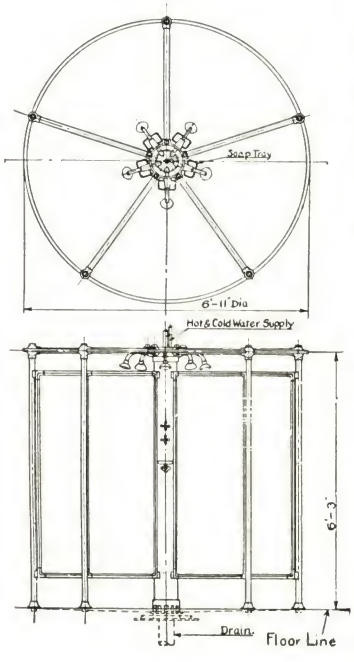
Construction and Materials—Vertical and horizontal frame members, as well as central standard, of wrought iron pipe, lacquered. Standard partitions of heavy gauge, pickled cold rolled steel, baked enameled. Standard color artillery gray. Non-rusting partitions of aluminum alloy available at added cost. Soap trays, control valves and shower heads, heavy brass, chromium plated. Shower regularly furnished with white duck curtains.



Five Can Bathe at Once
Bradley Type "O" shower. Note deep steel partitions, central drain

Sizes and Types—Bradley "5-In-A-Group" Showers are available in two sizes; Senior Model 84 in. in diameter, Junior Model 72 in. in diameter. Can be furnished with water supply connections from above or below. Type "A" with supply lines from below has operating valves suspended vertically from mixing chamber. Type "O" (illustrated) with supply lines from overhead has valves in the central standard.

Erection—The Bradley "5-In-A-Group" Shower furnished completely piped, ready for connection to supply and drain lines, is easy to erect and may be installed on any floor pitched slightly to carry off water.



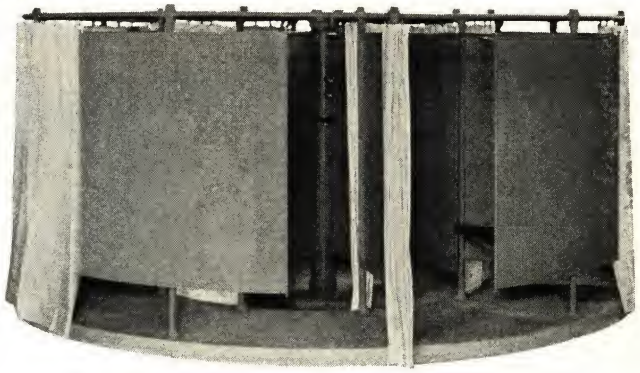
Mixing Chamber—The new Bradley reservoir-type mixing chamber furnishes water tempered to suit each user. It practically eliminates sudden changes in water temperature and thus greatly minimizes the scalding hazard so common in batteries of ordinary single showers. Water may be tempered to any desired degree at any pressure, thus effecting a considerable saving in water.

Shower Head—The new type Bradley shower head is provided with a Monel metal screen as a protection against clogging. Due to its design, the shower head is economical in water consumption and directs a stream of water on the user at such an angle as to allow the entire body to be under the shower without water striking the head.

Bradley Shower and Dressing Room Combination

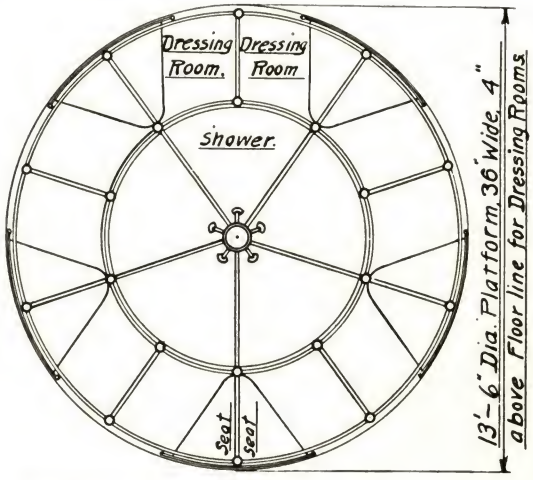
In this new self-contained, circular unit Bradley combines the advantages of the "5-In-A-Group" Shower with the privacy and convenience of individual dressing room compartments. It is easily and quickly erected, saves valuable floor space, reduces installation and maintenance expense, assures maximum sanitation and lessens janitor labor.

The Bradley "5-In-A-Group" Shower is the central unit of the new fixture. Around the shower are ten individual dressing rooms—2 dressing rooms for each shower compartment. Specifications of material and construction for the combination fixture are the same as for the Bradley Shower. Standard color artillery gray. Each dressing room is equipped with seat, clothes hook, etc. Regularly furnished with white duck curtains.



The New Bradley Shower and Dressing Room Unit

Where Used—Like other Bradley fixtures, the new Shower and Dressing Room Combination is designed for the group washing requirements of factories, schools and institutions. Because of the privacy and convenience made possible by its integral single unit design, it is especially popular for girls and women.



Floor Plan of Combination Shower and Dressing Room

Bradley Drinking Fountains

Bradley Drinking Fountains are constructed of the same beautiful and lasting materials and according to identically the same process as Bradley Washfountains. They are suitable for either indoor or outdoor installations and are widely used in buildings of all kinds—industrial establishments, schools, institutions, office buildings and stores—as well as in parks, playgrounds and on the sidewalks of city streets.

Bradley Drinking Fountains are available in 3 styles: Type "S"—Side stream model. Type "M"—Multiple head design with 3 bubblers. Type "V"—Center stream model; height 36 in.

Bradley Service

Bradley representatives are always pleased to co-operate with the architects in their territories and our Engineering Department is at the service of all architects who may desire assistance or suggestions in regard to washroom design and arrangement.

INDIVIDUAL DRINKING CUP COMPANY, INC.

Original Makers of the Paper Cup
Manufacturers of Dixie Drinking Cups and Dispensers,
Containers, Carriers, Dishes and Holders

EASTON, PA.

The Architect and the Individual Drinking Cup

In railroad stations, theaters, hotels, banks, office buildings, department stores and, in fact, wherever public drinking outlets are provided, the architect is now making provision for the installation of Dixie Drinking Service as a part of the standard equipment of the structure. The individual cup has been universally recognized as the most satisfactory as well as the safest method.

In some cases, the architect has found it possible to inset the dispenser in the wall. This may be desirable when a flush surface is required but care should be taken that the dispenser can be serviced without difficulty. This can be done either through a panel in the wall back of the fixture or by allowing adequate space for inserting a supply of cups at the opening in the face.

However, since the exposed dispenser is in far more common use at the present time the sizes of the various types are given below, together with a brief description which will enable the architect to select the style best suited to his design.

Dixie Individual Drinking Cups

Dixies are made from the finest materials obtainable. Every step in their manufacture is carefully supervised to insure the maintenance of the high quality for which Dixies are noted.

Sturdy two-piece construction, comfortable rolled brims and smooth sides make Dixies pleasant to drink from, and the raised bottom makes possible the accurate dispensing of Dixies. Decorated with a blue Adam period design, Dixies are as pleasing to the eye as they are to the lips.

Dixie Dispensers

No. 16 Dispenser—For use with No. 44 Dixies, holding approximately 4 oz. All steel base, holds either factory filled carton or special steel tube. Over-all height (with carton) 19 in., with steel or glass tube 20 in. Width of base 4 in., depth of base 5 in. Color, walnut. Attach to wall with screws enclosed in envelope inside dispenser.

No. 25 Dispenser—For use with No. 4 Dixies, holding approximately 4 oz. Complete with decorated glass tube. Over-all height 23 in., width of base 4 in., depth 5 in. Color, mahogany duco. Attach to wall by special wall plate and screws enclosed in envelope inside dispenser.

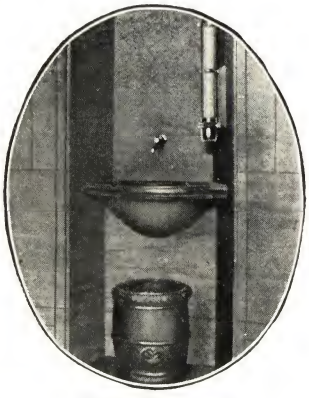
No. 31 Penny Vendor for Dixies—For use with No. 5 Dixies, holding approximately 5 oz. Complete with decorated glass tube. Over-all height 33 in., width of base 5 in., depth of base 5¼ in. Color, green duco. Attach to wall by back plate and screws enclosed with vendor.

No. 33 "Tower" Penny Vendor for Dixies—For use with No. 5 Dixies, holding approximately 5 oz. Complete with decorated glass tube. Over-all height 36 in., width of base 5½ in., depth of base 6 in. Color, silver poplar. Attach to wall by back plate and screws enclosed with vendor.

Service

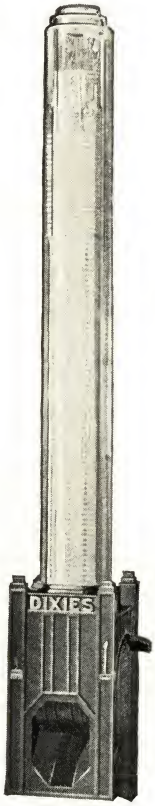
Dixies' representatives will submit details on request, and the Dixies' Service Department is prepared to develop special installations under architects' instructions.

69th Street Theater



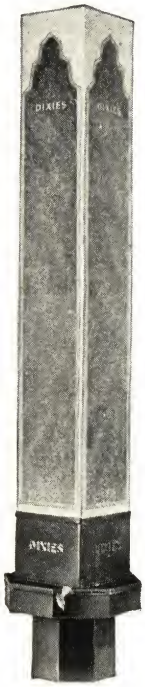
Hotel Cleveland

Bank of Pittsburgh



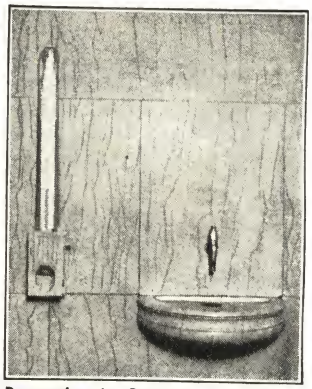
No. 33
Height, 36 in.
Width, 5½ in.
Depth, 6 in.

No. 25
Height, 23 in.
Width, 4 in.
Depth, 5 in.



No. 16
Height, 19 in.
Width, 4 in.
Depth, 5 in.

Dispensers for Dixies



Pennsylvania Station, New York

CENTURY BRASS WORKS, INC.

Drinking Fountain Specialists

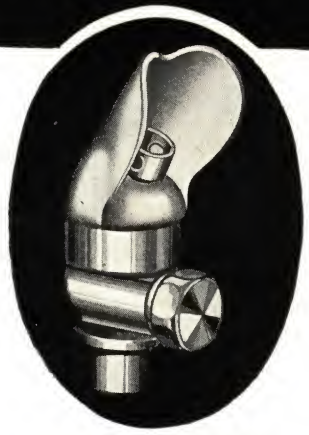
BELLEVILLE, ILL.

Beauty of Design

The Century Company manufactures a complete line of vitreous china and porcelain enameled drinking fountains. Exclusive Century designs are available for hotels, theaters, schools, institutions, stores and every industrial need. All fountains are available in white or seven striking colors. Century equipment enhances the appearance of the finest interiors.

The quality of Century products is recognized everywhere. The vitreous china and porcelain enamel are the finest manufactured. Exposed fittings are solid brass, plated with both nickel and chromium. Century equipment provides a lifetime of efficient service. Illustrated are three Century Fountains equipped with the famous Century Automatic Bubblerhead. For detail specifications of the complete Century line refer to Century A. I. A. Catalog "R-1." If you do not have it write for your copy today.

Century SANITARY DRINKING Fountains



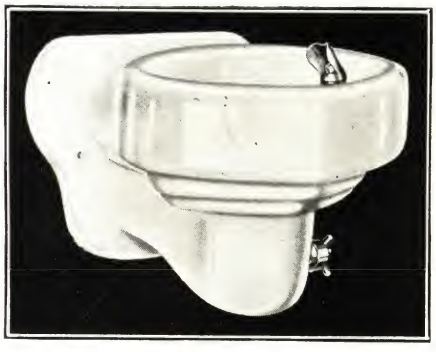
Automatic Bubblerhead

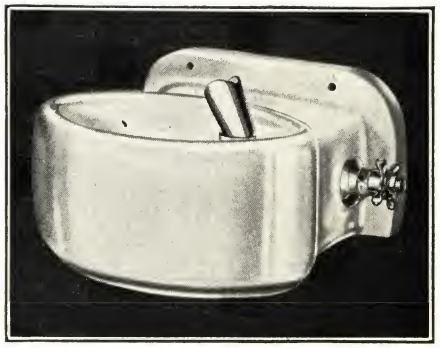
An outstanding bubblerhead, completely automatic, it constantly maintains a healthful drinking stream regardless of fluctuating water pressure. Many mechanical features and simplicity of its solid brass construction cause it to be preferred. Write for catalogue and complete specifications

True Sanitation

In the great public places where throngs daily gather Century equipment best demonstrates its true superiority. Here usage is hard and hurried drinks are numbered by the thousands. Here Century's outstanding efficiency provides a new standard of sanitation. Each turn of the strong, sturdy stopcock instantly produces a full convenient drinking stream. A clean, wholesome drink! There is no prolonged waiting for water. Sudden splashing gushes and tantalizing trickles are completely banished. The new Century Bubblerhead automatically and instantly compensates for variations in water pressure. It provides every day in the year a wholesome, convenient drinking stream and incorporates every mechanical device to promote health. Investigate these health fountains now.

The Century Company invites your inquiry and will be glad to cooperate fully. Write today.





Porcelain Enameled Fountains

The Century line of Porcelain Enameled Fountains is complete. Fountains are available in every combination and scores of styles. Century multiple wall fountains offer particular advantages to schools and public institutions. The battleship construction of these fountains is unique and guarantees a lifetime of carefree, dependable service. Illustrations and complete specifications of all Century products are contained in Century A. I. A. Catalog "R-1."

Vitreous China Fountains

Century Vitreous China Fountains are carefully constructed by skilled mechanics from the finest materials available. Here you will find wall fountains, pedestal fountains, recessed and semi-recessed fountains in many attractive styles and colors. Proportions and designs have been carefully planned and gracefully harmonize with the finest interiors. These fountains are fully illustrated in Century A. I. A. Catalog "R-1."

BATCHELDER DRINKING FOUNTAINS

BATCHELDER-WILSON COMPANY

540 No. Michigan Avenue
CHICAGO, ILL.

2633 Artesian Street
LOS ANGELES, CALIF.

101 Park Avenue
NEW YORK, N. Y.

For Batchelder Tiles refer to Manufacturers' Index

BATCHELDER DRINKING FOUNTAINS

Construction

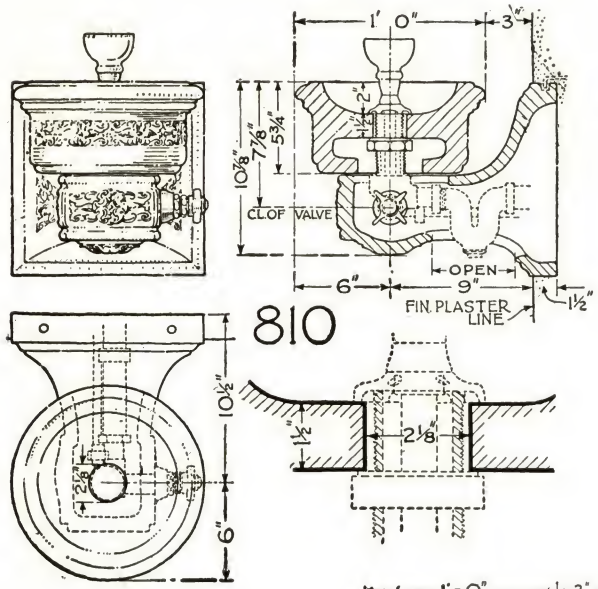
Batchelder Drinking Fountains are of glazed terra cotta, two-piece construction. Each fountain is designed to make use of a definite plumbing fitting which is clearly designated by the manufacturer's name and identifying symbol. Illustrations show photograph, section, and plan, with an alternative back. All openings are made exactly as shown. Modifications to fit special requirements can be done only on special order. Questions pertaining to plumbing requirements should be studied carefully and orders should be by definite catalogue number.

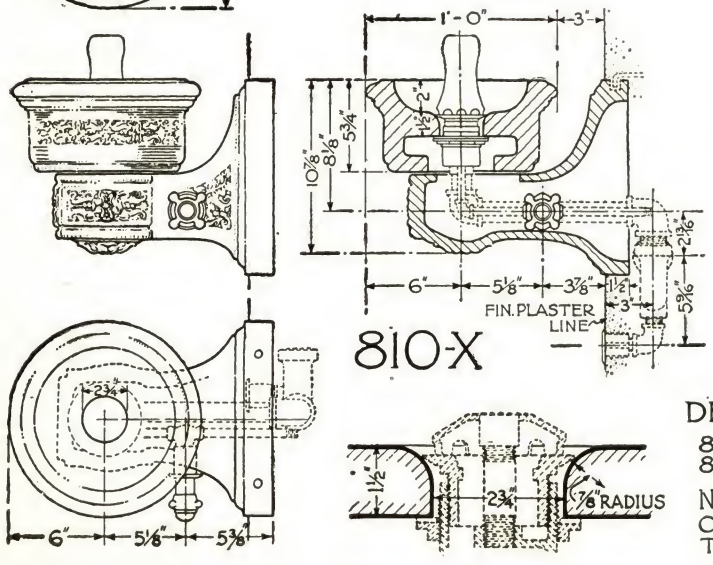
We furnish no plumbing fittings nor do we quote on anything other than the terra cotta members. If these facts are kept in mind it will avoid misunderstandings.

Color

Color is Patina Glaze, fired to high temperatures. We offer these fountains in a choice of twelve different colors which may be described as follows: tan, topaz, gray-blue, fawn, beryl, light olive, dark olive, cypress, heather, gray-indigo, black, ivory. These colors appear to harmonize with almost any type of decorative scheme. Whichever color may be selected, it represents the general over-all tone of the fountain. We sometimes, but not always, employ subordinate touches of either darker tones or slightly contrasting tones in the background of the modeling. We are glad to send an actual glazed sample showing our suggestion for a definite color scheme to harmonize with any color scheme.

Under no circumstances do we accept orders to reproduce designs, colors or glazes of other manufacturers.



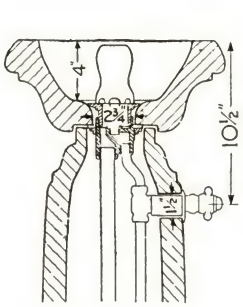


NOTE:-WALL FOUNTAINS SHOULD BE BEDDED IN SOLID MASONRY CONSTRUCTION OR ADEQUATE PROVISION SHOULD BE MADE OTHERWISE TO SUPPORT THEM.

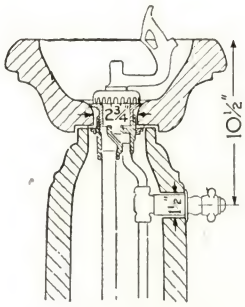
NOTE:-DESIGNS SHOULD BE REFERRED TO BY NUMBER AND LETTER — ORDERS SHOULD SPECIFY COLOR.

DES. NO.	BUBBLER	SUPPLY AND WASTE
810	STANDARD MFG.,CO. K-823	
810-X	CRANE CO. C-9500	SOP-1039-A

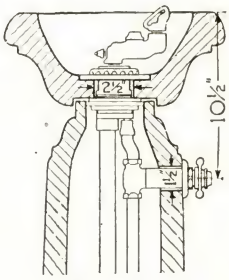
NOTE:-WE FURNISH NO PLUMBING FITTINGS - OUR DESIGN NUMBERS REFER TO TWO PIECE TERRA COTTA FOUNTAIN ONLY.



1050-X



1050-C

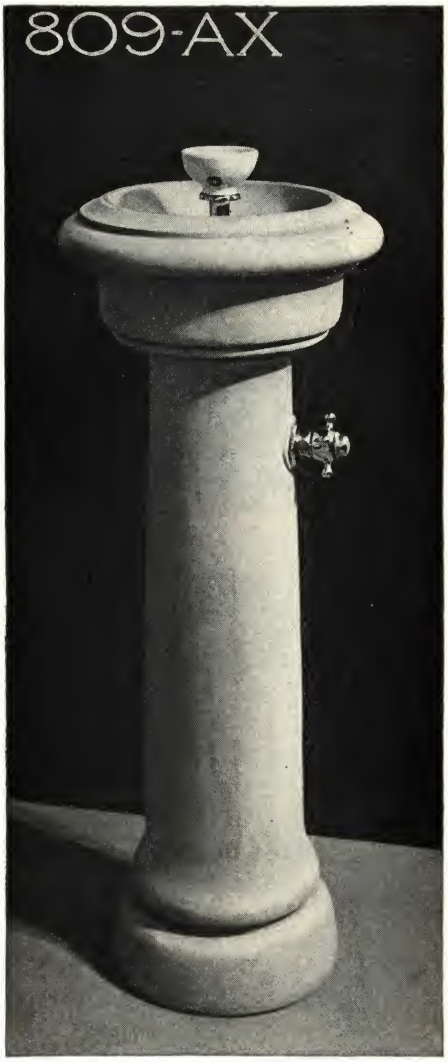


1050-T

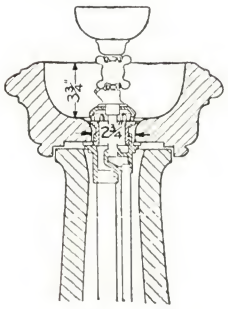
NOTE - WALL FOUNTAINS SHOULD BE BEDDED IN SOLID MASONRY CONSTRUCTION OR ADEQUATE PROVISION SHOULD BE MADE OTHERWISE TO SUPPORT THEM

NOTE - DESIGNS SHOULD BE REFERRED TO BY NUMBER AND LETTER — ORDERS SHOULD SPECIFY COLOR

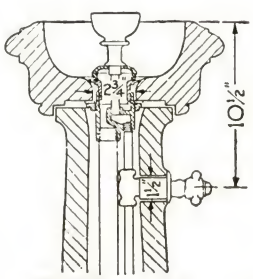
NOTE:- WE FURNISH NO PLUMBING FITTINGS - OUR DESIGN NUMBERS REFER TO TWO PIECE TERRA COTTA FOUNTAIN ONLY



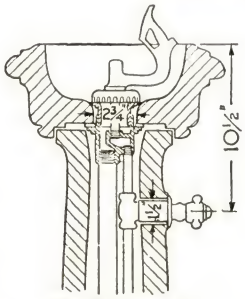
DES NO.	BUBBLER		SUPPLY AND WASTE
809-A	CRANE CO.	C-9516	ASK - 623-B
809-B	CRANE CO.	C-9516	ASK - 623-B
809-AX	CRANE CO.	C-9506	ASK - 850
809-BX	CRANE CO.	C-9506	ASK - 850
809-AC	CRANE CO.	C-9530	ASK - 850
809-BC	CRANE CO.	C-9530	ASK - 850
809-AT	HALSEY W. TAYLOR CO.	592	
809-BT	HALSEY W. TAYLOR CO.	592	
1050-X	CRANE CO.	C-9500	HSK - 749
1050-C	CRANE CO.	C-9530	HSK - 749
1050-T	HALSEY W TAYLOR CO.	592	



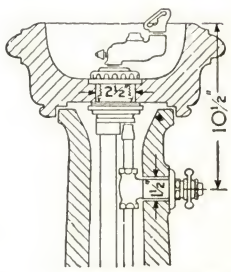
809-A 36" HGT
809-B 30" HGT



809-AX 36" HGT.
809-BX 30" HGT



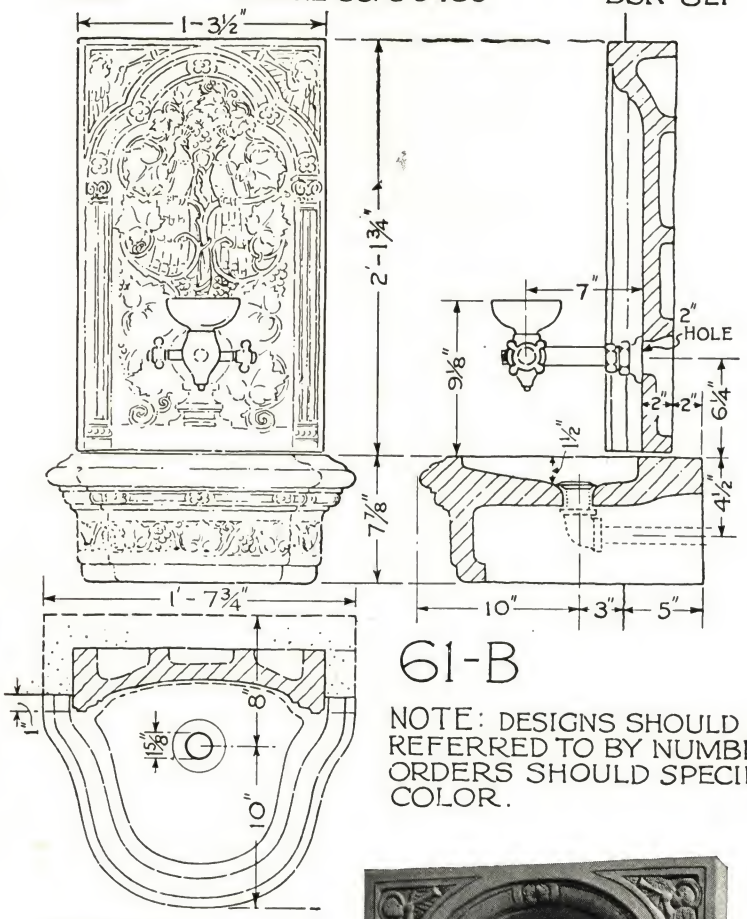
809-AC 36" HGT
809-BC 30" HGT



809-AT 36" HGT
809-BT 30" HGT

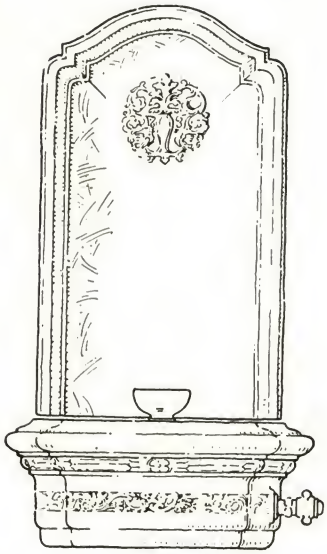
726-B

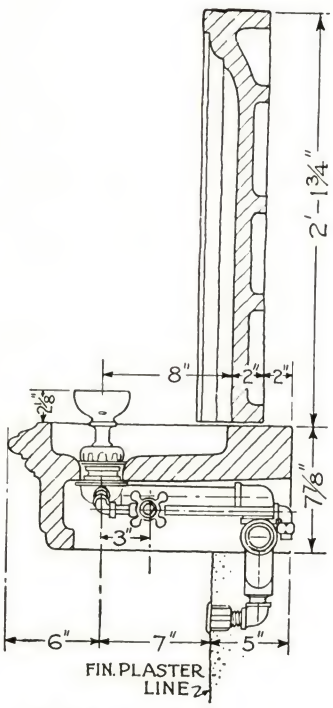
DES. NO.	BUBBLER	SUPPLY AND WASTE
61-B	CRANE CO. C-9460	BSK 821
726-B	CRANE CO. C-9460	BSK 821

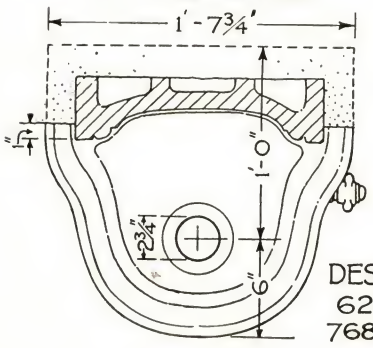


61-B

NOTE: DESIGNS SHOULD BE REFERRED TO BY NUMBER-ORDERS SHOULD SPECIFY COLOR.







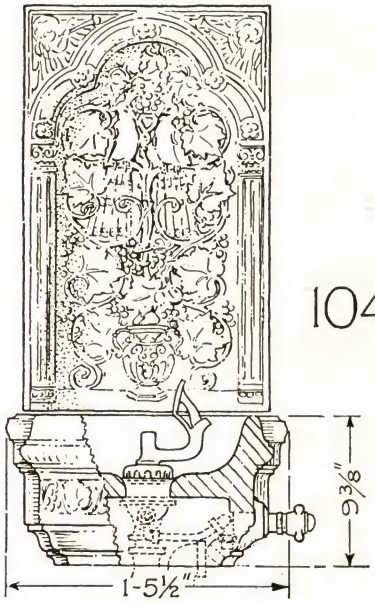
768-X

DES. NO.	BUBBLER	SUPPLY AND WASTE
62-X	CRANE CO. C-9504	SOP 1037
768-X	CRANE CO. C-9504	SOP 1037

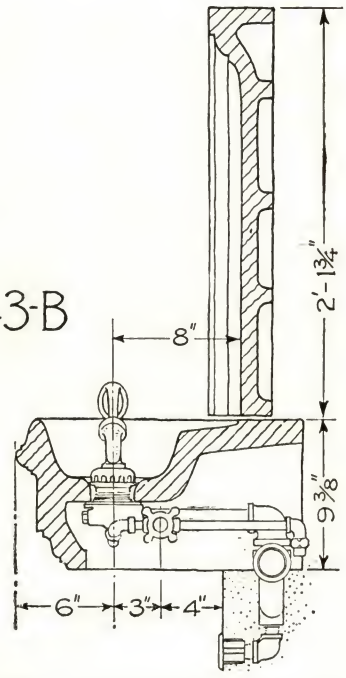
62-X

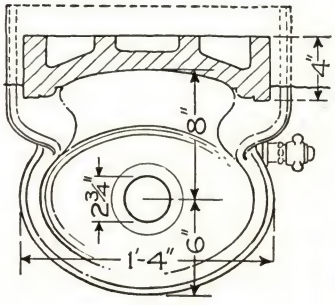
1041-B

DES. NO.	BUBBLER	SUPPLY AND WASTE
1041-B	CRANE CO. C-9530	CRANE CO.
1043-B	CRANE CO. C-9530	CRANE CO.

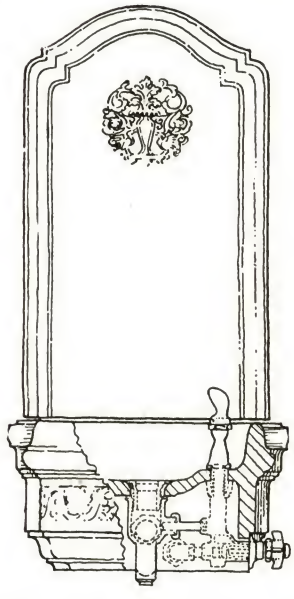


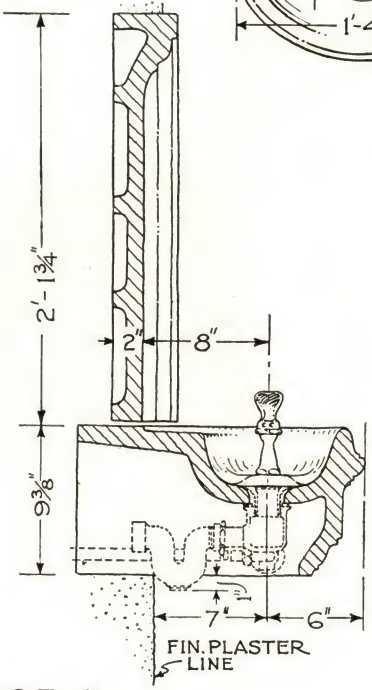
1043-B

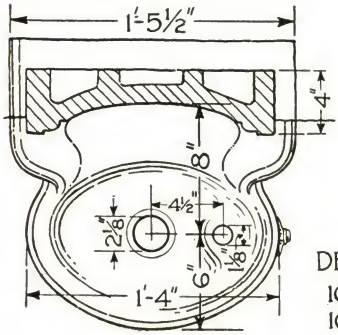




NOTE:-DESIGNS SHOULD BE REFERRED TO BY NUMBER-ORDERS SHOULD SPECIFY COLOR.





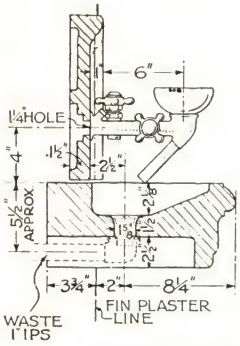


1051-B

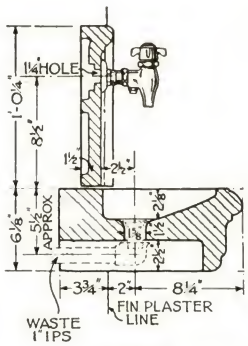
NOTE:-WE FURNISH NO PLUMBING FITTINGS.

DES. NO.	BUBBLER	SUPPLY AND WASTE
1051-B	STANDARD MFG.,CO.	STANDARD MFG.,CO.
1053-B	STANDARD MFG.,CO.	STANDARD MFG.,CO.

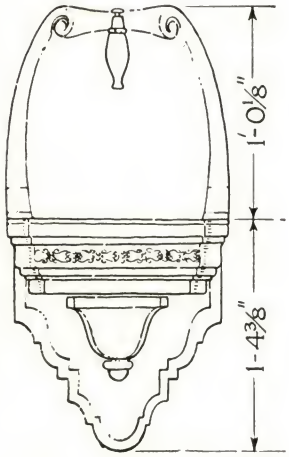
1053-B

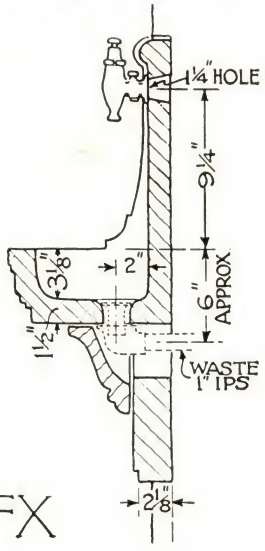


723-B

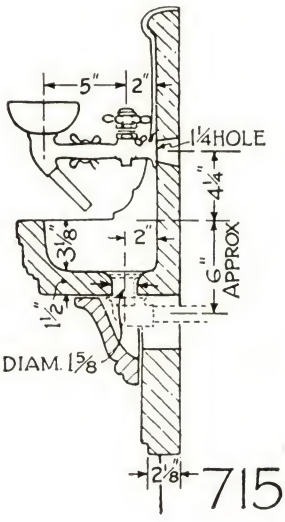


723-F

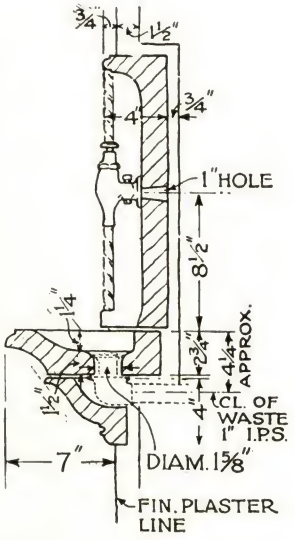




715-FX



715-BX



1021-F

1022-F

NOTE:-WALL FOUNTAINS SHOULD BE BEDDED IN SOLID MASONRY CONSTRUCTION OR ADEQUATE PROVISION SHOULD BE MADE OTHERWISE TO SUPPORT THEM.

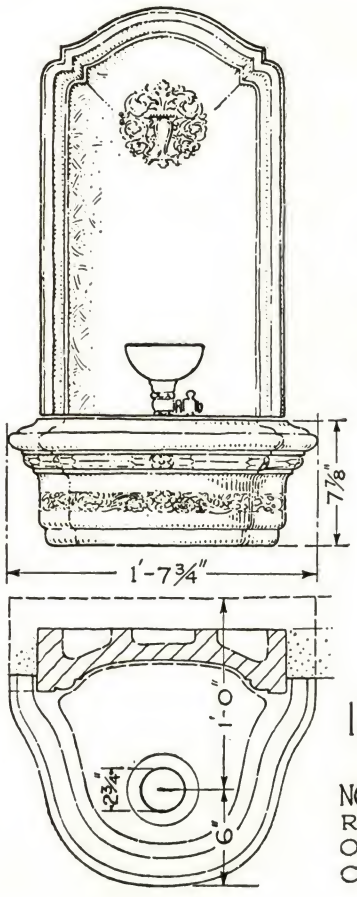
NOTE:-DESIGNS SHOULD BE REFERRED TO BY NUMBER AND LETTER ORDERS SHOULD SPECIFY COLOR.

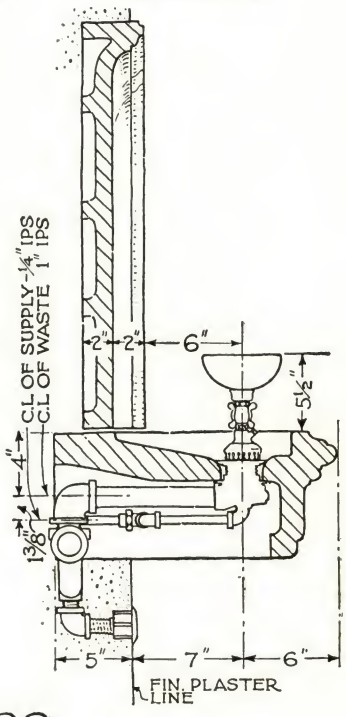
DES. NO.			SUPPLY AND WASTE
723-B	CRANE CO.	C-9462-A	BSK-821
723-F	STANDARD MFG.,CO.	K-868	BSK-821
715-BX	CRANE CO.	C 9462-A	BSK-821
715-FX	MURRAY & SORENSEN	155-C	BSK-821
1021-F	MURRAY & SORENSEN	155-C	BSK-821
1022-F	MURRAY & SORENSEN	155-C	BSK-821

NOTE:-WE FURNISH NO PLUMBING FITTINGS.

62

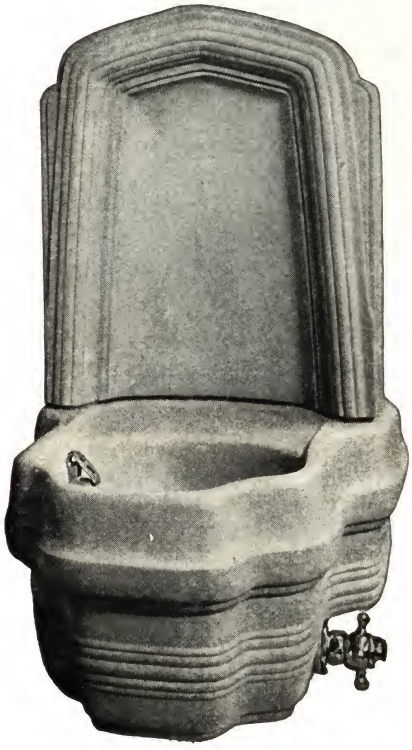
DES. NO.	BUBBLER	SUPPLY AND WASTE
62	CRANE CO. C-9516	SOP-871-E
182	CRANE CO. C-9516	SOP-871-E

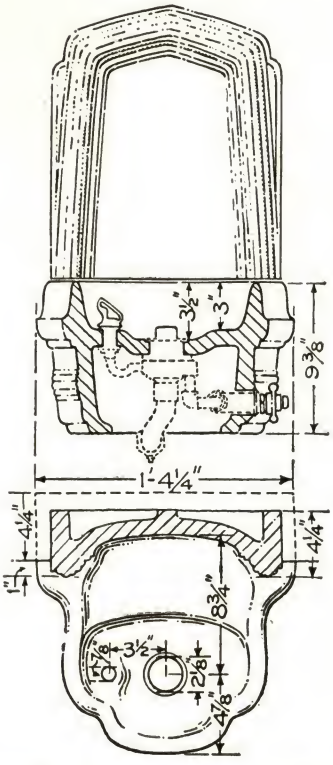




182

NOTE:- DESIGNS SHOULD BE REFERRED TO BY NUMBER- ORDERS SHOULD SPECIFY COLOR.





1079-B

DES. NO.	PROJECTOR	SUPPLY AND WASTE
1079-B	HALSEY W. TAYLOR CO.	HALSEY W. TAYLOR CO.
1080-B	HALSEY W. TAYLOR CO.	HALSEY W. TAYLOR CO.

1080-B

OREGON BRASS WORKS

Manufacturers of Ornamental Drinking Fountains of Bronze, Aluminum and White Metal

PORTLAND, ORE.

Ornamental Drinking Fountains

We produce the very finest fountains at from one-third to one-half the normal cost of manufacturing a single fountain of special design. This saving is effected by manufacturing in quantities and by thus eliminating the designing, modeling and pattern work necessary in producing fountains each of different design.

It is also possible, when a design is being reproduced, to work out the mechanical design and to improve patterns to give more satisfactory results.

Materials

Only the best castings, made from hand chased metal patterns, are used.

All coloring is done by chemical processes and not by the use of colored lacquers.

Finish

All standard hardware finishes can be matched. Sample of finish required should be furnished, if possible.

Design 125

Design 195

Special Designs

Through our experience in specializing in the manufacture of fountains, we are in the best position to execute orders for fountains of special design.

Installation

Bolts and special fittings are included where necessary so that these fountains can be installed by any plumber.

Equipment

We equip these fountains with any type or make of bubblers that you may specify, provided that they can be adapted to the fountains selected.

Guarantee

Our fountains are guaranteed in every respect. If not entirely satisfactory, they may be returned at our expense.

Prices

Quotations given upon application. Specify finish desired when requesting quotation.

Design 110

Design 140

Design 115

Design 150

The beauty of Oregon Brass Works Ornamental Drinking Fountains rests not entirely in design but also in the precision workmanship and skilled finishing.

Design 60

Design 160

Design 170

Design 205

Many of the nation's fine public buildings have been beautified by the installation of Ornamental Drinking Fountains manufactured by OREGON BRASS WORKS.

Design 215

Design 255

Design 130

Design 120

Particularly adaptable to the buildings of financial institutions where distinctive equipment is both desired and required.

THE D. A. EBINGER SANITARY MFG. CO.

Manufacturers of "Ebco" Water Coolers

COLUMBUS, OHIO

AGENCIES IN ALL PRINCIPAL CITIES

Products

"Ebco" Drinking Fountains; "Ebco" Electric Water Coolers; "Ebco" Iced Water Coolers.

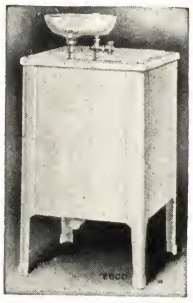
For "Ebco" Dish Washing Sinks and Circular Wash Sinks, see Manufacturers' Index.

"Ebco" Water Coolers and Fountains

The safe and sanitary supply of cool, fresh drinking water is accomplished economically and satisfactorily by means of "Ebco" Water Coolers and Fountains. Chief among the important features of the "Ebco," is the Angle Jet Bubbler and Automatic Stream Control Valve. They insure a drinking stream which is convenient to drink from and eliminate objectionable spurting and variation in volume due to differences in line pressure. The "Ebco" jet cannot be squirted, tampered with or touched by mouth or fingers; it is one of the most sanitary jets devised. "Ebco" Water Coolers and Fountains are made in all the desired styles. They are perfectly insulated with corkboard sealed with hydraline. Water coils are high grade seamless copper, tinned inside and outside. A complete catalogue of the entire line of iced and electrical type coolers will gladly be mailed on request.

C-271 "Ebco" Iced Water Cooler
With one C-1300 automatic stream control, self-closing valve and angle stream bubbler

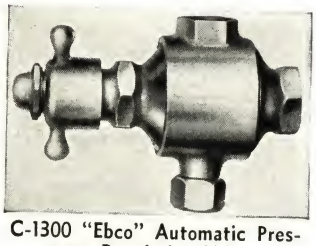
C-1600 Glass Filler Valve
Self-closing with regulator and stop. Adjustable flange



Left:
Model C-304 Angle Stream Bubbler
Condensation basin in top. Finish, white porcelain enameled.
Compressor unit may be placed adjacent to fountain in basement, or in adjoining room

Model No. 1—JP "Ebco" Electrical Water Cooler
Equipped with pre-cooler
Write for catalogue

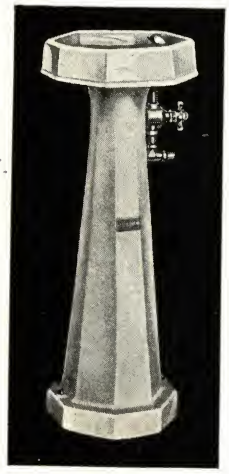
Automatic stream control regulating valves, furnished with "Ebco" angle jet bubblers, produce a constant drinking stream regardless of varying pressures in water lines



C-1300 "Ebco" Automatic Pressure Regulating Valve
Over 90% efficient on pressure variations between 25 and 100 lb.

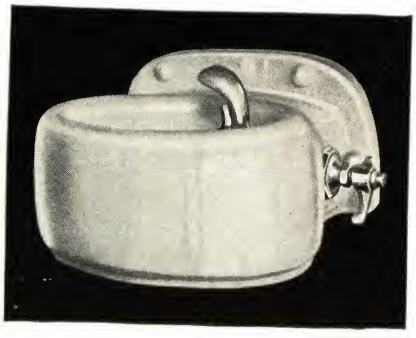
Eliminating Water Waste by Measured Water Flow

C-1500 Automatic Pressure Regulator
¼-in. iron pipe inlet, ⅜-in. outlet



C-209 "Ebco" Vitreous Enameled Pedestal Fountain
Furnished with angle stream bubbler, supply and waste to the floor, and C-1300 automatic stream control valve. Heights 30 and 36 in.

Right:
C-241 "Ebco" Vitreous China Wall Fountain
Furnished with angle stream bubbler, C-1400 automatic stream control valve and concealed trap



C-211 "Ebco" Vitreous China Pedestal Fountain
Built-in angle stream bubbler, C-1300 automatic stream control self-closing valve.
Supply and waste to floor.
Sizes—Pedestal 30 and 36 in. high

Left:
C-243 "Ebco" Vitreous Enameled Wall Fountain
Furnished with angle stream bubbler, C-1400 automatic stream control valve and nickel-plated "P" trap

HALSEY TAYLOR
DRINKING FOUNTAINS

Sanitary Drinking Fountains with practical automatic stream control.

The Halsey W. Taylor Co.
Warren, Ohio

LOCAL REPRESENTATIVE

COLOR

in vitreous china fountains

TO MEET the demand for fountains of vitreous china in colors to harmonize or contrast with walls or interiors of various tones, Halsey Taylor Drinking Fountains can be furnished in any of the following colors:

C-251. Straw or Yellow
C-252. Buff or Brick
C-253. Ivory or Dark Marble
C-254. Blue
C-255. Sage Green
C-258. Chrome Green
C-260. Black
C-269. Copper
C-270. Forest Green
C-271. Orchid
C-280. Autumn Brown
C-281. Ivory or Light Yellow
C-282. Tan or Java Tan
C-283. Light Marble

Although these colors meet the average requirements along this line, special colors may be had if desired.

Prices on Colored Glaze Quoted on Request

THE HALSEY W. TAYLOR CO.

Automatic Stream Control Drinking Fountains

WARREN, OHIO

OFFICES IN THE FOLLOWING CITIES

ALBANY, N. Y.
BIRMINGHAM, ALA.
CHARLOTTE, N. C.
CHATTANOOGA, TENN.
CHICAGO, ILL.
CINCINNATI, OHIO
DENVER, COLO.
DETROIT, MICH.
HALIFAX, N. S.
HOUSTON, TEX.
KANSAS CITY, MO.
LOS ANGELES, CAL.
MINNEAPOLIS, MINN.
MONTREAL, QUE.
NASHVILLE, TENN.
NEW ORLEANS, LA.
NEW YORK, N. Y.
PHILADELPHIA, PA.
PITTSBURGH, PA.
RICHMOND, VA.
SALT LAKE CITY, UTAH
SAN FRANCISCO, CAL.
SEATTLE, WASH.
ST. LOUIS, MO.
SYRACUSE, N. Y.
TAMPA, FLA.
WASHINGTON, D. C.
WORCESTER, MASS.

Products

HALSEY TAYLOR SANITARY DRINKING FOUNTAINS (Patented) Automatic Stream Control; PRACTICAL DRINKING MOUND, NON-SQUIRTING.

Also Electric Coolers and Ice Coolers.

Foreword

Long before the great war, Halsey Taylor Drinking Fountains were becoming increasingly popular. But it was during America's entry into the war that the 2-Stream Projector Halsey Taylor Fountain was accorded Government approval as the most sanitary—the so-called "Cantonment" types being adopted as standard for all training camps.

From that day to this, these fountains have been improved and refined until now they are recommended and preferred by architects and builders generally because of their decided advantages in promoting practical drinking convenience and sanitation.

Considering the fact that their exclusive benefits can be had without sacrifice of economy and with the additional factor of beauty of design, architects will find their specification logical and sure to please their clientele. They embody distinctive, patented features found in no other make or type and result in the following advantages:

(1) Practical Automatic Stream Control—An automatic device maintains a constant height in the drinking stream even though the line pressure may vary 50 lb. The stream is never too high, never too low.

(2) Ideal Drinking Mound—The 2-stream projector was designed for and adopted by the Government during the war. This exclusive design makes the side stream really practical, and removes the objections found with ordinary sidestream foundations because of their hoselike stream.

(3) Absolute Sanitation—The drinking mound is formed by the converging of two streams of water, thus setting up an interference forming a localized drinking mound which makes it impractical to drink from any other point, therefore sanitary in the extreme. The finger or lips cannot come in contact with or contaminate the source of supply. It is absolutely impossible to squirt the water.

Recognized by Architects

Especially in schools, where health-safety counts most, Halsey Taylor Drinking Fountains are recognized by architects everywhere as ideal. In industrial plants, in public buildings of every type, in municipal structures, churches, hospitals and hotels, these modern health-safe fountains are daily specified.

Moreover, it must be remembered that Halsey Taylor Fountains are made and sold by the largest organization devoted exclusively to that line of manufacture. Our sole aim and purpose is to produce the best fountain for any need and our entire resources and facilities are pointed toward that end. We aim to sell a service rather than a mere fountain, and invite architects or builders to write us relative to any problems that may come up in connection with drinking-water provision.

Fountains to Meet Every Requirement

In the following pages of this catalogue you will find shown various fountains to meet every requirement.

Halsey Taylor exclusive features are now available in cabinets for use with various types of electric refrigeration units. Write for special literature.

General Information for Architects

Heights Recommended—For kindergartens 24 in.; grade schools 30 in.; high schools 30 or 36 in.; factories 36, 39, or 42 in. For kindergarten lever handle self-closing stop will be found much easier for smaller children to operate.

Number of Pupils—Experience teaches that one drinking fountain should be provided for each fifty pupils—however, in no case should one fountain be planned to serve more than seventy pupils.

Continuous Flow—Where it is desired to have continuous flow of water, we can furnish a by-pass valve on most types which will permit a small stream of water to flow continuously and a full stream when the self-closing stop is operated.

Finish—Exposed fittings on all fountains with the exception of fixtures Nos. 501 to 515 are furnished in chromium plate. However we can furnish nickel plate, bronze or polished brass upon request.

Water Consumption—The amount of water required in different classes of installations will vary and, where the actual amount of water required is not known, the following data will give the approximate demand to be expected.

(1)	Heavy manufacturing	¼ gal. per hour per person.
(2)	Light manufacturing.	⅛ gal. per hour per person.
(3)	Office buildings.....	⅛ gal. per hour per person
(4)	Transients 1	gal. per hour per 100 persons
(5)	Hotels	⅛ gal. per hour per room. (maximum 1½ gal. per day.)
(6)	Restaurants	1/10 gal. per person served.
(7)	Cafeteria	1/12 gal. per person served.
(8)	Theaters 1	gal. per hour per 75 seats.
(9)	Schools	⅛ gal. per hour per student.
(10)	Hospitals	1/12 gal. per hour per bed. (Plus ⅛ gal. per hour per attendant.)

Color—All vitreous china fixtures shown in catalogue can be furnished in various colors to match the woodwork, marble, or interior trim. See preceding page.

Marble Fountains—Send for roughing-in measurements of Halsey Taylor fittings for marble, or terra cotta wall and pedestal fountains.

Blue Prints—Blue prints giving details will be furnished for any fixtures shown.

WALL FOUNTAINS

No. 600 Wall Fountain

Specification—Halsey Taylor No. 600 Wall Fountain with heavy vitreous china receptor; brass strainer; cast iron baked gray enameled bracket to wall; self-closing stop; loose key volume regulator; ⅜-in. brass supply; 1¼-in. brass trap and waste pipe; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 30 lb.

Dimensions—

Receptor	7½x10 in.
Depth of receptor	3 in.
Projection from wall	11½ in.
To center of drinking mound	8 in.
Supply	⅜ in. I.P.
Waste outlet—tapped	1-in. I.P. thread

Price—

As described, each	$30.50
Complete less trap, each	28.00
Without trap, supply and waste fittings, each	26.00

No. 601 and No. 602 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 601 heavy vitreous china wall drinking fountain with integral trap housing, concealed wall hanger, brass strainer, self-closing stop with cross handle, loose key regulator and union connection for ⅜-in. iron pipe supply, brass trap for 1¼-in. iron pipe outlet, *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

No. 602 Specification—Same as above, except furnished less trap and with waste fittings for drain to wall.

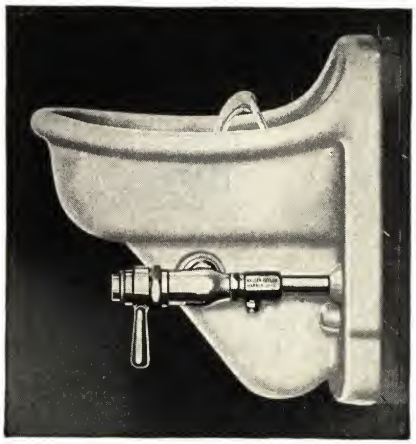
Shipping weight, 40 lb.

Dimensions—

Depth of receptor	3¼ in.
Projection from wall	11¼ in.
Width	11 in.
Supply	⅜ in.
Waste	1¼ in.

Price—

No. 601, as described and complete with trap, each	$35.00
No. 602, as described complete less trap and with waste fitting for drain to wall, each	32.00



No. 603 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 603 heavy vitreous china wall drinking fountain with integral trap and clean-out plug; lever handle self-closing stop; loose key volume regulator; 1¼-in. waste outlet and ⅜-in. supply; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 35 lb.

Dimensions—

Depth of receptor	3½ in.
Projection from wall	12 in.
Width	9½ in.
Supply	⅜ in.
Waste	1¼ in.

Price—

As described, each	$35.00

No. 604 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 604 heavy vitreous china wall drinking fountain with completely closed integral trap housing; concealed wall hanger; brass wall bolts; brass strainer; self-closing stop with cross handle; loose key regulator and union connection; ⅜-in. supply; 1½-in. New York regulation rough brass trap with clean-out plug through trap housing; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 40 lb.

Dimensions—

Depth of receptor	3½ in.
Projection from wall	12 in.
Width	9½ in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each	$40.00

WALL FOUNTAINS

No. 605 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 605 heavy vitreous china wall drinking fountain with integral trap housing; concealed wall hanger; brass wall bolts; brass strainer; self-closing stop with cross handle; loose key regulator and union connection for ⅜ in. iron pipe supply; rough brass trap for 1¼ in. iron pipe outlet; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 50 lb.

Dimensions—

Receptor	10x13	in.
Depth of receptor	3½	in.
Width over all	13	in.
Wall to drinking stream	8	in.
Wall to front of fountain	13	in.
Supply	⅜	in.
Waste	1¼	in.

Price—

Each $45.00

No. 607 Cast Iron Vitreous Enameled Wall Fountain

Specification—Halsey Taylor No. 607 heavy cast iron vitreous enamel all-over wall drinking fountain with integral trap housing; concealed wall hanger; brass wall bolts; brass strainer; self-closing stop with cross handle; loose key regulator and union connection for ⅜ in. iron pipe outlet; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 85 lb.

Dimensions—

Receptor	10x13	in.
Depth of receptor	3¼	in.
Width over all	13½	in.
Wall to drinking stream	8	in.
Wall to front of fountain	14	in.
Supply	⅜	in.
Waste	1¼	in.

Price—

As described, each $50.00

No. 608 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 608 heavy vitreous china wall drinking fountain with completely closed integral trap housing; concealed wall hanger; brass wall bolts; brass strainer; self-closing stop with cross handle; ⅜ in. iron pipe supply; loose key regulator and union connection; 1½ in. New York regulation rough brass trap with clean-out plug through trap housing; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

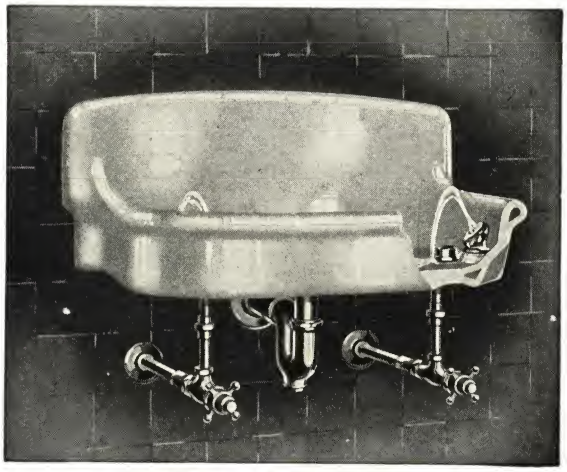
Shipping weight, 50 lb.

Dimensions—

Receptor	10x13	in.
Depth of receptor	3½	in.
Wall to drinking stream	8	in.
Wall to front of fountain	13	in.
Supply	⅜	in.
Waste	1½	in.

Price—

As described, each $50.00



No. 610 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 610 heavy vitreous china wall drinking fountain with integral back and concealed hangers; brass strainer; self-closing stops with cross handle; loose key volume regulators; ⅜ in. iron pipe supply; 1¼ in. brass trap; *two 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 90 lb.

Dimensions—

Depth of receptor	3½	in.
Length over all	24	in.
Height of back over all	10½	in.
Wall to drinking stream	8	in.
Wall to front of fountain	13	in.
Supply	⅜	in.
Waste	1¼	in.

Price—

As described, each $80.00

WALL FOUNTAINS

No. 611 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 611 heavy vitreous china wall drinking fountain with integral back and concealed hangers; brass strainer; self-closing stops with cross handle; loose key volume regulators; 1¼-in. brass trap; ⅜-in. iron pipe supply; self-opening and self-closing glass filler faucet; *two 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Can be furnished with any combination of heads, fillers or faucets. Prices on request.

Shipping weight, 92 lb.

Dimensions—

Depth of receptor	3½ in.
Length over all	23 in.
Height of back over all	10½ in.
Wall to drinking stream	8 in.
Wall to front of fountain	13 in.
Supply	⅜ in.
Waste	1¼ in.

Price—

As shown, each.....$95.00

No. 612 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 612 heavy vitreous china wall drinking fountain without back; brass strainer; self-closing stops with cross handle; loose key volume regulators; 1¼-in. brass trap; ⅜-in. iron pipe supply; two painted cast-iron wall brackets; *two 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 70 lb.

Dimensions—

Depth of receptor	3½ in.
Length over all	24 in.
Wall to drinking stream	8 in.
Wall to front of fountain	13 in.
Supply	⅜ in.
Waste	1¼ in.

Price—

As described, each.....$70.00

No. 622 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 622 heavy vitreous china wall drinking fountain with integral trap housing; concealed wall hanger; brass strainer; self-closing cross handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; 1½-in. New York Regulation trap with clean-out plug; *2-stream mound building projector and Taylor Automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 50 lb.

Dimensions—

Receptor	12x13 in.
Depth of receptor	3½ in.
Width over all	13 in.
Projection from wall	13 in.
Height over all	12 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each.....$50.00

No. 623 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 623 heavy vitreous china wall drinking fountain with integral trap housing; concealed wall hanger; brass strainer; self-closing stop; loose key regulator and union connection for ⅜-in. iron pipe supply; 1½-in. New York regulation trap with clean-out plug; equipped with oscillating lever handle glass filling faucet through back; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Specification Halsey Taylor No. 624, same as No. 623, except with 24-in. back.

Shipping weights, 105 and 115 lb. respectively.

Dimensions—

Receptor	12x13 in.
Depth of receptor	3½ in.
Width over all	13 in.
Projection from wall	13 in.
Height over all	18 in.
Supply	⅜ in.
Waste	1½ in.

Prices—

No. 623, as described, each	$65.00
No. 624, as described, each	75.00

WALL FOUNTAINS

No. 625 Vitreous China Recessed Wall Fountain

Specification—Halsey Taylor No. 625 heavy vitreous china recessed wall drinking fountain; brass strainer; self-closing lever handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; 1½-in. New York regulation trap with clean-out and metal wall flange; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* When ordering state whether for plaster or marble wall.

Shipping weight, 110 lb.

Dimensions—

Width over all	16 in.
Height over all	29½ in.
Receptor opening	12½ in. wide by 20¾ in. high by 10 in. deep
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $100.00

No. 626 Vitreous China Recessed Wall Fountain with Glass Filler

Specification—Halsey Taylor No. 626 heavy vitreous china recessed wall drinking fountain; brass strainer; self-closing lever handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; 1½-in. New York regulation trap with clean-out and metal wall flange; equipped with oscillating lever handle glass filling faucet through back; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* When ordering, state whether for plaster or marble wall.

Shipping weight, 110 lb.

Dimensions—

Width over all	16 in.
Height over all	29½ in.
Receptor opening	12½ in. wide by 20¾ in. high by 10 in. deep
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $105.00

No. 627 Vitreous China Recessed Wall Fountain with Glass Filler Only

Specification—Halsey Taylor No. 627 heavy vitreous china recessed wall drinking fountain; brass strainer; loose key regulator; 1½-in. New York regulation trap with clean-out and metal wall flange; equipped with oscillating lever handle glass filling faucet through back. All exposed fittings *chromium plate.* When ordering, state whether for plaster or marble wall.

Shipping weight, 105 lb.

Dimensions—

Width over all	16 in.
Height over all	29½ in.
Receptor opening	12½ in. wide by 20¾ in. high by 10 in. deep
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $93.00

No. 630 Vitreous China Semi-recessed Wall Fountain

Specification—Halsey Taylor No. 630 heavy vitreous china semi-recessed wall drinking fountain; brass strainer; self-closing lever handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; waste outlet 1¼-in. iron pipe. (Trap not furnished but may be placed in wall if required.) *2-stream projector and Taylor automatic control.* All exposed fittings *chromium plate.*

Shipping weight, 85 lb.

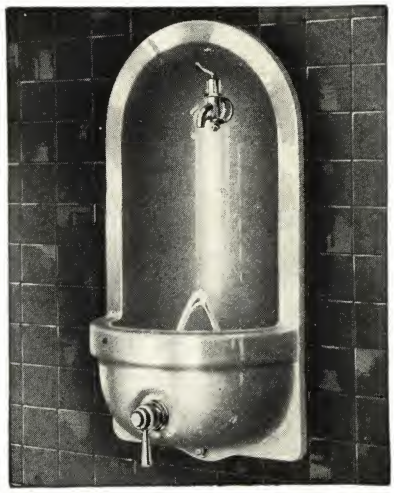
Dimensions—

Width over all	14 in.
Height over all	25½ in.
Recessed depth	4½ in.
Projection from wall	7 in.
Supply	⅜ in.
Waste	1¼ in.

Price—

As described, each $90.00

WALL FOUNTAINS



No. 631 Vitreous China Semi-recessed Wall Fountain with Glass Filler

Specification—Halsey Taylor No. 631 heavy vitreous china semi-recessed wall drinking fountain; brass strainer; self-closing lever handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; waste outlet 1¼-in. iron pipe (trap not furnished but may be placed in wall if desired); equipped with oscillating lever handle glass filler faucet through back; *2-stream projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

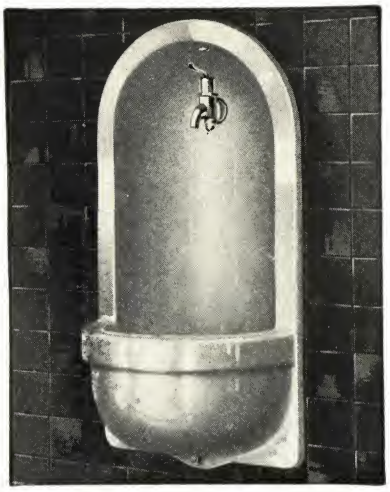
Shipping weight, 90 lb.

Dimensions—

Width over all	14 in.
Height over all	25½ in.
Recessed depth	5¼ in.
Projection from wall	7 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $95.00



No. 632 Vitreous China Semi-recessed Wall Fountain with Glass Filler Only

Specification—Halsey Taylor No. 632 heavy vitreous china semi-recessed wall drinking fountain; brass strainer; ⅜-in. iron pipe supply; waste outlet 1¼-in. iron pipe (trap not furnished but can be placed in wall if required); equipped with oscillating lever handle glass filler faucet through back. All exposed fittings *chromium plate.*

Shipping weight, 80 lb.

Dimensions—

Width over all	14 in.
Height over all	25½ in.
Recessed depth	4½ in.
Projection from wall	7 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $83.00

No. 2640 Vitreous China Semi-recessed Wall Fountain
No. 2641 Same, with Glass Filler

Specification—Halsey Taylor No. 2641 heavy vitreous china semi-recessed wall drinking fountain; brass strainer, self-closing lever handle stop on right hand side; loose key regulator and union connection for ⅜-in. iron pipe supply; waste outlet 1½-in. iron pipe (trap not furnished but may be placed in wall if desired); equipped with oscillating lever handle glass filler faucet through back; *2-stream projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 90 lb.

Dimensions—

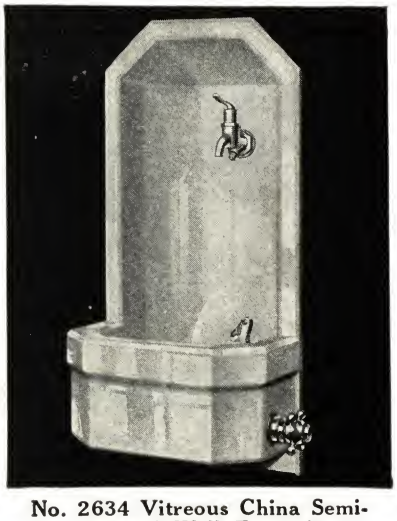
Width over all	14 in.
Height over all	25½ in.
Recessed depth	4½ in.
Projection from wall	7 in.
Supply	⅜ in.
Waste	1½ in.

Price—

No. 2641, as described, each	$95.00
No. 2640, less glass filler, each	90.00

Specification—Halsey Taylor No. 2634 heavy vitreous china semi-recessed wall drinking fountain; strainer, self-closing handle stop; positive shut-off loose key regulator and union connection for ⅜-in. iron pipe supply; waste outlet 1½-in. iron pipe; (trap not furnished but may be placed in wall if desired). Equipped with oscillating lever handle glass filler faucet through back; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 95 lb.



No. 2634 Vitreous China Semi-recessed Wall Fountain with Glass Filler

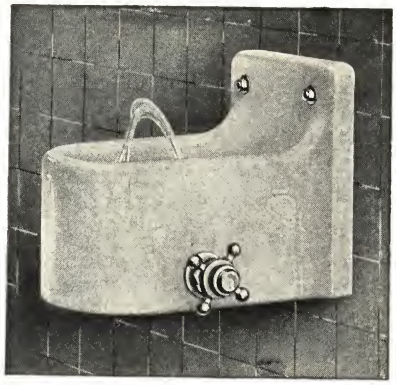
Dimensions—

Width over all	14 in.
Height over all	26 in.
Recessed depth	5¼ in.
Projection from wall	7 in.
Supply	⅜ in.
Waste	1½ in.

Price—

No. 2634, same as shown, each	$95.00
No. 2633, same as above, but with bubbler only, less glass filler, each	90.00
No. 2635, same as shown, but with glass filler only, each	85.00

WALL FOUNTAINS



No. 400 (Non-automatic) Vitreous China Wall Fountain (Patented)

Specification—Halsey Taylor No. 400 heavy vitreous china wall drinking fountain with cross handle self-closing stop installed with union on each side; positive shut-off loose key valve between supply and union ⅜-in. iron pipe supply; 1-in. iron pipe waste to wall, without trap; *2-stream mound building projector.* All exposed fittings *chromium plate.*

Shipping weight, 35 lb.

Dimensions—

Depth of receptor	2½ in.
Projection from wall	11½ in.
Width	8½ in.
Supply	⅜ in.
Waste	1 in.

Price—

No. 400, as described, less automatic control	$28.00
No. 400-A, with automatic stream control	33.00

No. 2002 (Non-automatic)

Specification—Halsey Taylor No. 2002 fountain with push button valve, *2-stream angle jet projector* and push button glass filler valve. Cast iron enameled bowl provided with slot to prevent waste water from rising over projector in case of drain stoppage. All exposed fittings *chromium plate.*

Shipping weight 12 lb.

Dimensions—

Width over all	7 in.
Height over all	5 in.
Projection from wall	8½ in.
Supply	⅜ in.
Waste	⅜ in.

Price—

No. 2002, same as shown, each	$18.00

No. 702 Cast Iron Vitreous Enameled Battery Wall Fountain

Specification—Halsey Taylor No. 702 Battery Wall Fountain; cast iron trough with apron vitreous enameled; on painted iron supporting brackets; brass supply fittings; self-closing supply valves and loose key compression stop; 1½-in. brass P trap with clean-out; ⅜-in. iron pipe supply; *two 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 85 lb.

Dimensions—

Length over all	26 in.
Distance between heads	19 in.
Distance wall to front	13 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each	$70.00

If furnished with metal guard, add $2.00 per head to list price, and with vitreous china guard, add $3.00 extra per head.

No. 703 and No. 704 Cast Iron Vitreous Enameled Battery Wall Fountain

Specification—Halsey Taylor No. 703 Battery Wall Fountain; cast iron trough with apron vitreous enameled; on painted iron supporting brackets; brass supply fittings; self-closing supply valves and loose key compression stop; 1½-in. brass P trap with clean-out; ¾-in. iron pipe supply; *three or four 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

No.	703	704
Projectors	3	4
Shipping weight	115 lb.	140 lb.

Dimensions—

Length over all	44 in.	55 in.
Distance between heads	17 in.	15 in.
Distance wall to front	13 in.	13 in.
Supply	¾ in.	¾ in.
Waste	1½ in.	1½ in.

Prices—

As shown, each	$95.00	$120.00

If furnished with metal guard, add $2.00 per head to list price, and with vitreous china guard, add $3.00 extra per head.

PEDESTAL FOUNTAINS

No. 520-68

No. 520-68 Pedestal Fountain

Specification—Halsey Taylor No. 520-68 Pedestal Fountain; receptor made from cast iron, vitreous enameled; set in cast iron protecting shield; heavy cast iron top and base; 4-in. outside diameter steel tubing standard; enclosed galvanized supply and waste pipes; self-closing stop; loose key volume regulator concealed in base; ⅜-in. iron pipe supply; 1-in. waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray. For details of installation see No. 520-600 pedestal below.

Shipping weights, 87, 90 and 95 lb., respectively.

Dimensions—

Receptor	7½x10 in.
Diameter adjustable base cover	16½ in.
Height of base cover	10½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height $39.00
	39-in. height 40.00
	42-in. height 41.00

Fig. 1

Fig. 2

No. 520-600 Pedestal Fountains

Specification—Halsey Taylor No. 520-600 Pedestal Fountain; heavy vitreous china receptor; brass strainer; 4-in. outside diameter steel tubing standard and heavy cast iron tripod base and cover; enclosed galvanized supply and waste pipes; self-closing stop; loose key regulator concealed in base; ⅜-in. iron pipe supply; 1-in. waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

By raising base cover (Fig. 1) connections can be made without disturbing floor or concrete. After connections are made pedestal is bolted to foundation, stream adjusted, and base cover lowered to proper position, concealing regulator (Fig. 2).

Shipping weights, 85, 87 and 89 lb., respectively.

Dimensions—

Receptor	7½x10 in.
Diameter adjustable base cover	16½ in.
Height of base cover	10½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height $42.00
	39-in. height 43.00
	42-in. height 44.00

No. 616 Vitreous China Pedestal Fountain

Specification—Halsey Taylor No. 616 heavy vitreous china pedestal fountain with 10-in. x 13-in. receptor; brass strainer; cast brass supply and waste connection; self-closing stop with loose key volume regulator at side of pedestal; floor screws with cap nuts; ⅜-in. iron pipe supply; 1-in. waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

30-in. height, shipping weight, 85 lb.; 36-in. height, shipping weight, 94 lb.

No. 616

Dimensions—

Receptor	10x13 in.
Height top of pedestal	30 or 36 in.
Depth of receptor inside	3½ in.
Diameter of pedestal at floor	15 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	30-in. height $66.00
	36-in. height 70.00

No. 617

No. 618

No. 617 and No. 618 Pedestal Fountains

Specification—Halsey Taylor No. 617 Pedestal Fountain; heavy vitreous china receptor; brass strainer; 2⅜-in. outside diameter steel tubing standard and cast iron closed base; self-closing stop; loose key volume regulator; ⅜-in. iron pipe supply; 1-in. waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Specification—Halsey Taylor No. 618 Pedestal Fountain; same as above but with cast iron open base for connections above floor line. Both styles finished in gray.

Shipping weights, 45 and 50 lb., respectively.

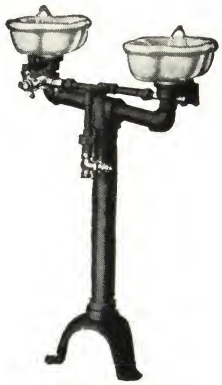
Dimensions—

Receptor	7½x10 in.
Depth of receptor	3 in.
Base	9½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height $32.00
	39-in. height 33.00

PEDESTAL FOUNTAINS



No. 618-2

No. 618-4

No. 618-2 and No. 618-4 Pedestal Fountains

No. 520

No. 520 Pedestal Fountain

Specification—Halsey Taylor No. 618-2 Pedestal Fountain; two heavy vitreous china receptors; brass strainers; 2½-in. outside diameter steel tubing standard and cast iron open base; self-closing stops; loose key volume regulators and loose key compression stop; supply—note dimensions in margin; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Specification—Halsey Taylor No. 618-4 Pedestal Fountain; same as above but with four heads.

No. 618-2 shipping weight, 75 lb.
No. 618-4 shipping weight, 110 lb.

Dimensions—

Receptors	7½x10 in.
Depth of receptor	3 in.
Base	12½ in.
Width over receptors	28½ in.
Supply—No. 618-2	½ in.
No. 618-4	¾ in.
Waste	1 in.

Prices—

No. 618-2, 36-in. height	$ 60.00
No. 618-4, 36-in. height	115.00

Specification—Halsey Taylor No. 520 Pedestal Fountain; heavy vitreous china receptor; *4-stream angle jet projector;* cast iron top with base with 4-in. outside diameter steel tubing standard; enclosed galvanized supply and waste pipe; self-closing stop; loose key volume regulator concealed in base; ⅜-in. iron pipe supply and 1-in. waste. All exposed fittings *chromium plate.* Finished in gray.

By raising base cover, connections can be made without disturbing floor or concrete. After connections are made pedestal is bolted to foundation, stream adjusted, and base cover lowered to proper position, concealing regulator.

Shipping weights, 86, 88 and 90 lb.. respectively.

Dimensions—

Receptor	6 in.
Diameter adjustable base cover	16½ in.
Height base cover	10½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height $34.00
	39-in. height 35.00
	42-in. height 36.00

No. 567

No. 568

No. 567 and No. 568 Pedestal Fountains

Specification—Halsey Taylor No. 567 Pedestal Fountain; heavy cast iron vitreous enameled bowl; 2⅜-in. outside diameter steel tubing standard and cast iron closed base; self-closing valve; loose key volume regulator; ⅜-in. iron pipe supply; 1-in. iron pipe waste; *2-stream mound building projector.* All exposed fittings *chromium plate.*

Specification—Halsey Taylor No. 568 Pedestal Fountain; same as above but has cast iron open base for connections above the floor line. Both styles finished in gray.

Shipping weights, 45 and 48 lb., respectively.

Dimensions—

Receptor	7½x 9½ in.
Base	9½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height $25.00
	39-in. height 26.00

No. 547

No. 548

No. 547 and No. 548 Pedestal Fountains

Specification—Halsey Taylor No. 547 Pedestal Fountain; heavy vitreous china receptor, with No. 515 fountain head; self-closing stop; loose key volume regulator; *4-stream angle jet projector;* 2⅜-in. outside diameter steel tubing standard with cast iron closed base. Galvanized supply and waste pipes concealed within standard; ⅜-in. iron pipe supply and 1-in. waste. All exposed fittings *chromium plate.*

Specification—Halsey Taylor No. 548 Pedestal Fountain; same as above but with cast iron open base for connections above floor line. Both styles finished in gray.

Shipping weights, 45 and 52 lb., respectively.

Dimensions—

Receptor	9½ in.
Diameter of base	9½ in.
Supply	⅜-in. I.P.
Waste	½-in. I.P.

Prices—

As described, each	36-in. height $25.00
	39-in. height 26.00

COMBINATION COOLER AND DRINKING FOUNTAINS

No. 800 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 800 Combination Cooler and Drinking Fountain; heavy vitreous china receptor; brass strainer; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation, re-granulated cork in sidewalls and pressed cork-board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; supply pipe furnished with self-closing stop and volume regulator; ⅜-in. iron pipe supply, 1-in. iron pipe waste. Cover furnished so that padlock may be used to prevent removal of ice. *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 148 lb.

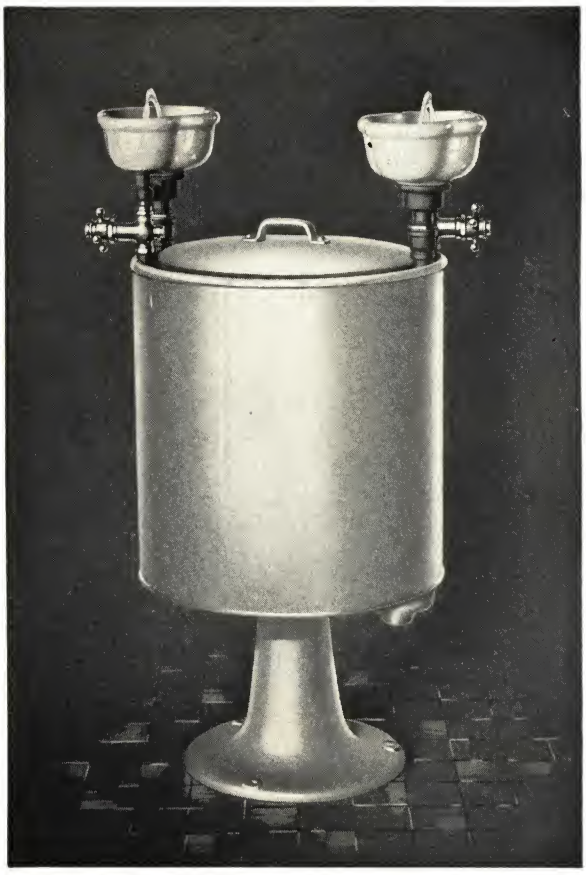
Dimensions—

Receptor	7½x10 in.
Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Height to top of receptor	40 in.
Diameter of base	14 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.
Ice capacity	80 lb.

Ice consumption approximately 1 lb. per capita per day

Price—

As described, each $72.00



No. 802 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 802 Combination Cooler and Drinking Fountain with two heads; heavy vitreous china receptors; brass strainers; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation; re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; supply pipe furnished with self-closing stop and volume regulator; ⅜-in. iron pipe supply, 1-in. iron pipe waste; cover furnished so that padlock may be used to prevent removal of ice. *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 160 lb.

Dimensions—

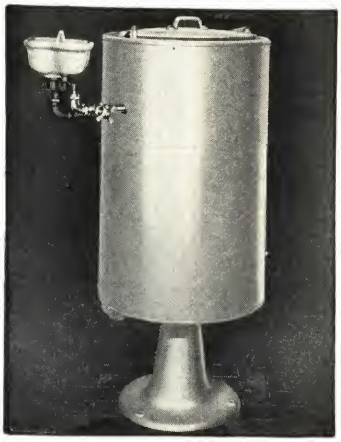
Receptors	7½x10 in.
Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Height to top of receptor	40 in.
Diameter of base	14 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.
Ice capacity	80 lb.

Ice consumption approximately 1 lb. per capita per day

Price—

As described, each $110.00

COMBINATION COOLER AND DRINKING FOUNTAINS



No. 820 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 820 Combination Cooler and Drinking Fountain; same as No. 800 excepting ice capacity of 120 lb. and cooling coil of double length. Dimensions of ice chamber 20-in. outside diameter x 30 in. high. Height to top of fountain receptor, 42 in.; ⅜-in. iron pipe supply and 1-in. iron pipe waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

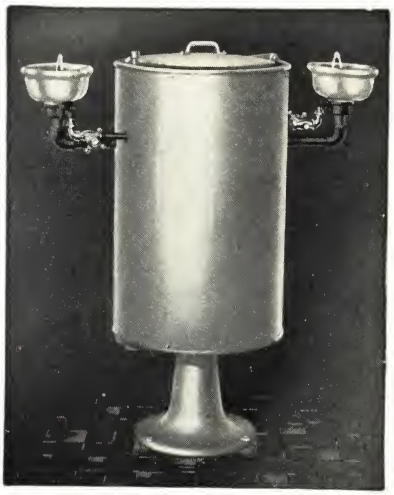
Shipping weight, 194 lb.

Dimensions—

Ice chamber	20-in. o.d. x 30-in. height
Height to top of ice chamber	42 in.
Height to top of receptor	42 in.
Ice capacity	120 lb.

Price—

As described, each $87.00



No. 822 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 822 Combination Cooler and Drinking Fountain, same as No. 820 illustrated and described above, except furnished with two heads; ice capacity of 120 lb. and cooling coil of double length. Dimensions of ice chamber 20-in. outside diameter x 30 in. high. Height to top of fountain receptor, 42 in.; ⅜-in. I.P. supply and 1-in. iron pipe waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 210 lb.

Dimensions—

Ice chamber	20-in. o.d. x 30-in. height
Height to top of ice chamber	42 in.
Height to top of receptor	42 in.
Ice capacity	120 lb.

Price—

As described, each $120.00

No. 580 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 580 Cafeteria Cooler and Drinking Fountain; 15½-in. diameter combination cast iron cover and catch basin, with perforated nickel plated brass drain plate; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation: re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; ⅜-in. iron pipe supply and 1-in. iron pipe waste. Catchbasin is removed to replenish ice in cooler.

Equipped with vitreous china receptor, *2-stream mound building projector and Taylor automatic stream control* and one self-opening, self-closing glass filler. All exposed fittings *chromium plate.* Finished in gray or white.

Shipping weight, 170 lb.

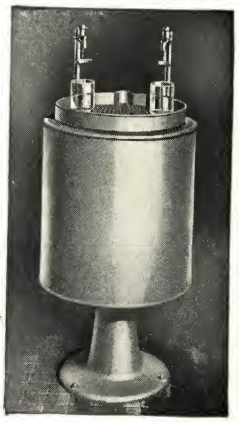
Dimensions—

Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Height to top of receptor	40 in.
Ice capacity	80 lb.

Price—

As described, each $92.00

No. 577 Cafeteria Cooler and Drinking Fountain



No. 577

Specification — Halsey Taylor No. 577 Cafeteria Cooler and Drinking Fountain; 15½-in. diameter combination cast iron cover and catch basin, with perforated nickel plated brass drain plate; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation: re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; ⅜-in. iron pipe supply and 1-in. iron pipe waste. Catchbasin is removed to replenish ice in cooler.

Equipped with two self-opening, self-closing glass fillers. All exposed fittings *chromium plate.* Finished in gray or white.

Shipping weight, 160 lb.

Dimensions—

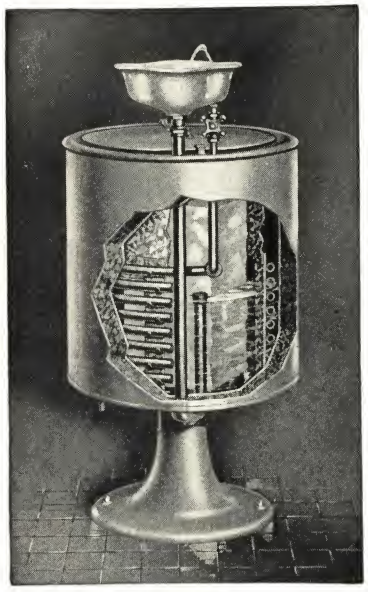
Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Ice capacity	80 lb.

Prices—

As described, each	$80.00
No. 576 with one glass filler only, each	70.00

COMBINATION COOLER AND DRINKING FOUNTAINS

No. 570 Combination Cooler and Drinking Fountain



No. 570

Specification—Halsey Taylor No. 570 Combination Cooler and Drinking Fountain; cast iron vitreous enameled receptor; brass strainer; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation: re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; supply pipe furnished with self-closing stop and volume regulator, *2-stream mound building projector;* ⅜-in. iron pipe supply and 1-in. iron pipe waste. Cover furnished so that padlock may be used to prevent removal of ice. All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 142 lb.

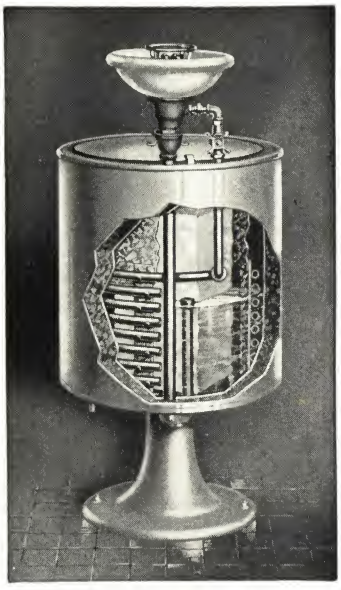
Dimensions—

Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Height to top of receptor	40 in.
Ice capacity	80 lb.

Price—

As described, each $65.00

No. 573 Combination Cooler and Drinking Fountain



No. 573

Specification — Halsey Taylor No. 573 Combination Cooler and Drinking Fountain; heavy 9½-in. vitreous china receptor; brass strainer; brass supply and cast iron trap mounted on cooler, with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation: re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; supply pipe furnished with self-closing stop and volume regulator; furnished with No. 515 fountain head with *4-stream angle jet projector* and 4-in. guard ring; ⅜-in. iron pipe supply and 1-in. iron pipe waste. All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 150 lb.

Dimensions—

Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Height to top of receptor	40 in.
Ice capacity	80 lb.

Price—

As described, each $60.00

PLAIN COOLERS

No. 571 Plain Cooler

No. 571

Specification — Halsey Taylor No. 571 Plain Cooler; brass supply and waste connections; cover, top and base made of cast iron and pressed steel; body of tank and coil guard made of galvanized sheet iron; insulation; re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; ⅜-in. iron pipe supply and 1-in. iron pipe waste; ice capacity 80 lb. Dimensions of ice chamber 20-in. outside diameter x 20 in. high. Cover furnished so that padlock may be used to prevent removal of ice. Finished in gray.

This cooler designed for use in connection with drinking fountains already installed or where it is desired to conceal the cooler; also for installation in basement to supply fountains on floors above.

Shipping weight, 152 lb.

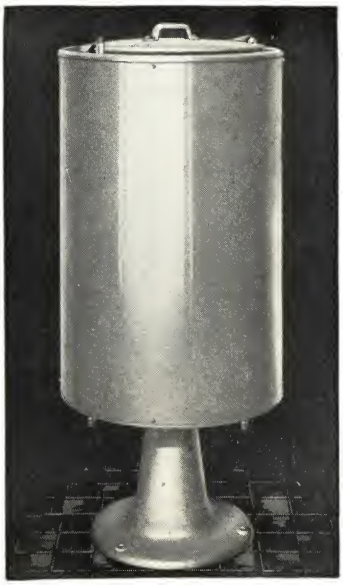
Dimensions—

Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Ice capacity	80 lb.

Price—

As described, each $48.00

No. 572 Plain Cooler



No. 572

Specification—Halsey Taylor No. 572 Plain Cooler; same as No. 571 illustrated and described at left; excepting ice capacity of 120 lb. and cooling coil of double length. Dimensions of ice chamber 20-in. outside diameter x 30 in. high; ⅜-in iron pipe supply and 1-in. iron pipe waste. Cover furnished so that padlock may be used to prevent removal of ice. Finished in gray.

Shipping weight, 170 lb.

Dimensions—

Ice chamber	20-in. o.d. x 30-in. height
Height to top of ice chamber	42 in.
Ice capacity	120 lb.

Price—

As described, each $65.00

NON-AUTOMATIC FOUNTAINS

No. 566 Cantonment Type Wall Fountain

Specification—Halsey Taylor No. 566 Cantonment Type Wall Fountain; cast iron vitreous enameled all over; self-closing stop; loose key volume regulator; brass strainer; 1¼-in. brass trap; ⅜-in. iron pipe supply; *2-stream mound building projector.* All exposed fittings *chromium plate.*

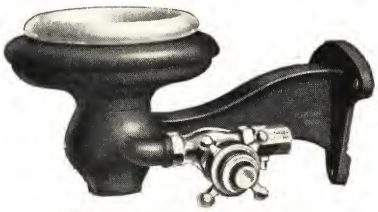
Shipping weight, 20 lb.

Dimensions—

Receptor	7½x9½ in.
Projection from wall	11½ in.
To center of drinking mound	8 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	$23.00
Complete, less trap	20.50
With 1-in. male spud, less trap and tailpiece, each	20.00



No. 540 Wall Fountain

Specification—Halsey Taylor No. 540 Wall Fountain; heavy 6-in. vitreous china bowl mounted on cast iron bracket and bowl support; self-closing stop; loose key volume regulator; furnished with *4-stream angle jet projector;* ⅜-in. iron pipe supply and 1-in. waste. All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 20 lb.

Dimensions—

Projection from wall	12 in.
Diameter of bowl support	7 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Price—

As described, each	$16.50

No. 542 Wall Fountain

Specification—Halsey Taylor No. 542 Wall Fountain; heavy 9½-in. vitreous china bowl mounted on cast iron bracket to wall; brass strainer; 3¾-in. guard ring; self-closing stop; loose key volume regulator; furnished with *4-stream angle jet projector;* ⅜-in. iron pipe supply and 1-in. waste. All exposed fittings *chromium plate.* Finished in gray.

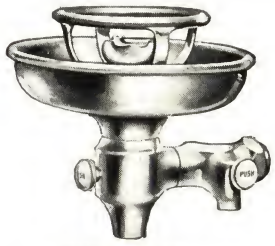
Shipping weight, 25 lb.

Dimensions—

Projection from wall	13 in.
Diameter of bowl	9½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Price—

As described, each	$22.00



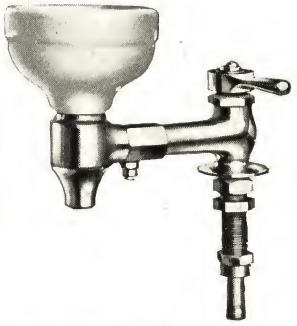
No. 505 Fountain

With 6-in. nickel plated spun brass bowl; guard ring; self-closing push button valve; volume regulator; *4-stream angle jet projector;* self-closing push button valve on side for filling glass; ½-in. supply; ⅜-in. outlet iron pipe threads.

Shipping weight, 3½ lb.

Price—

As described, each	$12.00



No. 506 Fountain

Nickel plated brass self-closing lever handle stop; volume regulator; 4-in. vitreous china bowl; *4-stream angle jet projector;* ¼-in. iron pipe supply.

Shipping weight, 4 lb.

Price—

As described, each	$10.50

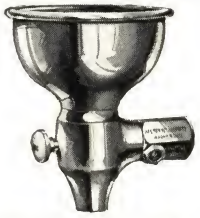
No. 508 Fountain

Nickel plated brass; self-closing stop; volume regulator; 3¾-in. guard ring; *4-stream angle jet projector;* ⅜-in. iron pipesupply.

Shipping weight, 2 lb.

Price—

As described, each	$9.00



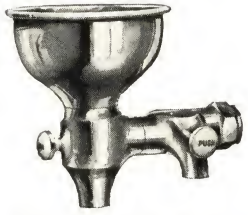
No. 501 Fountain

With 4-in. nickel plated spun brass or vitreous china bowl; self-closing push button valve; volume regulator; *4-stream angle jet projector;* ½-in. supply; ⅜-in. outlet, iron pipe threads.

Shipping weight, 2 lb.

Prices—

As described, each	$6.00
With 6-in. nickel plated cup and 4-in. guard ring	9.50



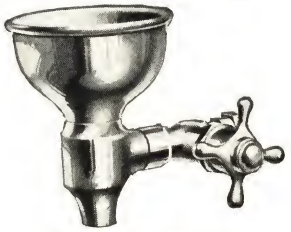
No. 502 Fountain

Same as No. 501, but has self-closing push button valve on side for filling glass; ½-in. supply; ⅜-in. outlet, iron pipe threads.

Shipping weight, 2½ lb.

Price—

As described, each	$8.50



No. 504 Fountain

With 4-in. nickel plated spun brass or vitreous china bowl; self-closing stop; volume regulator; *4-stream angle jet projector;* ¾-in. supply; ⅜-in. outlet, iron pipe threads.

Shipping weight, 3 lb.

Price—

As described, each	$ 9.00
With 6-in. nickel plated brass bowl and guard ring	12.50

FOUNTAIN HEADS

No. 575 Fountain Head

Specification—Halsey Taylor No. 575 Fountain Head; cast iron vitreous enamel 7½x9½-in. receptor; self-closing stop and volume regulator; waste outlet 1½ or 2-in. iron pipe; ⅜-in. iron pipe supply; *2-stream mound building projector.* All exposed fittings *chromium plate.*

Used to replace present unsanitary heads on coolers and pedestal fountains.

Shipping weight, 13 lb.

Prices—

As described, each	$17.00
Less self-closing stop and regulator, each	12.00

No. 586 Fountain Head

Specification—Halsey Taylor No. 586 Fountain Head; vitreous china 7½x10-in. receptor; brass strainer; ⅜-in. iron pipe supply; waste outlet 1¼ or 1½-in. iron pipe; self-closing stop with regulator and union connection; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Used to replace present unsanitary heads on coolers and pedestal fountains.

Shipping weight, 20 lb.

Price—

As described, each	$22.00

No. 514 Fountain Head

With nickel plated brass base and 4-in. vitreous china bowl; loose key volume regulator; furnished with *4-stream angle jet projector;* height 4¼ in.; ⅜-in. iron pipe supply.

Shipping weight, 2 lb.

Price—

As described, each	$4.50

No. 515 Fountain Head

Nickel plated brass; with 3¾-in. guard ring; loose key volume regulator; *4-stream angle jet projector;* height over all 3⅛ in.; furnished with either ⅜-in. iron pipe male or female thread.

Shipping weight, 2 lb.

Price—

As described, each	$4.50

No. 509 Fountain Head

Nickel plated brass; self-closing stop; volume regulator; 3¾-in. guard ring; *4-stream angle jet projector;* supply ⅜-in. iron pipe.

Shipping weight, 2 lb.

Price—

As described, each	$9.00

ESTABLISHED 1894

THE BEATON & CADWELL MFG. CO.

Manufacturers of Flush Valves

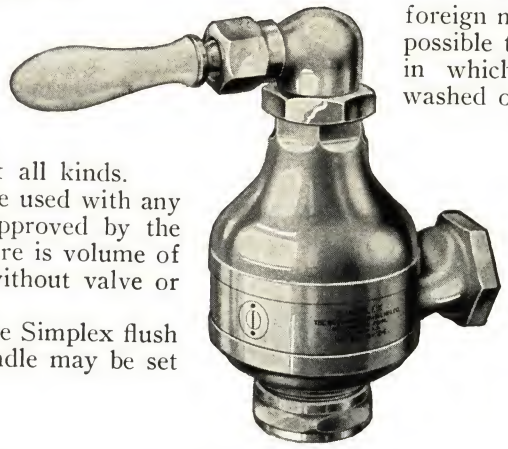
NEW BRITAIN, CONN.

NEW YORK OFFICE: 234 Water Street—Telephone, BEekman 3-3967-68

Product

SIMPLEX FLUSH VALVES.

For our page on Floor and Ceiling Plates, Radiator Air Valves, etc., see Manufacturers' Index.



Simplex Flush Valves

Simplex flush valves are especially designed for schools, apartments, office buildings, factories, public installations or all kinds.

Simplex flush valves may be used with any standard bowl that has been approved by the Bureau of Standards, where there is volume of water sufficient to flush bowl without valve or tank.

The oscillating handle on the Simplex flush valve is constructed so that handle may be set in any position desired.

Siphon Proof

Simplex flush valves are constructed with integral "vacuum break" which allows air to enter, preventing contents of closet bowls siphoning to water supply pipe and contaminating water supply.

Outside By-pass Control

The Simplex flush valve has a time plug arrangement that allows valve to be adjusted from the outside of valve (when necessary). All valves are regulated at the factory for the usual conditions.

The by-pass is so constructed that there are four different channels. If foreign matter accumulates in one of these it is possible to turn plug to one of the other three in which case the accumulation should be washed out without taking valve apart.

Finish

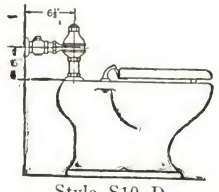
Unless otherwise specified all valves except concealed type will be furnished nickelplated. Exposed parts of concealed valves are nickelplated.

Chromium plated Simplex valves can be furnished at higher prices. This finish is especially recommended for long life; resists tarnish and corrosion indefinitely. No polishing required on chromium plated Simplex flush valves.

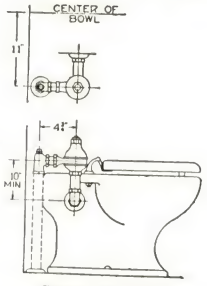
Illustrations

The following line cuts show various roughing-in measurements. Special variations can be complied with.

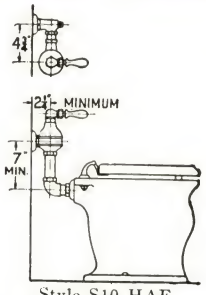
Either oscillating metal handle or metal push button can be supplied as desired. Oscillating handle can be furnished where push button is shown, and vice versa.



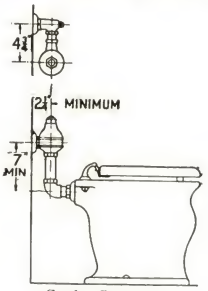
Style S10 D
1¼-in. flush connection
Style S10 DR
1½-in. flush connection
List price, $23.00



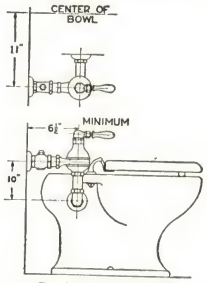
Style S10 EA
1¼-in. flush connection
Style S10 EAR
1½-in. flush connection
List price, $24.50



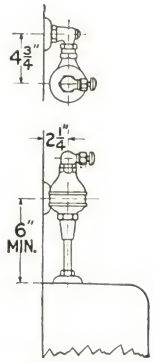
Style S10 HAE
1¼-in. flush connection
Style S10 HAER
1½-in. flush connection
List price, $24.50



Style S10 EA
1¼-in. flush connection
Style S10 EAR
1½-in. flush connection
List price, $24.50

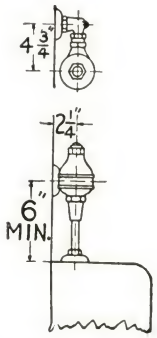


Style S10 HDE
1¼-in. flush connection
Style S10 HDER
1½-in. flush connection
List price, $24.50

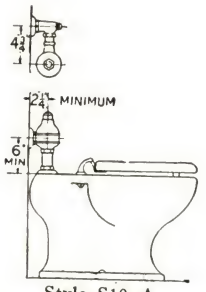


S-10-FUA ¾-in. angle stop and ¾-in. outlet
List price each, $22.00

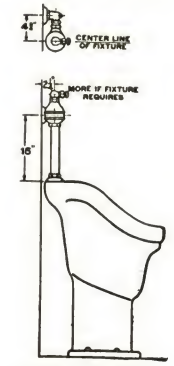
Can be furnished with oscillating handle or top push button



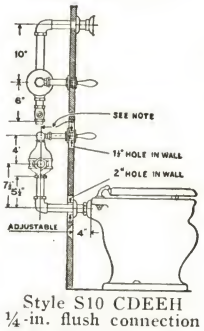
Style S10 UA
¾-in. angle stop and ¾-in. outlet
List price, $22.00



Style S10 A
1¼-in. flush connection
Style S10 AR
1½-in. flush connection
List price, $23.00



Style S10 QFA
1¼-in. flush connection
Style S10 QFAR
1½-in. flush connection
List price, $24.00



Style S10 CDEEH
1¼-in. flush connection
Style S10 CDEEHR
1½-in. flush connection
List price, $26.00

Can be furnished with push button instead of oscillating handle. Same list price

When wall is more than 1 in. in thickness add to list price as follows: 1 to 2 in., 60¢, and 30¢ for each additional inch in thickness.

THE IMPERIAL BRASS MFG. CO.

Manufacturers of the Watrous Line of Plumbing Specialties

1222 West Harrison Street
CHICAGO, ILL.

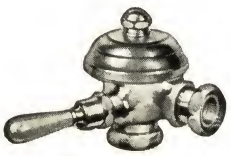
Products

WATROUS MAJESTIC and JEWEL FLUSH VALVES. Also, Watrous Combination Lavatory Fixtures, Watrous Lavatory Wastes, Watrous Self-closing Faucets.

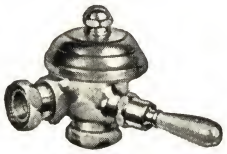
For Imperial Window Washing Devices, Safety Belts, Builders' Hardware and Watrous Liquid Soap Fixtures, see Manufacturers' Index.

Watrous Majestic Flush Valves

No. M-525



No. M-526



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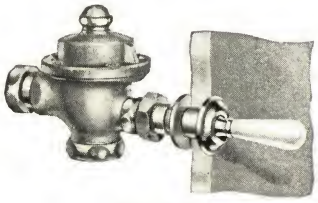


No. M-528

The Watrous Majestic Flush Valve combines superior design, expert workmanship and quality materials to give uninterrupted, efficient and economical service. In it you will find the following combined features, so necessary for proper flushing of any bowl or urinal:

(1) Outside regulation.
(2) A self-cleansing by-pass.
(3) A durable rubber diaphragm.
(4) No restriction of the waterway.

(1) Outside Regulation—A short or a long flush is accomplished by merely removing the cap at top of the valve, and simply turning the exposed screw with a screw driver which regulates the size of the by-pass opening. *It is not necessary to turn off the water or remove any of the working parts of the valve when this is being done.* The adjustment thus made assures a uniform flush.

(2) A Self-cleansing By-pass—The action of the valve does not depend upon the condition of the water and is not impaired by the presence of foreign particles in it. Every time the valve is flushed, a spring plunger (see B in diagram) is raised off its seat (C), leaving an opening that is sufficiently large to assure the by-pass against clogging.

(3) A Rubber Diaphragm—Of special composition without metal inserts. Easily removable. No slippage occurs with diaphragm construction to affect uniformity of flush.

(4) No Restriction of the Waterway—Regardless of the length of flush there is no restriction of the waterway, operating unit making full travel at each flush.

Correct "Shut-off" Action—The area of the control chamber of the Watrous Majestic Valve is exceptionally large—25% larger than the area usually found in ordinary flush valves. This large area gathers sufficient force, even at low pressures, to insure correct action by the shut-off mechanism.

Correct Bowl Action—The Watrous Majestic Valve also has an unusually large waterway per second of opening. It delivers to the bowl a sudden extra large volume of water, with sufficient "punch" to insure prompt flushing action. This flushes any bowl more thoroughly than a larger quantity of water introduced at a slower speed, particularly when supply pipes are small and pressure is low.

This valve will work on water pressures from the highest down to as low as 5 lb. This means the elimination of top-floor trouble—problems frequently encountered on the upper floor of buildings where the water pressure is likely to be low.

Types and Finish—The Watrous Majestic Valve can be furnished in the various types as shown above and are adaptable to any bowl or urinal. Furnished in heavy nickel or chromium plated finishes.

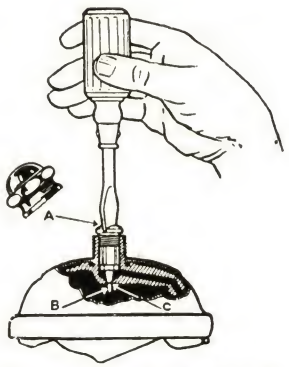
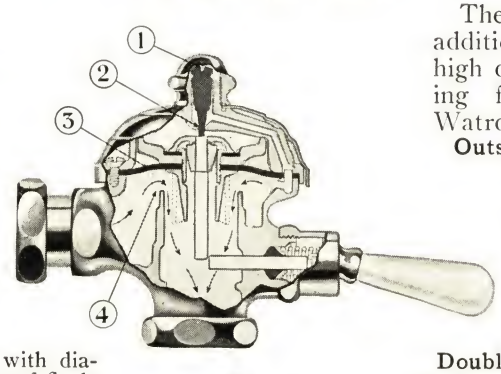
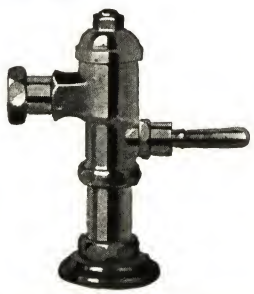


Diagram Showing Ease of Adjustment for Water Volume





Watrous Jewel Flush Valve

Watrous Jewel Flush Valve

The Watrous Jewel Flush Valve, in addition to its attractive appearance and high quality, has several of the outstanding features which are used in the Watrous Majestic Valve.

Outside Regulation and Unrestricted Waterway—The length of flush for any bowl can be made without shutting off the water or removing any of the working parts of the valve. In addition the regulation does not restrict the travel of the working parts, thereby having a full, unrestricted waterway regardless of how the valve is regulated.

Double Opening to By-pass—The double opening to by-pass is used to prevent clogging and the water in the valve cleans the by-pass at each flush.

Main Valve Seat Washer—Fitted to bottom of working unit and easily renewable.

Types and Finish—The Watrous Jewel Valve is furnished in the same various types as the Watrous Majestic and are adaptable to any bowl or urinal. Furnished in heavy nickel plate or chromium plated finish.

Catalogues and Blue Prints

Complete catalogue and roughing-in blue prints of all Watrous Fixtures on request.

ESTABLISHED 1855

SMITH & WESSON INC.

Manufacturers of Flush Valves

SPRINGFIELD, MASS.

Product

SMITH & WESSON FLUSH VALVES.

Adaptability

Smith & Wesson Flush Valves can be used on any standard plumbing fixtures and are furnished for exposed or concealed installations. *The valve operates equally well with either hot or cold water.*

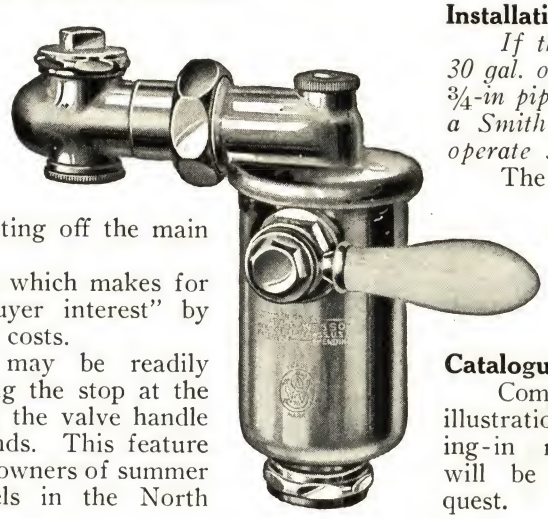
Advantages

As the Smith & Wesson Flush Valve is all-metal in its construction, having no packings or diaphragms, there is no deterioration either in service *or in stock.* The design of the valve is such that the necessity of any by-pass is done away with. It may be adjusted quickly and easily without special tools and without the necessity of shutting off the main water supply.

It operates on a ¾-in. supply which makes for a degree of "buyer interest" by lower installation costs.

The valve may be readily drained by closing the stop at the inlet and holding the valve handle open a few seconds. This feature is appreciated by owners of summer homes and hotels in the North where it is necessary to draw off the water during the winter months. It may be readily seen that the Smith & Wesson Flush Valve will require *no organized servicing.*

The valve can be furnished in nickel or chromium plate with either white Isolantite or metal handles, and the valve is guaranteed by SMITH & WESSON, who will furnish *new valves* in exchange for any which may prove to be defective within five years of the purchase date.



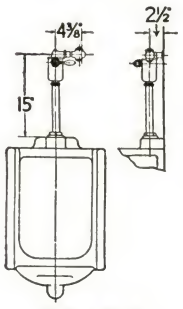
Installation

If there is a flow of not less than 30 gal. of water per minute through the ¾-in pipe at a pressure not under 15 lb., a Smith & Wesson Flush Valve will operate satisfactorily.

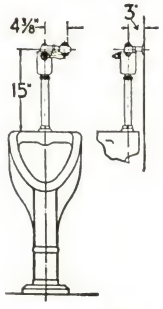
The approximate pressure at the valve may be obtained by deducting 1 lb. from the pressure at the main for each 2 ft. that the flush valve is above the main.

Catalogue

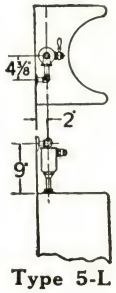
Complete catalogue, showing typical illustrations and roughing-in measurements, will be mailed on request.



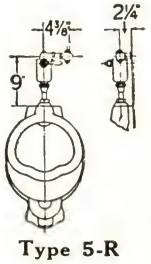
Type 6-R



Type 6-R



Type 5-L



Type 5-R

Price List

Type 1-S	Complete $23.00	Type 4-L	Complete $26.00
Type 1	Complete 24.00	Type 5	Complete 23.00
Type 2	Complete 24.50	Type 6	Complete 24.00
Type 3-L	Complete 24.50	Type 7	Complete 24.50

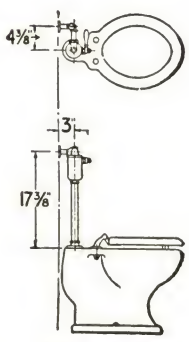
The Smith & Wesson Flush Valve complete consists of nickelplated valve with ¾-in. ground key stop (angle or straight), white or metal handle, 1¼-in. outside diameter nickelplated flush connection with nickelplated nut, spud nut, wall and spud flanges.

Type 1-S (shown) is furnished with right inlet (1-R-S) and left inlet (1-L-S). Type 1-R (shown) is furnished with back inlet (Type 1) and left inlet (Type 1-L). Type 2-L (shown) is furnished with back inlet (Type 2) and right inlet (Type 2-R). Type 6-R (shown) is furnished with left inlet (Type 6-L). Type 7-R (shown) is furnished with left inlet (Type 7-L).

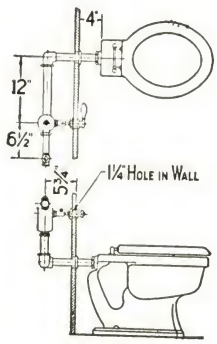
When ordering, designate which type is required, and for concealed installations (4-L), thickness of wall should be given.

With the Type 5 valve, the flush connection is nickelplated ¾-in. outside diameter.

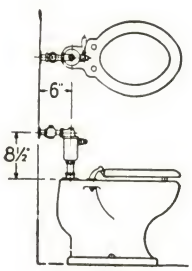
Smith & Wesson Flush Valves may be used to replace other makes of valves, and when ordered for this purpose, the center to center measurement of valve to be replaced should be given.



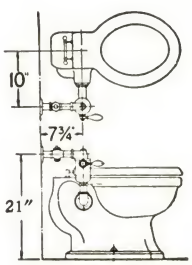
Type 1-R



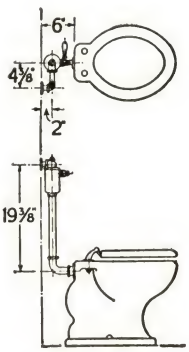
Type 4-L



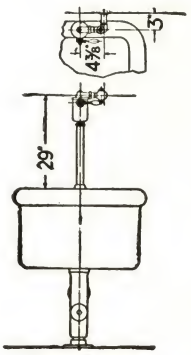
Type 1-S



Type 3-L



Type 2-L



Type 7-R

ESTABLISHED 1878

JAMES B. CLOW & SONS

Plumbing Supplies, Cast Iron Pipe and Fittings, Manhole Frames

TELEPHONE
West 6040

201-299 North Talman Avenue
CHICAGO, ILL.

Mail Address:
P. O. Box NN

SALES OFFICES

BOSTON, MASS. CHICAGO, ILL. DES MOINES, IOWA DETROIT, MICH. MILWAUKEE, WIS. MINNEAPOLIS, MINN.
NEW YORK, N. Y. PHILADELPHIA, PA. PITTSBURGH, PA. SAN FRANCISCO, CALIF. TOLEDO, OHIO

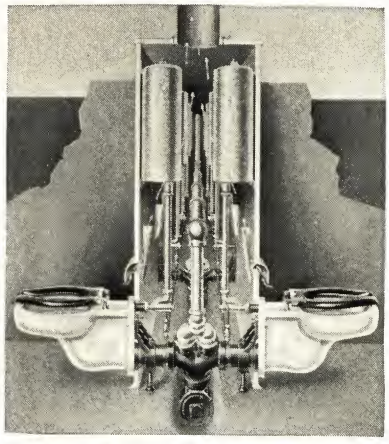
WORKS: CHICAGO, ILL.; NEWCOMERSTOWN, OHIO; COSHOCTON, OHIO; BIRMINGHAM, ALA.

Products

PLUMBING FIXTURES and SUPPLIES.
BRASS GOODS.
Also Cast Iron Pipe and Fittings; Manhole Frames and Covers.
For Gasteam Heating Systems, see Manufacturers' Index.
In addition to their own manufactured products, a full line of accessories, supplies and equipment for the installation and operation of Clow equipment is catalogued and carried in stock.

Plumbing Fixtures

For over fifty years this company has specialized in the development of plumbing fixtures for factories, railroads, hospitals, schools, office buildings and public comfort stations. This specialized line is supplemented by a complete line of staple plumbing fixtures for every type of installation.



Clow-Madden Automatic Closets

Clow-Madden Automatic Closets—Nationally used in public buildings and industrial types of construction, assuring the maximum in sanitation. Installations which have been in service for over twenty-five years are typical of the enduring quality which characterizes the entire line of Clow products. The illustration shows an application of the Clow ventilators to a double battery of stack-hung automatic closets which, hanging free of the floor, permit the most scrupulous cleanliness in the maintenance of sanitary conditions in toilet rooms.

Drinking Fountain—The one shown is a most advanced development of the angle stream fountain, in wall-hung type, with the non-back-syphoning arrangement in which the orifice of the jet of water is raised above the overflow line of the receptor so that pollution of the supply line is impossible under any circumstances. The orifice itself is so shielded that contact with the lips of the drinker is also impossible, neither can the jet be caused to squirt by placing a finger on the opening.

Clow Drinking Fountain

Gang Showers—These showers, which eliminate possible scalding and which nevertheless permit the individual user to adjust the temperature at will, are a necessary part of many installations. Showers of this type and special showers for unusual conditions will be designed and fabricated to order by an organization which has over a half century of experience in the problems of mass sanitation.

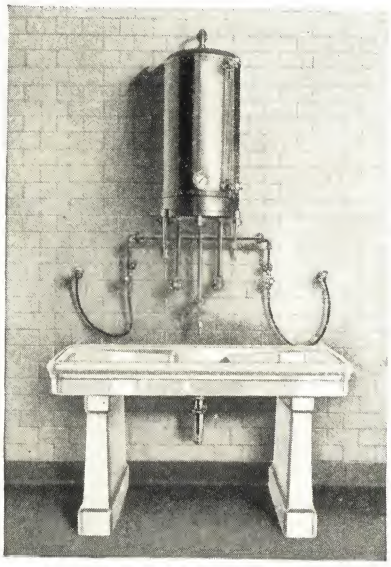
Hospital Plumbing Fixtures

Since the earliest developments of sanitary plumbing fixtures for hospitals, this company has pioneered in the design of this highly specialized equipment. Clow materials can be found in the hydrotherapeutic departments of many of the largest hospitals and sanitariums in the United States and Canada.

Continuous flowing and electric full baths; scotch, vapor, rain douche, and needle baths; arm, leg, and sitz baths; aix or vichy baths; and reclining cabinets for vapor or light baths are among the various types of standardized equipment that are available.

The infants' bath (see illustration) with an indirect gravity supply to avoid any possible fluctuation in supply line temperatures typifies the studied effort to bring these appliances to their ultimate stage of perfection.

Closets for patients or service rooms which receive and flush the bed pans are a recent addition to the Clow line.



Clow Infants' Bath

Brass Goods

The brass factory of this company produces a complete line of plumbing brass goods which are accurately fitted and tested in connection with the fixtures with which they are to be used. Wall hydrants which provide protection against frost are available for all wall thicknesses and with polished brass or chromium plated face plates.

Clow Frostproof Wall Hydrant

Catalogues

"Clow Plumbing Fixtures—Catalogue No. 50." Plumbing fixtures for every type of installation, with auxiliary equipment for supply, temperature control and disposal of drainage.

"Gasteam Heating Systems." A complete steam heating system without a boiler. A.I.A. File No. 29-f-4.

"Pipe Economy." Cast iron pipe and fittings of every kind and size including standard specifications and engineering tables of weights, dimensions, capacities, etc. Also valves, fire hydrants, cocks, tools, supplies and equipment for water and gas service installation, manhole frames and covers.

A. F. CURTIN VALVE CO.

Manufacturers of Noiseless Water Closet Tank Fittings

MEDFORD, MASS.

All Leading Plumbing Supply Houses Will Now Equip Tanks with Curtin Fittings

Products

CURTIN NOISELESS TANK FITTINGS for low down water closet tanks include the "CURTIN-VICTORY" VALVE, the "CURTIN-LEVER," the CURTIN ALL-WHITE LEVER and the "CURTIN-ROTARY" BALL COCK.

Why the Closet Tank Is Used

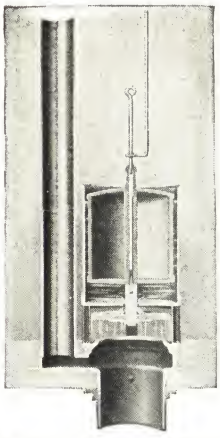
Water closets flushed from tanks equipped with Curtin Fittings will give a strong and perfect flush with only 4 gal. of water—a great saving. Economical to install, as the ordinary ⅝-in. service pipe from street gives ample water supply to any residence. With water closets flushed by direct pressure flush valves, however, a 1-in. or larger service is required, and in flushing directly from service pipe there is danger of contaminating the water supply. The Curtin Fittings require no attention or repairs. They operate quietly under all conditions. This is a most desirable feature, particularly in homes, apartments and hotels, where people should not be disturbed by noisy water closets.

A Curtin Equipped Water Closet Tank

"Curtin-Victory" Valve

This valve has a full, unrestricted waterway, and starts the siphon action immediately. It will operate even the largest closet with a minimum amount of water. It takes out all the water and the tank fills with clean water. Refills any closet. No refill tube is required. Has a flat seat washer which will not leak. Easily operated; a slight touch of the lever lifts the valve. It always finds its seat; there are no close fitting parts. Quiet in operation, it falls silently on its seat.

All bronze castings are made from certificate metal ingots. Cylinder and overflow tube of electrolytic seamless drawn copper.

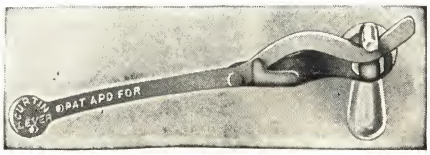


Sectional View "Curtin-Victory" Valve

Float slowly falling as water leaves float chamber; valve but partly closed, yet tank already emptied

"Curtin-Lever" and Curtin All-White Lever

This "Curtin-Lever" is made of cast bronze. It is very strong and always in alignment.



"Curtin-Lever"

An oversize flange covers lever opening in any tank without addition of plates or washers.

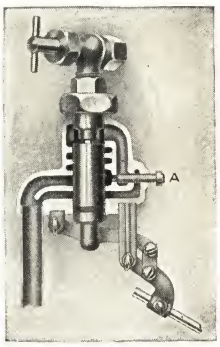
This double action lever exerts a powerful lift in either direction with a slight touch of handle. Once attached to the tank, it will neither work loose, nor shift position.

The Curtin All-White Lever, shown in the tank fittings illustration, has a neat all-china handle which adds much to the appearance of any tank where an all-white bathroom is desired.

"Curtin-Rotary" Ball Cock

We are the originators of the rotary ball cock, which was the first silent ball cock. Time has shown that revolving the stream of water, as in the "Curtin-Rotary" Ball Cock, is the only practical method of eliminating the noise.

On very low pressure, opening the by-pass screw "A" permits free passage of water through ball cock and insures quick filling of tank. With its powerful compound leverage, ball cock will operate satisfactorily under any pressure. Made of cast bronze and copper.

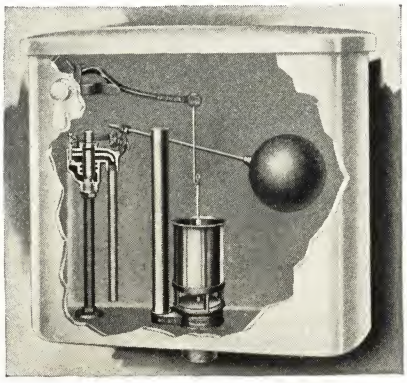


Sectional View "Curtin-Rotary" Back Supply Ball Cock or Float Valve

Back supply type with integral stop furnished for *all-white* bathroom with no exposed metal. Rotary ball cocks can also be supplied adapted for high tanks in the bathroom or expansion tanks in the attic.

Curtin Noiseless Fittings Installed in Low Tank

They will fit and operate in any low tank for any style of water closet and are often used on replacements. These fittings afford a most silent, sanitary and satisfactory method for the flushing of water closets.



Curtin Fittings Installed

Specifications

The words "Curtin Fittings including Lever" with plate number of any low closet tank insure the installation of these noiseless tank fittings on your work.

THE BRUNSWICK-BALKE-COLLENDER CO.

Manufacturers of Closet Seats, Billiard Tables, Bowling Alleys, Billiard and Bowling Supplies, Squash Courts and Shuffle Boards

GENERAL OFFICE
623-633 South Wabash Avenue
CHICAGO, ILL.

TELEPHONE
Wabash 4020

BRUNSWICK CLOSET SEATS SOLD BY ALL LEADING PLUMBERS, PLUMBING JOBBERS AND WATER CLOSET MAKERS

Products

WHALE-BONE-ITE CLOSET SEATS.
WHITE PYROXLINE CLOSET SEATS.
PEARL COLORED CLOSET SEATS.

For our pages on Billiard Tables and Bowling Alleys, see Manufacturers' Index.

The Company

THE BRUNSWICK-BALKE-COLLENDER CO. have been continuously in business since 1858 as manufacturers of special products requiring the highest type of cabinet work. The Company, over this seventy-four (74) year period, has established an enviable reputation for business integrity and its products are recognized standard for quality. For the past twenty (20) years the Company has manufactured and marketed Whale-Bone-Ite Closet Seats—the first moisture-proof, composition-sheathed seat.

Partial Recent Installation List

Government Buildings

Standard for all Post Offices and Veterans' Hospitals.
Department of Commerce Building, Washington, D. C.
Old Soldiers' Home, Sawtelle, Calif.

Public Buildings

Cook County Courthouse, Chicago, Ill.
Racine County Courthouse, Racine, Wis.
Jefferson County Courthouse, Birmingham, Ala.

Hospitals

Orangeburg Asylum, Orangeburg, N. Y.
Battle Creek Sanitarium, Battle Creek, Mich.
Manteno State Hospitals, Manteno, Ill.
Lying In Hospital, Chicago, Ill.

Hotels

The Arizona Biltmore, Phoenix, Ariz.
Barbazon Hotel, New York, N. Y.
The Harrisburger, Harrisburg, Pa.
The Kirkwood, Des Moines, Iowa
Phillips Hotel, Kansas City, Mo.
Piedmont Hotel, Atlanta, Ga.

Industrial Buildings

Standard with the following companies:
Quaker Oats Co., Campbell Soup Co., International-Harvester Co., Illinois Bell Telephone Co., National Biscuit Co., General Motors Co. (Delaware), Western Electric Co. (Baltimore), General Electric Co. (Philadelphia), Grigsby-Grunow Co., American Can Co.

Office Buildings

Chanin Building, New York, N. Y.
No. 1 North LaSalle Building, Chicago, Ill.
Board of Trade Building, Chicago, Ill.
Civic Opera Building, Chicago, Ill.
Palmolive Building, Chicago, Ill.
Chicago Daily News Building, Chicago, Ill.

Stadiums

Soldiers' Field, Chicago, Ill.
Dyche Stadium, Evanston, Ill.
Stagg Field, Chicago, Ill.
Yost Stadium, Ann Arbor, Mich.
University of Illinois Stadium, Champaign, Ill.

Public Schools

Standard in the following cities:
Chicago, Kansas City, Milwaukee, Philadelphia, Cleveland, Detroit, Los Angeles.

National Buildings

Standard for the following:
Sears, Roebuck and Co., Montgomery Ward & Co., S. S. Kresge Co., F. W. Woolworth Co.

WHALE-BONE-ITE CLOSET SEATS

Description

General—Closet seats are constantly subject to moisture either by actual contact or close proximity. Therefore, it is obvious that not only must the wood core (selected for its lightness) be of special construction, but the composition covering must be permanently moisture resistive and sufficiently tough and resilient to withstand hard use and even abuse without denting, checking, cracking or deterioration in appearance.

The Core—Whale-Bone-Ite cores are made of thin layers of crossed grain laminated wood which materially increases the strength and is assurance against warping, contraction and expansion. Cores are hermetically sealed with Whale-Bone-Ite.

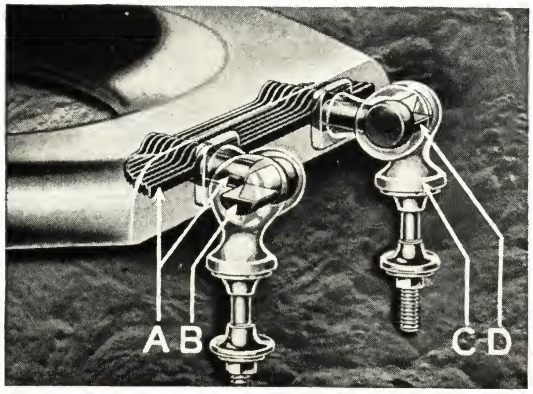
The Whale-Bone-Ite Covering—Whale-Bone-Ite is a polished, jet-black, tough, resilient composition vulcanized under hydraulic pressure over the wood core in a continuous, homogeneous covering approximately $\frac{3}{16}$ in. thick. Due to the concealed hinge plate which forms an integral part of the core, neither the core nor the Whale-Bone-Ite covering are punctured when the hinge is attached. The joint between covering and wood cannot be broken apart.

Construction of Whale-Bone-Ite Seats

WHALE-BONE-ITE BLACK MOULDED HINGES

Whale-Bone-Ite is now moulded over metal forming an ebony finish to match the Whale-Bone-Ite seats. This finish is not only particularly pleasing and harmonious in appearance, but it is unbelievably durable and permanently non-corrosive.

Ebony-finish hinges are standard on all hinge construction.



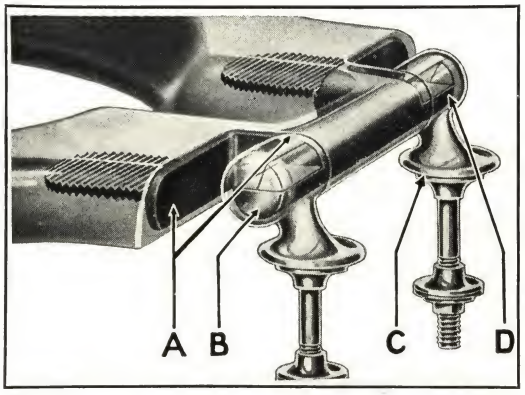
Phantom View—Detail of Construction Closed Back Seat and Hinge in One Unit

(A) Heavy metal die cast corrugated hinge plate and post lugs in one piece embedded in laminated core.

(B) Metal post bearing, an integral part of hinge plate.

(C) Heavy metal die cast post insert and check lug.

(D) Covering of Whale-Bone-Ite over hinge plate, posts, inserts and seat, one solidified unit.



Phantom View—Detail of Construction Open Back Seat and Hinge in One Unit

(A) Heavy metal die cast corrugated hinge plate and post lugs in one piece embedded in laminated core.

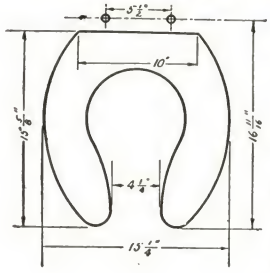
(B) Metal post bearing, an integral part of hinge plate.

(C) Heavy metal die cast post insert and check lug.

(D) Covering of Whale-Bone-Ite over hinge plate, posts, inserts and seat, one solidified unit.

WHALE-BONE-ITE SEATS

NO. 23-81 FOR REGULAR BOWLS



No. 23-81—Seat with cover.

No. 23-8—Seat without cover.

No. 23-86—Seat without cover, with seat check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

NO. 24-81 FOR REGULAR BOWLS

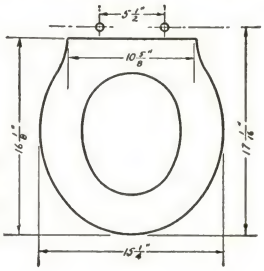
No. 24-81—Seat with cover.

No. 24-8—Seat without cover.

No. 24-86—Seat without cover, with seat check.

Note: *Check limits the extreme lift of seat.*

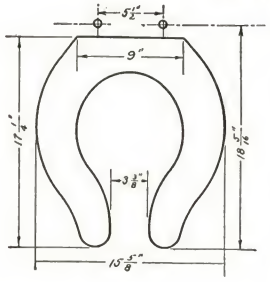
Note: *Diagram at right shows accurate shape and dimensions.*



Note: *Seats with Cover Do Not Have Checks*

WHALE-BONE-ITE SEATS—Continued

NO. 21-968 FOR EXTENDED LIP BOWLS

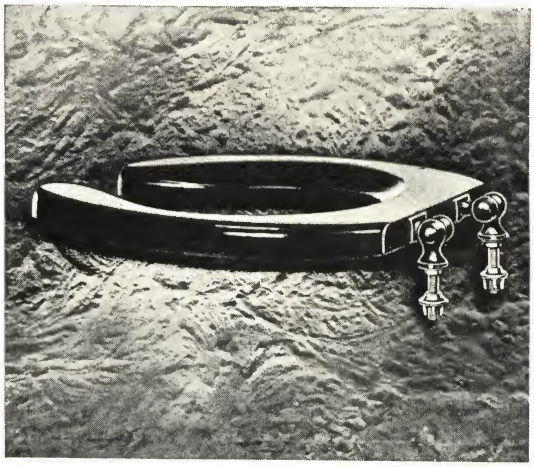


No. 21-968—Seat without cover, with check.

No. 21-98—Seat without cover, without check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*



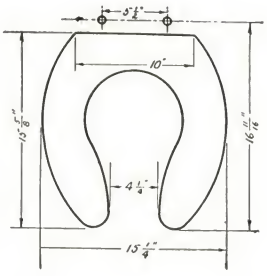
NO. 23-968 FOR REGULAR BOWLS

No. 23-968—Seat without cover, with check.

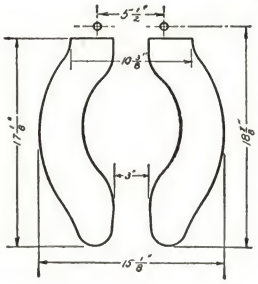
No. 23-96—Seat without cover, without check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*



NO. 18-568 FOR EXTENDED LIP BOWLS



No. 18-568—Seat without cover, with check.

No. 18-581—Seat with cover.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

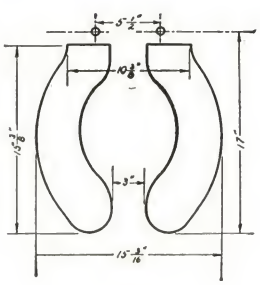
NO. 18½-568 FOR REGULAR BOWLS

No. 18½-568—Seat without cover, with check.

No. 18½-581 — Seat with cover.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*



WHITE AND PEARL CLOSET SEATS

Brunswick Sheet Covered White Seats with Reinforced Cushion Edge

The shining white surface of the new Brunswick is not paint or enamel. It is a covering, a sheathing, of white pyralin. The same handsome ivory-like pyralin used for the backs and handles of ladies' boudoir sets. It is permanently beautiful, will not wear off, crack, split or discolor. It is easy to keep clean and is perfectly sanitary. There are no cracks or joints to gather dirt or harbor germs.

The illustration at the lower right shows a section of the Brunswick cut away. See how the sheathing of pyralin is moulded in one piece, seamless, round the hardwood core.

Exclusive Feature—At the edges of the seat, the pyralin is thicker. The "Two Little White Squares" on the cut surface show this extra thickness—9 times thicker and 800% stronger. It extends all around the edges of the seat, since the edges are the critical points of construction—as they last, so the whole seat will last.

Guarantee—This extra thickness is a feature exclusive with Brunswick. It is patented. It enables every Brunswick to carry a guarantee against separation of the sheets at this point.

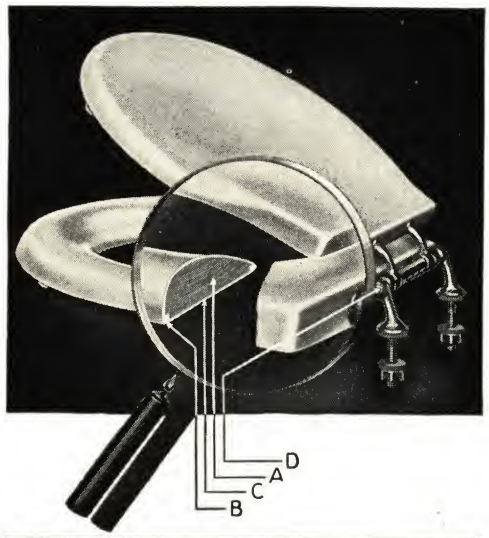
Other Features of Construction—As illustrated at right, the features of construction are as follows:

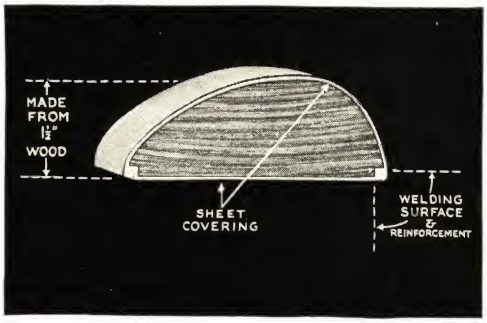
(A) Constructed of straight grain hardwood core, with reinforced dowels, an insurance against warping and splitting.

(B) Pyroxline reinforced insert provides ample welding surface for the pyroxline sheets, and a cushion against impacts. This degree of durability is found only in the Brunswick reinforced cushion edge.

(C) The surface is easy to keep clean and will not crack, craze or discolor. It is literally one piece and cannot be broken or pulled apart where the upper and lower sheets meet—this is an exclusive Brunswick feature.

(D) The sturdy non-fouling hinge is attached in a manner that does not expose metal to the surface of the seat—guaranteeing beauty and durability.





THE NEW PEARL COLORED SEATS

Any of the White Seat designs illustrated on this and the two following pages may be obtained in the new Pearl Colors. The construction and covering materials are identical with that described above for the Brunswick White Seats, except that the pyralin is a beautiful iridescent sea pearl closely approximating natural pearl in appearance.

The colors are Black Pearl, Green Pearl, Blue Pearl, Fawn Pearl, Lavender Pearl, White Pearl.

The new chromium plated hexagon hinge illustrated above can be furnished, when specified, on any White or Pearl Extended Back Seat.

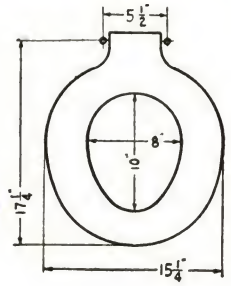
NO. 300 FOR REGULAR BOWL

No. 300—Seat with cover.
No. 301—Seat without cover, without check.
No. 302—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*

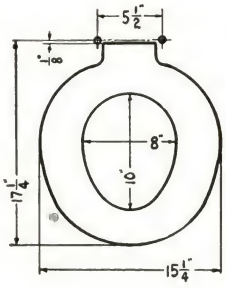
Note: *Hinge, chromium white or Whale-Bone-Ite.*



Note: *Seats with Cover Do Not Have Checks*

WHITE AND PEARL SEATS—Continued

NO. 303 FOR REGULAR BOWLS



No. 303—Seat with cover.
No. 304—Seat without cover, without check.
No. 305—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

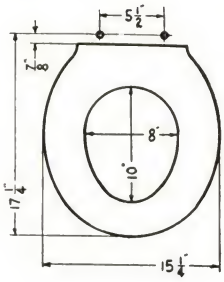
Note: *For close roughing.*

NO. 309 FOR REGULAR BOWLS

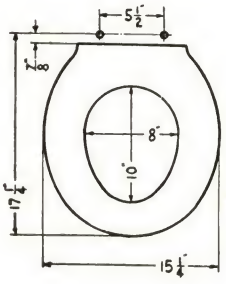
No. 309—Seat with cover.
No. 310—Seat without cover, without check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*



NO. 312 FOR REGULAR BOWLS



No. 312—Seat with cover.
No. 313—Seat without cover, without check.
No. 314—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

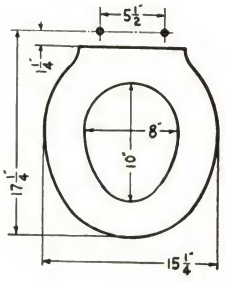
Note: *Particularly adapted to hotels.*

NO. 315 FOR REGULAR BOWLS

No. 315—Seat with cover.
No. 316—Seat without cover, without check.
No. 317—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

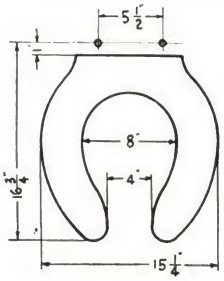
Note: *Diagram at right shows accurate shape and dimensions.*



Note: *Seats with Cover Do Not Have Checks*

WHITE AND PEARL SEATS—Continued

NO. 356 FOR REGULAR BOWLS



No. 356—Seat with cover.
No. 357—Seat without cover, without check.
No. 358—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

Note: *Particularly adapted to hotels.*

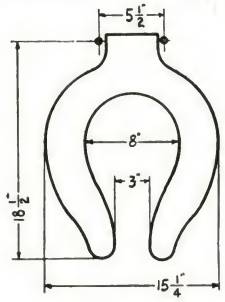
NO. 375 FOR EXTENDED LIP BOWLS

No. 375—Seat with cover.
No. 376—Seat without cover, without check.
No. 377—Seat without cover, with check.

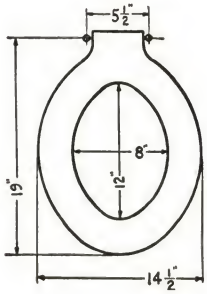
Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*

Note: *Hinge, chromium white or Whale-Bone-Ite.*



NO. 306 FOR ELLIPTICAL BOWLS

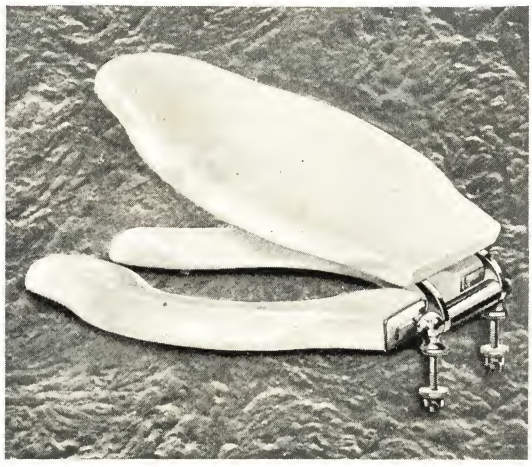


No. 306—Seat with cover.
No. 307—Seat without cover, without check.
No. 308—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

Note: *Particularly adapted to hotels.*



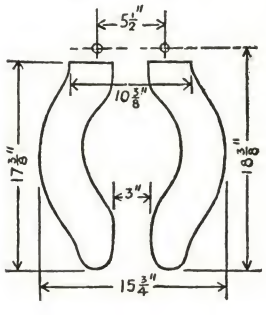
NO. 381 FOR EXTENDED LIP BOWLS

No. 381—Seat with cover.
No. 382—Seat without cover, without check.
No. 383—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*

Note: *Open front and back.*



Note: *Seats with Cover Do Not Have Checks*

C. A. BOYLE & CO.

Zundel Sanitary Toilet Chairs, Shower Baths and Accessories

CHICAGO, ILL. NEW YORK, N. Y.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Zundel
SANITARY TOILET CHAIR

396C—Chelsea
396C—Home Type, Oval Bowl
White $60.00 Colored $65.00
397C—Home Type, Extended Lip Bowl
White $62.50 Colored $67.50

384C—Coronado
384C—Home Type, Oval Bowl
White $42.00 Colored $47.00
385C—Home Type, Extended Lip Bowl
White $44.50 Colored $49.50

364C—Devon
364C—Apartment Type, Oval Bowl Only
White $30.00 Colored $35.00

At last a seeming impossibility has been accomplished. The ugly unattractive appearance of the toilet has been replaced with a sanitary, practical, decorative accessory—the Zundel Sanitary Toilet Chair.

To give a toilet chair beauty was easy, but it required real engineering skill to create a chair that would fit perfectly any model bowl, assure perfect sanitation and still be an attractive decoration to the bath. All of these features are incorporated in the Zundel Sanitary Toilet Chair.

Patented Features Assure Sanitation

In the bottom of the hinge-block at the back of the chair are two adjusting-pin projections arranged to fit perfectly into the hinge-post holes in the bowl. When chair is set on the bowl in proper position and these pins are in place, the resiliency of the side-rails holds the front legs against the bowl, and in this manner the chair is held in a perfectly rigid position, although it is not fastened to the bowl.

The sanitary non-soiling feature is obtained by the front lip being attached to the hole-seat, so that it is raised and lowered with the seat, preventing the chair from becoming soiled. This feature also makes every part of the bowl accessible for easy cleaning.

An improved new feature of the Zundel Sanitary Toilet Chair is a specially designed hinge. This not only assures absolute silence when raising and lowering the seat and cover but also prevents them from falling after they have been raised to a vertical position.

All wood parts are made of select quality weather-seasoned kiln dried birch. Chairs are finished with five coats of the best quality Waterproof Sprayed Periloid and are hand rubbed.

Toilet Chairs may be had Periloid Sheet covered. This covering is of the best quality and is cemented to the entire surface. The "Lap" joint feature of application insures the sheet covering against peeling or splitting at the seams.

All chairs shown are Periloid Sprayed Finish.
Send for complete illustrated catalog.

Three Types of Construction

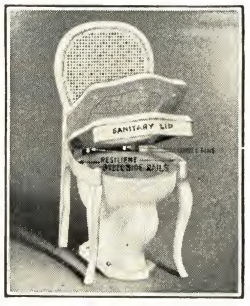
Zundel Sanitary Toilet Chairs are made in three standard types of construction, each designed for a specific use. The superiority of Zundel Sanitary Construction is an exclusive feature found only in Zundel Sanitary Toilet Chairs. Although Zundel Sanitary Chairs are practically a permanent part of the toilet, they can be removed or replaced instantly without the use of tools.

396CX—Belmont
396CX—Regal Type, Oval Bowl
White $80.00 Colored $85.00
397CX—Regal Type, Extended Lip Bowl
White $82.50 Colored $87.50

384CX—Blackstone
384CX—Regal Type, Oval Bowl
White $52.50 Colored $57.50
385CX—Regal Type, Extended Lip Bowl
White $55.00 Colored $60.00

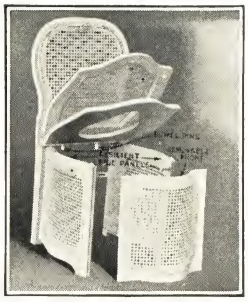
394CX—Ridgeland
394CX—Regal Type. Made for W. A. Case & Sons Mfg. Co.'s T/N Closet Combination
White $60.00 Colored $65.00

358CX-2—Carlton
358CX-2—Arm Type, Oval Bowl
White $46.50 Colored $51.50
359CX-2—Arm Type, Extended Lip Bowl
White $49.00 Colored $54.00

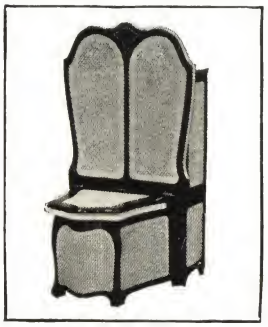


Home Type
A specially designed resilient attachment, holds the wood side rails firmly against the bowl. This type of construction offers a chair of generous proportions.

Apartment Type
The resilient steel, cadmium plated side rails hug the side of the bowl making the chair practically as rigid as the bowl itself and offers a compact small chair.



Regal Type
The resilient cane side panels firmly clamp the bowl preventing the chair from moving. The front cane panel may be easily removed for cleaning.



102CX—Royalat
102CX — Regal Type, Fits Oval, Extended Lip or Elongated Bowl. Conceals tank and bowl.
White $100.00
Colored $105.00

Note: Chairs with arm rests are made with rigid side rails and are known as "Arm type."

C. F. CHURCH MANUFACTURING CO.

Closet Seat Manufacturers

MAIN OFFICE
HOLYOKE, MASS.

FACTORIES
HOLYOKE, MASS. BRATTLEBORO, VT. WASHINGTON, N. J. MONSON, MASS.

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Products

CHURCH SANI-WHITE TOILET SEATS.

CHURCH SANI-BLACK TOILET SEATS.

Church sani-Seats

Also CHURCH SANI-COLORED TOILET SEATS in models similar to the Sani-White seats.

Church Sani-White and Sani-Colored Toilet Seats

Construction—***Lumber***—The wood used in Church Sani-White and Sani-Colored seats is selected hardwood, air dried and thoroughly seasoned in our own kilns. These seats are all made from full 1½-in. stock.

Reinforcement—Closed front seats are reinforced both front and back by means of spiral grooved dowels. These dowels measure ⅝x7 in. and are forced into the seat cross grain rendering it splitproof. Open front seats are doubly reinforced by two spiral grooved dowels inserted cross grain in the back.

Finish—Church Sani-White and Sani-Colored seats are sheet covered which means that a heavy white sheathing is veneered on the hardwood base by our special lap-weld process, resulting in a seamless surface which affords the greatest amount of protection against wear, tear, and atmospheric conditions.

The superfeature of all Church sheet covered seats is the lap-weld method of sealing the sheathing to the hardwood base. Lap-welding is recognized as the strongest method of joining, and by this exclusive Church process the surface becomes a smooth homogeneous finish.

Hinge—Hinges are cast from pure ingot brass heavily nickel plated, chrome plated or rubber covered. Brass wing nuts, nickel plated washers and rubber washers furnished on all hinges.

Guarantee—Church Sani-White and Sani-Colored seats are guaranteed for five years not to crack, split, peel, craze, or to discolor.

Catalogue

There is available for any architect or builder a new complete catalogue giving full information and specification data on the complete line of Church products.

Plate 220
Church Sani-White Sheet Covered Seat and Cover
For regular bowl, with No. 32 heavy nickel plated cast brass bar hinge and white cushion bar bumpers. No metal showing on underside of seat or cover

Plate 142
Church Sani-White Sheet Covered Seat and Cover
For regular bowl, with white cushion bar bumpers. All white (including hinge) which eliminates exposed metal

Plate 425
Church Sani-White Sheet Covered Seat and Cover
For regular bowl, with No. 68 nickel plated cast brass bar hinge and white cushion bar bumpers

Plate 500

Church Sani-White Sheet Covered Open Front and Open Back, Full Saddle Seat and Cover

For regular bowl, with No. 98 heavy nickel plated cast brass bar hinge and white cushion bar bumpers

Plate 260

Church Sani-White Sheet Covered Open Front Semi-extended Lip Seat and Cover

With No. 32 heavy nickel plated cast brass bar hinge and white cushion bar bumpers. No metal showing on underside of seat or cover

Plate 162

Church Sani-White Sheet Covered Open Front Full Saddle Seat and Cover

For regular bowl, with white cushion bar bumpers. All white (including hinge) which eliminates exposed metal

Plate 164

Church Sani-White Sheet Covered Open Front Full Saddle Seat and Cover

For elongated bowl, with white cushion bar bumpers. All white (including hinge) which eliminates exposed metal

Plate 251

Church Sani-White Sheet Covered Open Front Full Saddle Seat—No Cover

For regular bowl, with No. 35 extra heavy nickel plated cast brass check hinge and white cushion bar bumpers

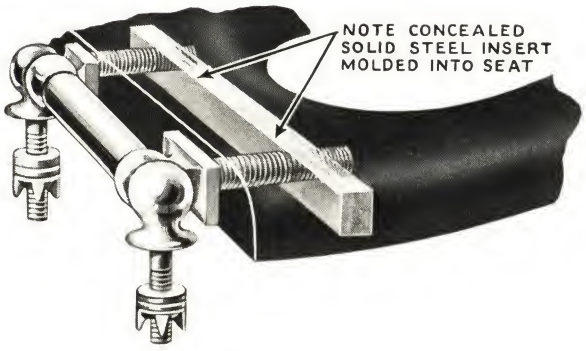
Plate 296

Church Sani-White Sheet Covered Open Front and Open Back Full Saddle Seat—No Cover

For elongated bowl, with No. 35 extra heavy nickel plated cast brass check hinge and white cushion bar bumpers

Church Sani-Black Seats

Description—Church Sani-Black Seats are a composition hard rubber product, created for public buildings, factories, schools, or wherever unusual abuse may be expected. They are produced through the combined processes of hydraulic pressure and veneering.



The surface is thick composition hard rubber, vulcanized in a mould under 108 tons of hydraulic heat pressure. This produces a hard, smooth, indestructible finish.

The core consists of solid hardwood specially reinforced at the back with three dowels arranged in such a way as to form a truss reinforcing. It is further strengthened by a steel insert moulded into the back of the core cross grain.

This construction eliminates the strain at the back and forms an added reinforcement to which the hinge attaches—as shown in the above illustration.

In combining the core and rubber covering we have produced a seat that has no joints or seams; a seat where core and covering are of uniform resiliency, shock absorbent, flexible to torsion, tough, hygienic and indestructible.

Church Sani-Black Seats are acid resisting, moistureproof, and attractive in appearance.

Where Used—Church Sani-Black Seats are recommended for factories, office buildings, public buildings, department stores, steamships—in fact, any place where abuse must be expected.

Important Hinge Feature—An important hinge feature of Church Sani-Black seats is the solid steel insert which is moulded into the core under 108 tons hydraulic pressure. The hinge is attached to the seat by means of heavy machine screws which are gripped by these threaded inserts, as shown, making it impossible for the hinge to loosen or the screws to pull out.

Guarantee—The C. F. Church Manufacturing Co. guarantees Church Sani-Black seats and covers and will furnish new seats and covers free of charge, in exchange for any that might break, split, crack, chip, scale, or craze.

Plate 56

Church Sani-Black Full Saddle Seat and Cover

For regular bowl with extra heavy nickel plated brass hinge, Cushion bar bumpers

A Few of the Notable Buildings Equipped with Church Sani-White and Sani-Black Toilet Seats

New Yorker Hotel, New York, N. Y.
Chrysler Building, New York, N. Y.
Mallow Sterling Hotel, Wilkes-Barre, Pa.
Empire State Building, New York, N. Y.
River Club Co-operative Apartments, New York, N. Y.
Fisher Building, Detroit, Mich.
Yale University, New Haven, Conn.
Meyer & Frank Department Store, Portland, Ore.
Irving Cobb Hotel, Paducah, Ky.
Fort Benning Barracks, Fort Benning, Ga.
Fort Shafter, Honolulu, H. I.
U. S. Government Building, Panama Canal Zone
Fidelity National Bank & Trust Company, Kansas City, Mo.
London Terrace Apartments, New York, N. Y.
Roskruge School, Tucson, Ariz.
Waldorf Astoria, New York, N. Y.
New York Central Lines Office Building, New York, N. Y.
Albrook Field, Panama Canal Zone
Pilgrim State Hospital, Brentwood, L. I., N. Y.
San Bernardino Hospital, San Bernardino, Calif.
Alexander Hamilton School, Los Angeles, Calif.
Di Vilbiss High School, Toledo, Ohio
Floyd Bennett Airport, Long Island City, N. Y.
City Hall, Kalamazoo, Mich.
S. S. President Hoover, Dollar Steamship Co.
S. S. President Coolidge, Dollar Steamship Co.
May Company Department Store, Cleveland, Ohio.

Plate 14

Church Sani-Black Full Saddle Seat and Cover

For regular bowl, with all-black moulded hinge. No exposed metal anywhere on either seat or cover. Cushion bar bumpers.

The hinges are mounded of a hard composition over brass and perfectly match the seat and cover; they cannot corrode or tarnish, there is no surface finish or plating to wear off. No exposed metal when installed

Plate 20

Church Sani-Black Open Front Full Saddle Seat and Cover

All-black moulded hinge. No exposed metal anywhere on either seat or cover. Cushion bar bumpers. Can be used on either a regular or extended lip bowl.

The hinges are moulded of a hard composition over brass and perfectly match the seat and cover; they cannot corrode or tarnish, there is no surface finish or plating to wear off. No exposed metal when installed

Plate 119

Church Sani-Black Open Front Full Saddle Seat with Sanitary Cut-out Back—No Cover

Moulded black hinge. No exposed metal. Standard dimensions and fits all elongated bowls.

The hinges are moulded of a hard composition over brass and perfectly match the seat; they cannot corrode or tarnish; there is no surface finish or plating to wear off. No exposed metal when installed.

No. 119C: As above except with check hinge

Plate 17

Church Sani-Black Open Front Full Saddle Seat with Sanitary Cut-out Back—No Cover

Moulded black hinge. No exposed metal. Standard dimensions and fits all regular bowls.

The hinges are moulded of a hard composition over brass and perfectly match the seat; they cannot corrode or tarnish; there is no surface finish or plating to wear off. No exposed metal when installed.

No. 17C. As above except with check hinge

Plate 5900

Church Sani-Black Open Front and Open Back Full Saddle Seat—No Cover

With moulded black concealed check hinge. Cushion bar bumpers. Standard dimensions and fits all elongated bowls.

The extra heavy hinge used on these seats has a patented concealed checking feature. The stop or check operates on the inside of posts and is so designed that it allows seat to stand in vertical position when raised without striking against wall, tank or flush valve.

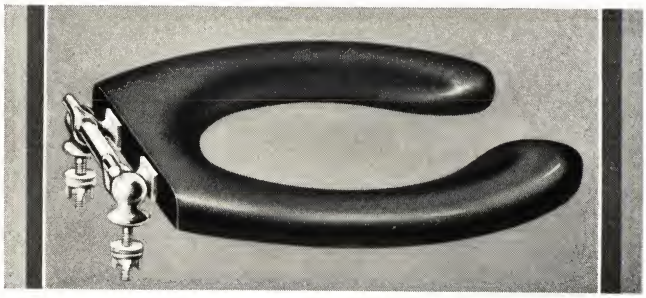


Plate 57

Church Sani-Black Open Front Full Saddle Seat—No Cover

For regular bowl with extra heavy nickel plated brass check hinge. Cushion bar bumpers.

This seat, because of the semi-extended lip length, can be used on either an extended lip or regular bowl

NEVER SPLIT SEAT COMPANY

Manufacturers of Closet Seats in All Finishes, Constructions and Models

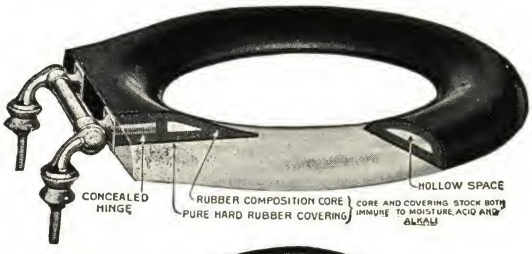
EVANSVILLE, IND., U. S. A.

Products

(1) "Evernu" Hard Rubber Seats. (Patented.)
(2) "Never-Split" Wood Seats. (Patented.)
  (a) White and Colored Sheet Pyralin Covered Seats.
  (b) White and Colored Sprayed Finish Seats.
  (c) Varnished Seats. (All finishes and woods.)
  (d) Special Seats of any description.

Guarantee

"Evernu" Seats are unconditionally guaranteed not to split, break, crack or craze. "Never-Split" hidden screw woodwork is guaranteed unconditionally not to split or come apart at the joints. The sheet "pyralin" finish is guaranteed for five years. The sprayed and varnish finishes are guaranteed for three years.



"Evernu" Hard Rubber Seats

Construction—"Evernu" Seats are made of pure hard rubber. They are hollow, except across the back where they are made solid and into which solid portion the hinges are attached. The interior wall, made of a special rubber composition, and the exterior wall of pure ebony or mahogany hard rubber are vulcanized together under tremendous hydraulic pressure into one indestructible unit. The hollow center provides lightness and strength. There are no joints to open, no cracks or crevices in the surface.

"Evernu" Cross Section

"Never-Split" Hidden Screw Construction

Finishes—"Evernu" Seats are made either ebony or mahogany in color. There is no finish to wear off or become unsightly, as the finish is simply the hard rubber surface buffed to a lasting luster. Surface can be sterilized and kept sanitary without injuring it in any way. It is impervious to moisture, heat, cold or any destroying elements.

"Evernu" Seats for U. S. Government—"Evernu" Seats comply with all U. S. Government Specifications covering Hard Rubber Seats including Master Specifications No. 448.

Installations—"Evernu" Seats are approved by many leading architects and engineers. They are installed in many prominent buildings. See list of installations in our catalogue.

"Never-Split" Wood Seats

Construction—All "Never-Split" seats are made by our patented hidden screw constructoin. (See construction cut.) They are held together by heavily threaded steel screws within the wood. The screws absolutely prevent the woodwork from ever splitting or coming apart at the joints. Screws have right and left-hand threads and are embedded into the wood by means of hydraulic pressure; they are entirely invisible, and there are no mortise holes, plugs or fillings in any surface of the woodwork or any outward indication of this unique hidden steel reinforcement.

Finishes—*(A) Sheet Covered*—Extra heavy sheet pyralin of the finest quality is used on all "Never-Split" Sheet Covered Seats. Sheeting is applied by a scientific process that completely envelops the woodwork in a seamless, lustrous and durable sheathing. Surface can be easily cleaned and will not chip, crack, craze or discolor. "Never-Split" sheet covered seats are made in pure white, sea pearl colors and plain colors.

(B) Sprayed Seats—"Never-Split" sprayed finish is a high grade white or colored sprayed lacquer. "Never-Split" "Imaculoid" sprayed finish is the same as the regular sprayed finish except that it has more coats and is given special treatment between coats. Both finishes are buffed to a high lustre.

(C) Varnished—"Never-Split" oak, mahogany, cherry and walnut finishes are made by carefully filling, staining and shellacking the wood, over which ground coats are applied several coats of highest grade varnish. Final coat can be furnished in gloss finish, dull rubbed or high polish.

Hinges

"Evernu" and "Never-Split" hinges are made from pure new brass. They are scientifically designed for strength and beauty and are offered in many designs and finishes, including nickel-plated brass, chromium plated, white metal, hard rubber covered and white or colored sprayed finish.

Special Seats

In addition to our regular line of seats and hinges, we make special seats and hinges of any design or finish. Prices will be submitted on receipt of information as to what is required.

No. 525-W

Catalogue and Construction Sections

Only a few models are shown here. Complete catalogue and construction sections on request.

No. 635

No. 580

No. 500

No. 640

STANDARD TANK AND SEAT CO.

Closet Seat Manufacturers

MAIN OFFICE AND FACTORY

CAMDEN, N. J.

Special Oval Seat
No. 196 for Standard Bowl—No. 206 for Extended Lip Bowl—No. 207 for Elongated Bowl. All white hinge, no metal exposed. On colored and Marine Pearl seats, chromium plated hinge furnished

Special Open Front Seat
No. 201 for Standard Bowl—No. 202 for Extended Lip Bowl—No. 208 for Elongated Bowl. All white hinge, no metal exposed. On colored and Marine Pearl seats, chromium plated hinge furnished

Open Front and Back Seat
No. 278 for Standard Bowl—No. 279 for Extended Lip Bowl. Furnished with No. 730 n.p. reinforcing Gibraltar bar hinge

STASCO

Products

"Stasco Empire Seamless White" Seats.
"Stasco Empire Seamless Colored" Seats.
"Stasco Ivory" White Sheet Pyralin Covered Seats.
"Stasco Marine Pearl" Sheet Pyralin Covered Seats.
"Stasco Arch-Built" Hard Rubber Seats.
"Stasco-lac" Oak and Mahogany Seats.
"Stasco" Bath Stools and Chairs.

Catalogue

A new, complete, standard size catalogue giving full information and specifications is available on request.

Stasco Finishes

All models shown obtained in the following finishes:

Empire Seamless Finish—A high grade, tough, durable, seamless covering manufactured and used exclusively by the Standard Tank and Seat Co. No seat has ever been returned because this finish broke down.

In white or the following colors: Straw, Orchid, Spring Green, Baby Blue, Old Rose, Lavender, Black. Fully guaranteed five years.

White Sheet Covered and Marine Pearl Finish—A heavy covering of sheet pyralin welded to the seat by a special process. Buffed to a permanent luster. Lap joint insures against peeling or splitting at seams. Fully guaranteed five years. In white or Marine Pearl colors.

Stasco-lac Oak and Mahogany—A special waterproof lacquer made exclusively by the Standard Tank and Seat Co., guaranteed not to paper mark or print and is acid-, alkali- and water-proof.

Construction—Only selected hard birch, maple or oak wood, clear on both sides and free from defects is used. Special, spiral grooved, hickory dowel reinforcement gives exceptional strength. Hinges used are heavy cast brass either nickel plated, chromium plated or all white covered, as specified.

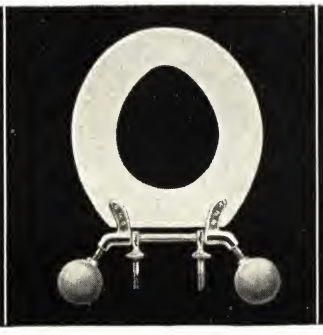
Plain Oval Seat
No. 210 for Standard Bowl—No. 212 for Extended Lip Bowl—No. 214 for Elongated Bowl. Equipped with No. 701 n.p. bar hinge

Open Front Seat
No. 270 for Standard Bowl, equipped with No. 725 Reinforcing n.p. bar hinge. No. 271 for Extended Lip Bowl—No. 272 for Elongated Bowl, equipped with No. 735 reinforcing n.p. bar hinge

Plain Oval Seat
No. 358 for Standard Bowl, equipped with No. 705 n.p. bar hinge

Extended Back Oval Seat
No. 360 for Standard Bowl, equipped with No. 360 concealed type n.p. hinge

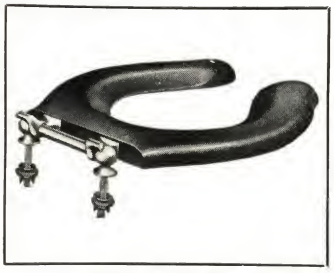
Plain Oval Seat
No. 362 for Standard Bowl, equipped with Fmery self-raising n.p. brass spring hinge



Plain Oval Seat
No. 366 for Standard Bowl, equipped with No. 366 self-raising n.p. brass hinge and bronzed iron ball weights

Plain Oval Seat
No. 368 for Standard Bowl, equipped with special close-ruf hinges made especially for use where closet is roughed-in too close for regular seat to be used

Stasco Special Oval Seat
No. 996 for Standard Bowl. Stasco hard rubber hollow construction equipped with moulded rubber cast brass hinges—no metal exposed type—cannot corrode or tarnish, furnished with or without check. Can be supplied less cover



Open Front Seat
No. 0970 for either Standard or Extended Lip Bowl. Equipped with heavy n.p. brass hinge or hard rubber moulded hinge, with check

Open Front Seat
No. 0973 for Elongated Bowl, with heavy n.p. brass hinge or hard rubber moulded hinge, with check

Hard Rubber Seats

Section—Hard Rubber Seat
Stasco arch-built hard rubber seats have a uniform protecting wall of hard rubber $\frac{3}{16}$-in. thick

Construction—Special arch construction utilizing the same engineering principle used in building construction the world over gives exceptional strength and resiliency. Made of highest grade, long-cure hard rubber. Permanent high polish. Hinges attached to brass insert moulded into solid rubber.

Hinges—All hinges are cast brass, heavily nickel or chromium plated. Guaranteed against breakage. All hinges furnished with wing nuts, plated washers and rubber washers. All seats and covers can be supplied with hard rubber covered hinges eliminating all exposed metal.

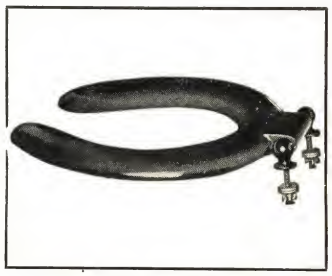
Guarantee—All Stasco Hard Rubber Seats are guaranteed unconditionally against manufacturing defects and to give absolutely satisfactory service. Seats not giving absolute satisfaction will be replaced.

Bath Stools and Chairs

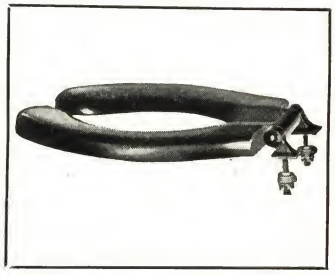
Finishes—All stools and chairs may be had in the following finishes:

Empire White Seamless, Empire Colored Seamless, "Ivory" White Sheet Pyralin Covered and Sheet Covered Marine Pearl.

STASCO



Open Front Seat
No. 0901 for either Standard or Extended Lip Bowl. Stasco hard rubber hollow construction. Equipped with moulded rubber cast brass hinges—no metal exposed type—cannot corrode or tarnish, furnished with or without check. Can be supplied with cover



Open Front and Back Seat
No. 0978 for Standard Bowl, equipped with heavy brass n.p. bar hinge or rubber covered hinge

Oval Saddle Seat No. 0964
For Standard Bowl, equipped with heavy brass n.p. bar hinge

Marine Pearl Bathroom Chair
No. 828 Empire White Seamless Finish with back rest and saddle seat. Can also be supplied with seat and back rest covered with white sheet pyralin, Marine Pearl sheet pyralin, Empire seamless plain colors. Of highest quality materials and workmanship. Height over all 27 in. Seat height 15½ in.

Bathroom Stool
No. 820—Finishes: tops only—Empire white seamless, white sheet pyralin covered, Empire seamless plain colors, Marine Pearl sheet pyralin covered. Legs—Empire white finish. Equipped with white crutch tips. Height 15 in., diameter of top 12 in. Shipped set up. When ordering, specify finish desired, etc.

Bathroom Stool
No. 825—Finishes: tops only—Empire white seamless, white sheet pyralin covered, Empire seamless plain colors, Marine Pearl sheet pyralin covered. Legs—Empire white finish. Equipped with crutch tips, made with extra heavy top and screwed-in legs. Height 11½ in. Top 10½ x 13½ in. Packed knocked-down. When ordering, specify finish desired, etc.

Bathroom Chair
No. 829 Empire White Seamless finish with back rest and plain seat. Can also be supplied with seat only covered with white sheet pyralin, Marine Pearl sheet pyralin, Empire seamless plain colors. When ordering, specify finish desired, etc.

W. A. CASE AND SON MFG. CO.

223 Delaware Avenue
BUFFALO, N. Y.

DISTRIBUTERS IN PRINCIPAL CITIES

T/N ONE-PIECE WATER CLOSET

Quiet Powerful Flushing Action

The T/N is so quiet that with ordinary water pressure it can scarcely be heard outside the bathroom door.

The T/N has a powerful centrifugal flushing action. Waste matter is generally eliminated before siphonic action takes place, leaving plenty of clean water to wash trapway and stack.

Non-overflowing

The T/N is non-overflowing in case of trap stoppage, eliminating all danger to rugs, floor or ceiling below.

T/N

the water supply, either through siphonage or gravity.

Made of Finest Two-fired Vitreous China

The T/N is made of the finest vitreous china—is twice fired to give it rocklike hardness, to make it impervious to moisture.

Rigid Testing Under Actual Working Conditions

Every T/N, before it is released for sale, is completely assembled, mounted and then twice tested under varying water pressures. This assures perfect mechanical action and brass fittings that are free from casting or mechanical defects.

No. 55

No. 60

No. 80

Three of the Five Seat Designs

The T/N is furnished in a wide variety of seat designs. Seats are of highest grade white as well as Sani-black vulcanized rubber

Built in One Piece

The T/N water closet eliminates separate wall tank by combining both tank and bowl in *one* piece. This has three advantages:

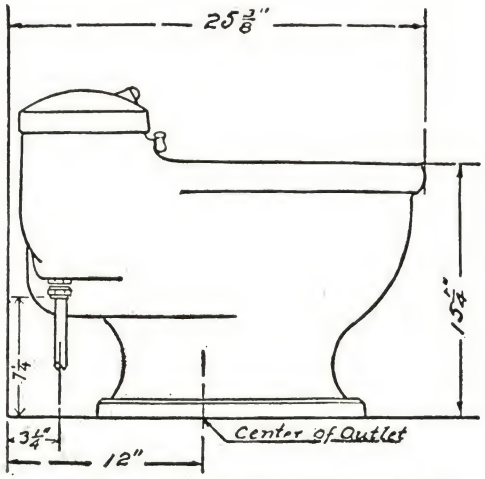
Saves Space—Ideal for small bathrooms, washrooms, or wherever economy of space is a factor. Fits in corners or under windows.

Better Appearance—No unsightly wall tank—likely to deface tile wall. The T/N is unobtrusive, inconspicuous.

Easy to Install—The T/N offers unusual freedom in roughing, as there are but two connections to make. Roughing minimum is but 12 ins.

Protects Water Supply Against Pollution

Ball cock is equipped with a patented vent. The outlet of this vent is located above any possible water level, and is always open to the atmosphere. Thus it is absolutely impossible to contaminate



Center of supply to center of bowl outlet 7"

Roughing-in Measurements

Note: 12 in. from wall to center of outlet is minimum measurement. We recommend 14-in. roughing which gives more space behind fixture for cleaning purposes. Fixture, however, can be roughed at any measurement 12 ins. or greater from wall to center of outlet. In roughing further than 12 ins. from wall consideration should be given measurement from wall to center of supply pipe. Over-all measurement of fixture 21 ins. wide, 26 ins. long

Agreeably Free From Trouble

Operating mechanism is extremely simple, but highly efficient. All working parts are renewable. Fittings are of high grade red metal with phosphor bronze ball cock seat. Closet bowl design gives an unusually large and properly located surface of water.

Modest Cost

When your client compares the T/N with other fine toilets, he will naturally expect it to be expensive. Yet the T/N's cost is decidedly modest—one that the average home owner can easily afford.

Furnished in White or Color

The T/N may be obtained not only in white, but in color to match any decorative scheme.

ROBSON LAVATORY

Extra Shelf Space

At last, plenty of lavatory shelf room for shaving things and toilet articles. This shelf is actually a miniature dressing table, built in as a part of the fixture.

Concealed Roughing

If the RobsoN is installed according to our recommended roughing-in measurements, and our special supplies with stops are used, supply fittings may be *concealed* under the raised shelf. The trap is the only exposed metal under the bowl.

Anti-splash Rim

Of course the RobsoN has an anti-splash rim.

Concealed Overflow

Overflow is out of sight in the front of the bowl, under the anti-splash rim. Another new touch of refinement.

Roomy, Large Bowl

The RobsoN Lavatory has a large roomy bowl.

Four Sizes—Described on next page. The smallest size is wall-hung. The other three are supported by legs.

Chrome Plated Legs and Fittings

In two simple, beautiful designs, illustrated on this page.

Wide Variety of Colors

Furnished in white and in a broad range of beautiful colors to match every decorative scheme.

Two-fired Vitreous China

The RobsoN is made of the finest two-fired vitreous china and is furnished with carefully finished fittings. Each lavatory is ground to fit the wall.

Easily, Economically Installed

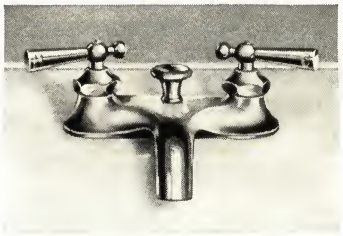
Fitting design permits economical installation. The special supplies can be adjusted to any reasonable inequalities in roughing-in work. A special wall hanger furnished with the lavatory permits plenty of adjustment both vertically and horizontally.

Moderate in Cost

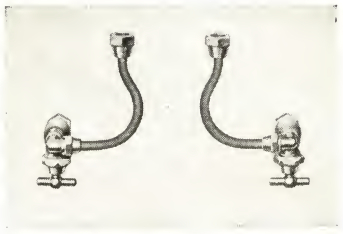
Like its companion piece, the T/N water closet, the RobsoN Lavatory looks as though it costs a great deal more than it actually does. You will find its price exceedingly moderate.

In One Crate Only

It contains the lavatory special supply and waste fittings, legs and wall-hanger. Special concealed supplies are an extra and are included in crate as an extra.

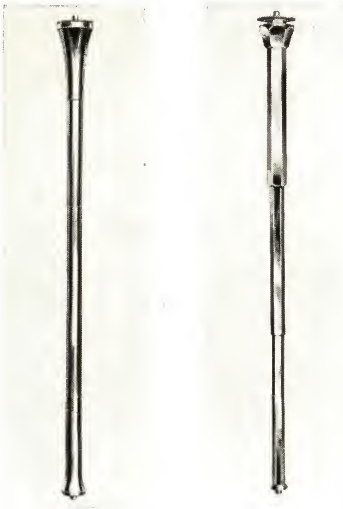


Supply and Pop-up Waste Fittings in Two Artistic Designs, Chrome Plated
Legs are furnished to match. All parts are renewable



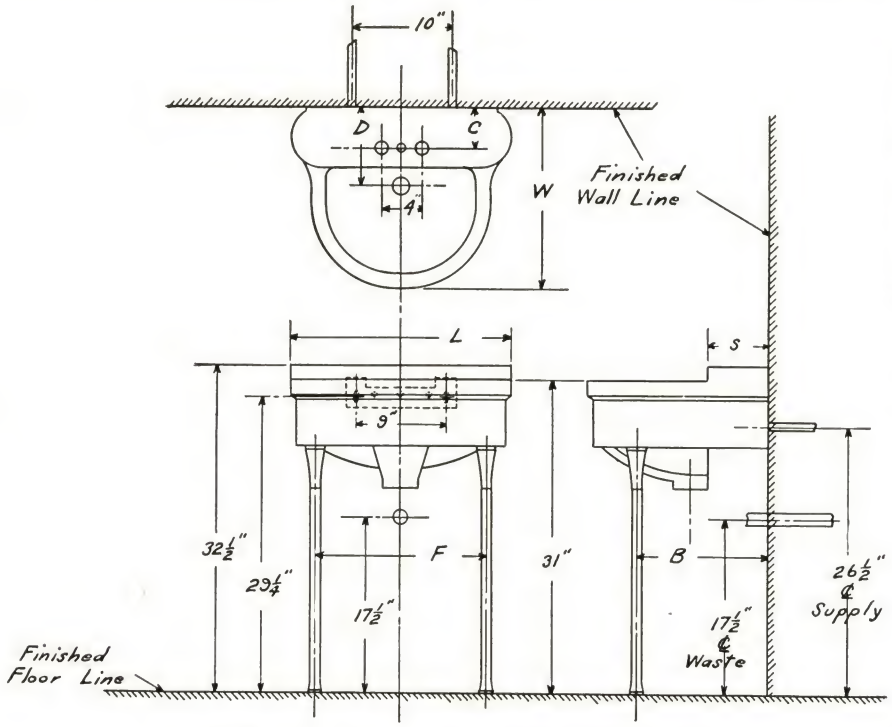
Special Supply Fittings with Stops
Can be concealed when installed as specified in roughing sheet

RobsoN Wall-hung Lavatory
For small washrooms, office buildings, hotels, schools and hospitals (see sizes on next page). Furnished in color as required



Adjustable Legs
Two simple, beautiful patterns to match fittings. Chrome plated

RobsoN Lavatory with Legs
This design made in 3 sizes (see next page). Furnished in color as required



Nominal Size	W	L	C	D	S	F	B
20 x 18	18"	22"	3 7/8"	7 5/8"	5 7/8"	No	Legs
24 x 20	19 3/4"	25 1/4"	4 7/8"	8 5/8"	6 7/8"	16 3/4"	12 1/2"
27 x 22	22"	27 1/4"	5 3/4"	9 1/2"	7 3/4"	18 3/4"	12 7/8"
30 x 22 1/2	22 1/2"	30 1/4"	5 3/4"	9 1/2"	7 3/4"	20 1/2"	14 1/8"

Showing the Generous Wide Shelf-space of the RobsoN Lavatory in Actual Use.

More than enough room for all the toilet articles ever used at one time

SIZES, INCHES

Nominal	Actual size	Basin size
30x22½	30¼x22½	12½x18
27x22	27¼x22	12⅛x18
24x20	25¼x19¾	11¼x16
20x18	22x18	10¾x15

Lavatories are equipped with chromium-plated combination supply and pop-up waste fittings. These can be obtained as desired in either plain or hexagonal art design. In the three larger sizes, supported by legs, legs are furnished to match fittings. Three valve fittings, self-closing valves, and shampoo nozzle for combination fittings, can also be furnished when required.

"ZECO" VITREOUS CHINA SANITARY WARE

"ZECO" SIPHON ACTION WASHDOWN BOWLS AND CHINA TANKS

Bowls

Two-fired. Every bowl tested.

No. 20A—Washdown bowl with square base to rough-in at 14 in.

No. 30A—Washdown bowl with square base to rough-in at 12 in.

Twin jets, properly placed.

Square base and pedestal. Extra large bowl opening.

Efficient performance.

Tank

No. 12A—China tank with (white or black) china handle (as preferred). Fitted with new design "No Trouble" fittings, with special automatic regulating device in ball cock. Flush valve of heavy cast red metal base and lock nut—1⅛-in. swedged overflow tube.

Pure gum rubber flush ball. Double-acting lever. Chromium plated, 5x6-in. elbow and couplings nuts, supply pipe and escutcheons. Quiet under all pressures. Sizes of tank, including cover—length, 21¾ in., height, 16¾ in., width, 8¼ in.

"EASTERN" RANGE BOILERS

Vertical or Horizontal

Standard: For working pressure not exceeding 85 lbs.

Extra heavy: For working pressure not exceeding 150 lbs.

Double extra heavy: For working pressure not exceeding 150 lbs., guaranteed for six years' service.

Regularly tapped: Five 1-in., arranged two in the head, in line with two in the side opposite the seam; one 6 ins. from the top line of boiler; and the other 6 ins. from the bottom line of the boiler; and one in the center of the bottom.

Additional charge is made for tappings in excess of five, and for tappings larger than 1 in., except in boilers 100 gallons and larger, which are tapped 1½ in.

Boilers can be furnished for vertical or horizontal installation, and also with galvanized or copper coils.

REGULAR SIZES

Size, in.	Gallons capacity		
	Standard	Extra heavy	Double extra heavy
12x36	18	18	18
12x48	24	24	24
12x60	30	30	30
14x48	32	32	32
14x60	40	40	40
16x48	42	42	42
16x60	52	52	52
18x60	66	66	66
20x60	82	82	82
22x60	100	100	100
24x60	130	120	120
24x72	144	144	144
24x96	192	192	192

"EASTERN" TANKS

"Eastern" Storage Tanks

Black or galvanized.

Standard for working pressure not exceeding 65 lbs.

Extra heavy for working pressure not exceeding 100 lbs.

Can be furnished for either vertical or horizontal installations—24 ins. diameter and smaller, tapped 1½ ins.; 30 to 42 ins. diameter, inclusive, tapped 2 ins. Larger diameters tapped 3 ins. Can be furnished with handhole or manhole or flanged openings. Can be equipped with coils as required.

In addition to tanks listed, we are equipped to build special tanks to specifications .

REGULAR SIZES

Cap. gal.	Diam., in	Length, in.	Cap. gal.	Diam., in	Length, in.	Cap. gal.	Diam., in	Length, in.
66	20	4	295	30	8	865	42	12
85	20	5	315	36	6	1000	42	14
100	24	4	365	36	7	750	48	8
120	24	5	420	36	8	940	48	10
140	24	6	525	36	10	1130	48	12
150	30	4	430	42	6	1300	48	14
180	30	5	500	42	7	1500	48	16
220	30	6	575	42	8	1700	48	18
250	30	7	720	42	10			

"Eastern" Pneumatic Tanks

75 lbs. working pressure.

Black or galvanized.

Vertical or horizontal.

REGULAR SIZES

Cap., gal.	Diam., in.	Length, in.
42	16	48
52	16	60
53	18	48
66	18	60
82	20	60
100	22	60
120	24	60
144	24	72
180	30	60
220	30	72
250	30	84
300	30	96
365	30	120
315	36	72
420	36	96
525	36	120

JOSEPH A. VOGEL COMPANY

School and Factory Closets, Frost-proof Closets and Hydrants

WILMINGTON, DEL. ST. LOUIS, MO.

The Company

For nearly 25 years the JOSEPH A. VOGEL COMPANY has been manufacturing seat-action closets, frost-proof and non-frost-proof. Vogel closets are installed and operating satisfactorily in all parts of the country, many of them for as long as twenty years.

Number Ten-A Seat-Action Closet

The newest addition to the Vogel line, the Number Ten-A Seat-Action Closet, is the result of these years

Vogel Number Ten-A Seat-Action Closet Combination with Syphon Action Bowl

Can also be supplied with syphon jet bowl or bowl having reverse trap

of experience and research in the plumbing field. It is a high grade sanitary closet, designed especially for use in schools, plants, factories, institutions, theatres, waiting rooms, comfort stations, office buildings, hospitals, residence basements, or any semi-public or public place, where durable closets are required.

In this era of sanitation, seat-action closets have proved themselves highly satisfactory for installations of this kind, because of their positive operation, and the fact that they flush every time.

Newspaper Test

A piece of newspaper, 12 inches square, was dropped into the bowl which was then given a 4-gallon flush. The paper was carried completely through the trap by this one flush.

Ball Test

A ball, 2⅜ in. in diameter was dropped into the bowl and passed through the trap with one 3½-gallon flush.

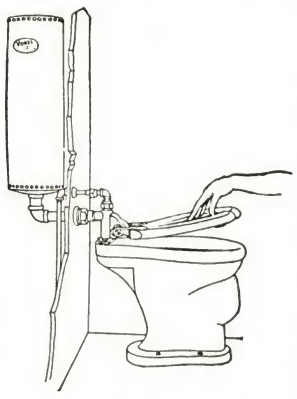
These tests are conclusive proof of the dependability of the Number Ten and Ten-A Selflush Water Closets under any conditions of service.

Endurance Test

On July 16, 1929, a Vogel Number Ten was taken from stock and placed on an endurance test. By means of an automatic arrangement this closet flushed continually night and day, 338,341 times, before a washer had to be renewed. This is equivalent to 130 years' wear. The test continues indefinitely.

With a service pressure of 60 lb. the following tank pressures are reached:

Twenty-pound tank pressure is reached in twenty seconds, giving a 3-gallon flush. This flush is completely effective.



It Operates Easily

Thirty-pound tank pressure is reached in twenty-five seconds, giving a 3½-gallon flush.

Forty-pound tank pressure is reached in thirty seconds, giving a 4-gallon flush.

More than 4 gallons of water is never used at a flush, although the tank is of 5-gallon capacity.

From the above, it is obvious that a completely effective flush will be given under any normal service conditions, but bear in mind that at least 20 lb. pressure is required at the closet for proper flush.

Materials

Every part of Vogel Number Ten and Ten-A closets is of the highest quality obtainable. The valve has few moving parts, and these are of high tension bronze.

Seat

The seat is a standard, accepted type of ebony hard rubber composition noted for its beauty and ability to give long service.

Either open or closed front seat can be supplied, and the closet can be washed down with live steam without injury.

Vogel Number Ten Closet Combination

Bowl

The bowl of Vogel Number Ten and Ten-A Closets is highest grade two-fired vitreous china, finished in a high hard glaze. The bowl is equipped with a shelf to which the valve is attached, so that no leaks can occur at the joint, even under the most severe operating conditions. Juvenile height bowl can be furnished at no additional cost.

Tank

Tanks are heavily galvanized, cylindrically riveted, and designed to withstand a pressure of 100 lb. to the square inch. Each tank is tested before being shipped.

Vogel Number Ten Closets are exactly the same as the Ten-A Closets, except with the Number Ten the tank is exposed, whereas, with the Number Ten-A, it is concealed behind the wall.

Operation of Vogel Number Ten and Ten-A Closets

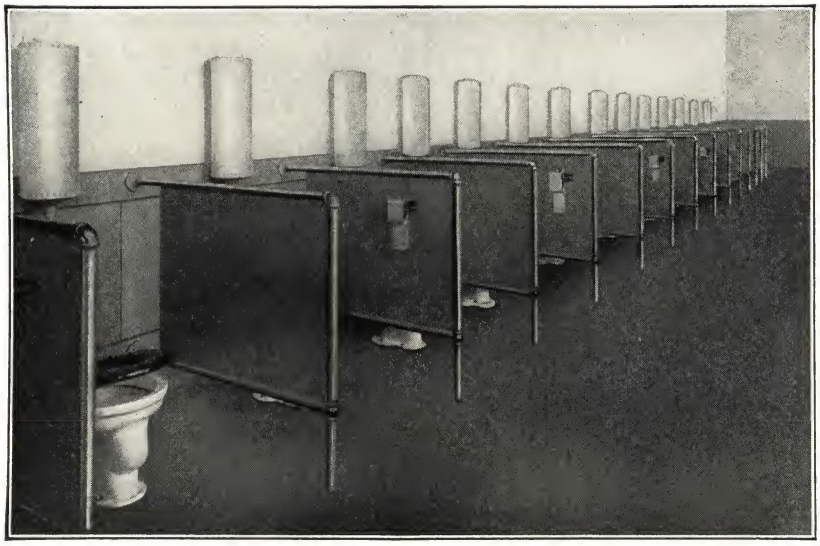
When the fixture is not in use the seat remains at an angle to the bowl. The weight of the body (any weight over 15 lb.) placed upon the seat lowers it to the horizontal position, causing the supply valve to open. Water enters the tank until the pressure within the tank equals the water service pressure, then the supply is automatically stopped. When the weight of the body is removed from the seat, the seat is released, closing the supply valve, opening the flush valve, and admitting a strong flush to the bowl.

Frost-proof Feature

Vogel Number Ten and Ten-A Seat-Action Closets, while not frost-proof, do have a valuable frost-proof feature. Naturally no bowl which has a trap can be frost-proof, but in Vogel Number Ten and Ten-A Closets all the water is used in flushing, so that no water remains in the tank or valve below the supply washer after flushing.

This eliminates the possibility of water freezing within the valve or tank. This feature is valuable in buildings, such as schools, where heat may be turned off for the week-end or during winter vacation periods.

Vogel Number Ten and Ten-A Closets are supplied with either syphon action or syphon jet bowls. The roughing-in dimensions given in the next page apply to the syphon action bowl. Write for roughing-in for syphon jet and juvenile height bowls.



A Typical Installation of Vogel Number Tens, in the Plant of Pusey & Jones, Wilmington, Del., Builders of Fine Yachts

Specifications

Vogel Number Ten and Ten-A Selflush Water Closets—Furnish and install in..... as shown on the drawings..... Vogel Number Ten [Ten-A] Selflush Water Closets, complete with vitreous china syphon-action bowl, ebony hard rubber composition seat with nickel-plated brass seat hinge and brace; Vogel Number Ten nickel-plated valve with all moving parts made of high tension bronze; heavily galvanized cylindrical pressure tank with wrought iron flush pipe and all necessary fittings.

Give location and number of fixtures required.....

.....

If juvenile height bowl is desired so state here.....

.....

If syphon jet bowl is desired so state here.....

.....

If open front seat is desired so state here.....

.....

If polished nickel or chromium plating is desired, change this paragraph accordingly.

If tank is to be concealed, or baked enamel tank is desired, change this paragraph accordingly.

If tank is to be concealed, thickness of wall must be given here.

List Prices

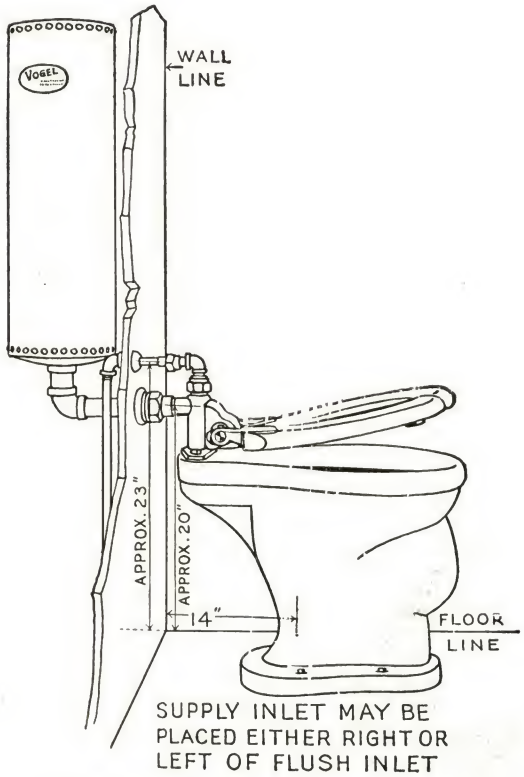
Number Ten Selflush Water Closet complete, consisting of vitreous china bowl, reinforced hardwood seat, Number Ten nickel-plated valve, heavily galvanized pressure tank, and galvanized flush pipe, List Price, $45.00.

Number Ten-A, with tank concealed, $48.00.

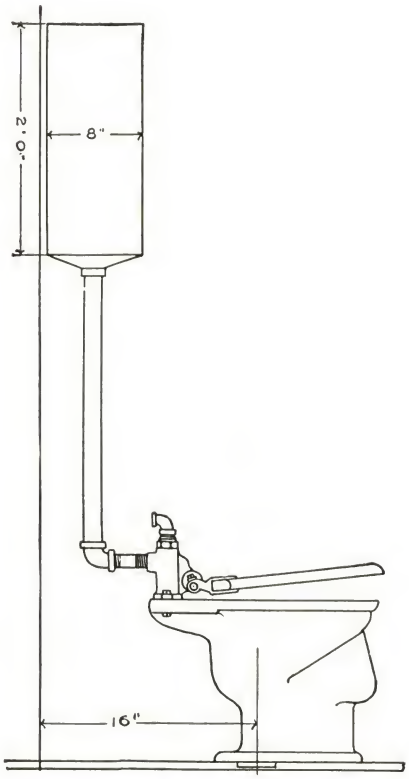
Juvenile height bowl furnished at no extra cost.

For chromium-plated valve and fittings, add $3.00.

For white enameled cylindrical tank, add $5.00.

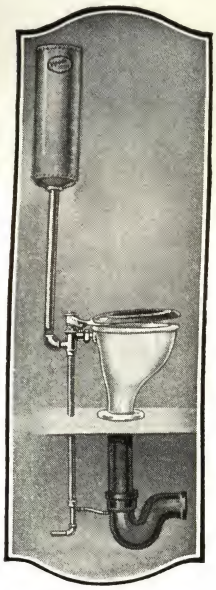


Roughing-in for Vogel Number Ten-A



Roughing-in for Vogel Number Ten

OTHER VOGEL PRODUCTS



Vogel No. 1

Vogel No. 1 Frost-proof Closet

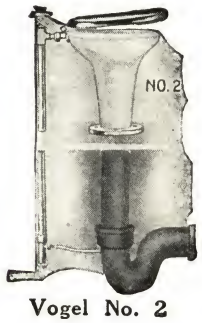
This closet uses but four gallons of water at a flush. Only enough water enters the tank to compress the air, and no more water is used until the seat is again operated. This air and water flush is strong and cleansing. The valve parts can be easily removed in a few moments by simply unscrewing the one flush cap back of the bowl.

Depressing the seat raises the rod, allowing the tank to fill. Releasing the seat allows a strong flush direct from tank to hopper. The water in valve casing then passes down through waste valve (below frost line) into sewer, leaving the entire fixture open.

No. 1, enameled inside, red outside, tall oval flushing rim, enameled rim hopper, reinforced hardwood seat, galvanized pressure tank, flush pipe, lead waste connection, supply and flush valves assembled with 3 ft. 3 in. valve rod casing. List price, $30. (Trap and soil pipe not included.)

Outfits with hoppers having 4-in. outlets for caulking into bell end of soil pipe at same list prices.

Valves furnished any length up to 5 ft., at no additional cost.



Vogel No. 2

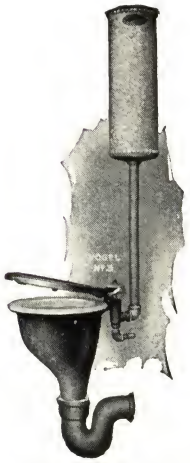
Outfits with hoppers enameled in and out, add list, $4.40. Outfits with self-raising seats, add list, $1.32.

Vogel No. 2 Frost-proof Closet

This outfit is different from the Vogel No. 1 outfit in that it contains but one packing and flushes while in use, after which no water remains in the fixture above the trap.

Vogel No. 2, enameled inside, red outside, enameled rim hopper with brass fan wash, hardwood seat, lead waste connection, valve assembled with 3 ft. 3 in. valve rod and casing. List price, $17.50. (Trap and soil pipe not included.)

Outfits with hoppers enameled in and out, add list, $4.40. Outfits with self-raising seats, add list, $1.32.



Vogel No. 3

Vogel No. 3

Vogel No. 3 is a Southern outfit and is not frost-proof. It is a durable, low-priced seat-action closet combination, made to stand up under hard use.

Vogel No. 3, enameled inside, red outside, tall oval flushing rim, enameled rim hopper, reinforced hardwood seat, galvanized pressure tank, flush pipe, heavy brass flush valve. List price, $25.

Outfits with hoppers enameled in and out, add list, $4.40.

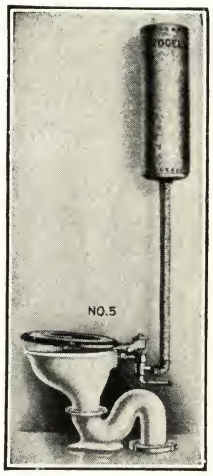
Outfits with self-raising seats, add list, $1.32.

When ordering, specify whether outfit with flanged bowl or bowl for caulking into soil pipe is desired.

Soil pipe trap not included with this outfit.

Roughs at same distance from wall as No. 1.

Vogel No. 5



Vogel No. 5

Vogel No. 5 is a factory outfit. It fills the demand for a strong and durable seat-action water-saving closet for factory use. The valve device is extremely simple, and repairs, though seldom necessary, can be easily made by removing the valve cap back of the bowl.

Vogel No. 5, enameled flushing rim hopper with S trap, enameled inside only, reinforced hardwood seat, heavy brass pressure flush valve, galvanized pressure tank, flush pipe and fitting. List price, $30. For bowl and trap enameled outside, add list, $8.75.

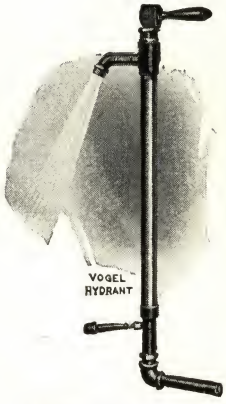
Outfits with self-raising seats, add list, $1.32.

Traps having 4-in. outlets for caulking into bell end of soil pipe at same list price.

Also furnished with full or ¾-S or trap for caulking at same price.

This closet is intended for inside installation and has the same powerful flush and lasting quality as our frost-proof outfits.

Vogel Frost-proof Hydrants



Vogel Hydrant

The Vogel Frost-proof Hydrant has been on the market several years and many thousands are giving entire satisfaction.

It is the easiest and most convenient way of supplying water for washing cars or filling radiators in unheated garages.

It has the dependable Vogel Frost-proof Supply Valve, with bevel valve seat that will not retain pipe cuttings, sediment, etc. The by-pass is in the plunger, so that when rod is withdrawn the waterway is straight and clear with no concealed by-pass in valve body.

Pipe casing is genuine wrought iron pipe, galvanized. Packing cap is the Vogel patent by which a uniform pressure is exerted at all times on the packing material. This hydrant has the endorsement of water departments on account of its positive open and shut operation, as it is either held entirely open or positively closed. Made in lengths: 3 ft., 4 ft., 5 ft.

Price complete with lead waste connection, list $7.50.

Literature

A complete catalogue of Vogel products will be sent promptly upon request. Also an eight-page bulletin on Vogel Numbers Ten and Ten-A Closets, designed especially for architects' use. This booklet has been prepared according to specifications of the A. I. A. filing system, and is No. 1 of a series of similar booklets on Vogel products which are now being prepared.

We shall also be glad to send folders and other information which we believe will be of interest to architects. Special roughing-in measurements will be supplied promptly.

THE BEAD CHAIN MANUFACTURING COMPANY

123 Mt. Grove Street, BRIDGEPORT, CONN.

Bead Chain

Bead Chain, as its name implies, is a type of chain formed from hollow metal beads with special fastening devices inside of the bead. The construction is such that a length of Bead Chain offers unusual strength, extreme flexibility, is absolutely non-kinkable and also attractive in appearance. It will show to good advantage anywhere.

USE BEAD CHAIN FOR PLUMBING

Trade Mark Reg. U. S. Pat. Off.

Nickel Silver Bead Chain is standard equipment with leading manufacturers of lavatories, tubs and trays. It is sanitary and holds its color where ordinary nickel-plated plumbing chain might wear brassy. It may also be obtained plated with chromium metal.

Uses of Bead Chain

Plumbing and Heating—With rubber stoppers in bathtubs, lavatories, kitchen trays and sinks, and for shower curtain holdbacks and as pull chains on high tanks; also for furnace regulator chains.

Lighting Fixtures—On pull chain sockets in connection with lighting fixtures, also for ornamentation and suspension.

Miscellaneous—Necklaces, bracelets, knife and pencil chains, jewelry items and lamp shades, dress, hat and belt trimmings, dog leashes, key rings, calendar and placard hangers.

A variety of special end rings and connectors, splicing links, stop balls, pendant balls and tassels are also manufactured for use with Bead Chain.

Material and Finishes

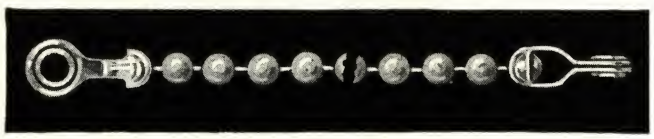
Bead Chain is manufactured in brass, bronze, copper, nickel silver, sterling silver and aluminum. Bead Chain may also be secured plated with chromium metal, Roman and old gold, or lacquered in various colors. Also manufactured and furnished in polished brass.

How to Specify Bead Chain

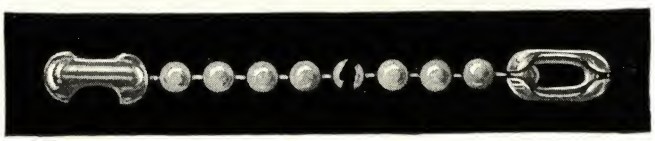
All chain between waste and overflow connections of lavatories, trays and tubs shall be nickel silver or chromium plated Bead Chain of suitable lengths.

No. 10 Bead Chain

Made throughout of Grade A nickel silver. Beads are $\frac{3}{16}$ in. in diameter. Tensiie strength 45 to 50 lbs. Equipped with new Type B combined jump ring couplings and splicing links. Also furnished with Type A couplings. Patents applied for.



No. 10 Bead Plumbing Chain with Type A Coupling



No. 10 Bead Plumbing Chain with Type B Coupling

No. 13 Bead Chain

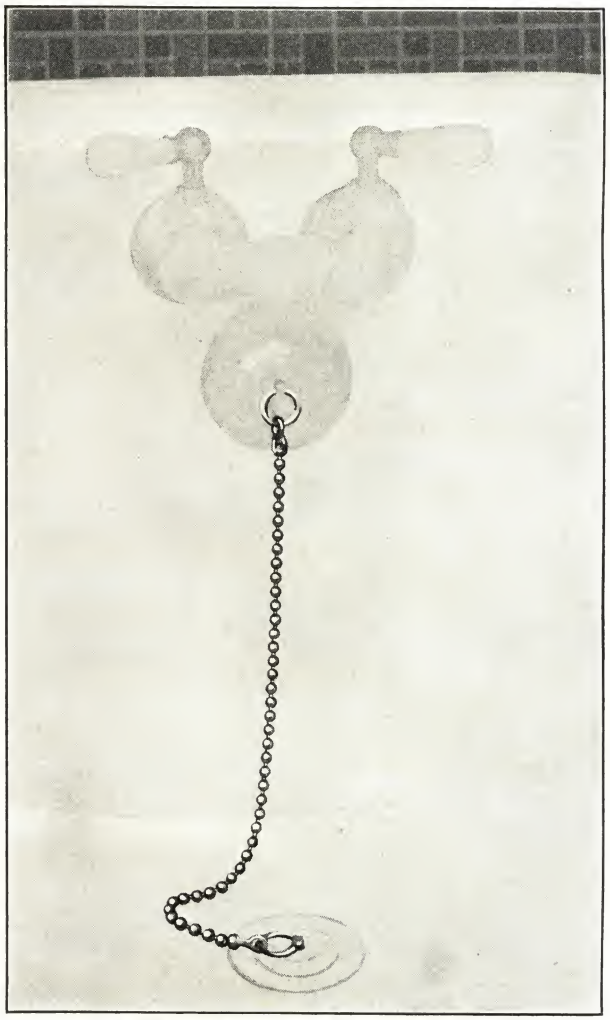
Beads ¼ in. in diameter. Made throughout of Grade A nickel silver. Tensile strength 120 to 130 lbs. Equipped with Type A patented jump ring couplings.

No. 13 Bead Plumbing Chain with Type A Coupling
Actual size

Sizes and Lengths

Both No. 10 and No. 13 are stocked in inch lengths from 10 to 18 in., inclusive, with jump ring couplings attached. Other lengths with jump ring couplings attached are furnished on request. Measurements are from center to center of eye. Bead Chain is also furnished on reels, jump ring couplings in bulk—No. 10 on reels of 500 ft., and No. 13 on reels of 250 ft.

Bead Chain is standard equipment with manufacturers of dependable plumbing supplies.



Bead Chain Attached to Bathtub Stopper

THE HIGGIN MANUFACTURING CO.

Metal Access Panels

NEWPORT, KY.

SALES AGENCIES IN PRINCIPAL CITIES

HIGGIN ALL METAL Access Panel

(Patented)

Product

HIGGIN ALL-METAL ACCESS PANELS.

For Higgin All-metal Weatherstrips and Window and Door Screens, see Manufacturers' Index.

Purpose

The Higgin All-metal Access Panel fills a long-felt need for an inconspicuous flush panel giving quick access to critical places in plumbing, heating and refrigerating systems, as well as for use as scuttles and for many other places. It is ideal for residences, apartment houses, hotels, hospitals, office and other buildings.

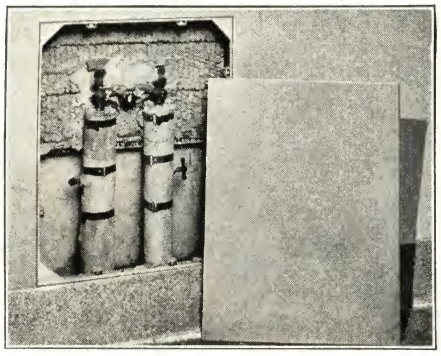


Fig. 1. Panel Open for Access to Supplies in Back of Bathtub

Fig. 1 shows panel open for access to supplies in back of bathtub. Small size panel for reaching concealed valves is shown in Fig. 2. Fig. 3 shows lid in place. Hinged type panel for ceiling use is shown in Fig. 4.

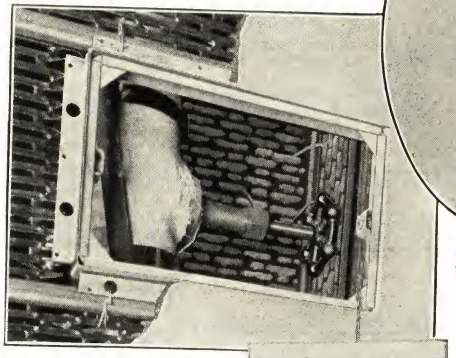


Fig. 2. Small Size Panel for Concealed Valves

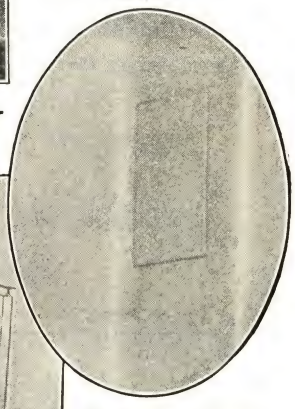
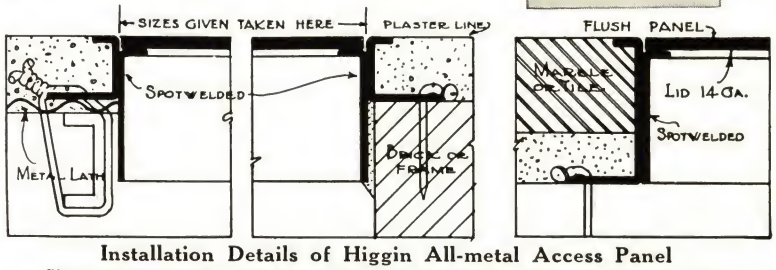


Fig. 3. Metal Panel with Lid in Place

Construction

Frame is of one piece, with small continuous angle on inside forming a rabbet for lid. Perforated channels are spot-welded to outside of frame for fastening and plaster key. Retaining clips and special cam fasteners are used on all sizes of panels. Cam is operated by screw head bolt set flush with surface of lid. Panels may also be equipped with concealed hinges, allowing door to swing 180°. Cam fasteners are provided with this type of panel also.



Installation Details of Higgin All-metal Access Panel

Showing Higgin All-metal Access Panel in metal lath and plaster, plaster on brick or building tile, and with marble or tile facing. When panels are to be used in tile or marble, it must be so stated in ordering

Advantages

Both panel and frame are of metal. Comes ready to install. Can be placed quickly and easily where desired. No special framing required. Avoids chance of plasterer sealing the opening. Eliminates necessity of tearing down walls to get at concealed fittings. Fits flush with wall in plaster, marble or tile, and permits painting, decorating or papering over to make inconspicuousness complete.

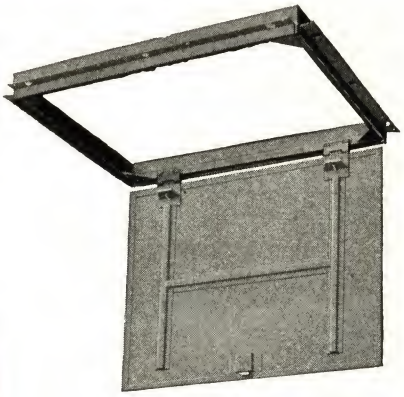


Fig. 4. Hinged Type Panel for Ceiling

Stock Sizes

7½x11½ in.
12½x16½ in.
14½x18½ in.
18½x24½ in.
18½x30½ in.

Measurement points are shown on detail drawing in lower left-hand corner.

Roughing-in dimensions should be ½ in. greater than above sizes.

In Ordering Panels

In ordering panels, state whether hinged or regular panels are desired (regular type has removable lid as illustrated in Fig. 1).

If panels are to be used in walls having marble, tile or like material facing, order must so specify. In all other cases panels will be furnished with flanges set back far enough for plaster finish only (as illustrated in detail in extreme lower left-hand corner).

Standard finish of panels consists of a baked enamel prime coat.

Panels can be furnished in color finishes, special sizes and with key locks, at a slight additional cost.

Hinged type panels can also be equipped with small handle to operate cam which makes them adaptable for clothes chutes, etc.

THE F. H. LAWSON CO.

Famous since 1816 as Manufacturers of High Grade Metal Products

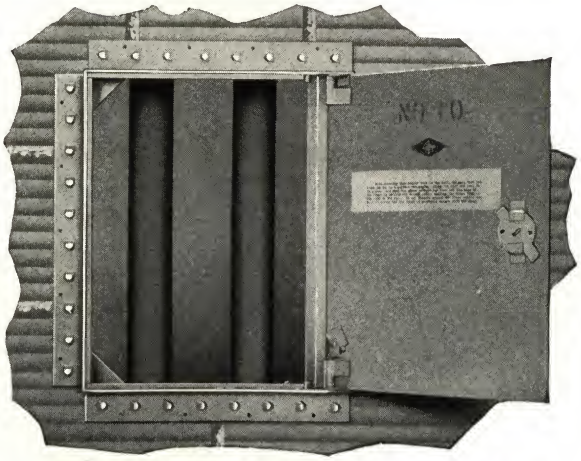
MAIN FACTORY AND OFFICES
Evans, Whately, Boston and B. & O. R. R.
CINCINNATI, OHIO

BRANCH OFFICES: NEW YORK, N. Y., and CHICAGO, ILL.

For Lawco Bathroom Cabinets, see Manufacturers' Index

Lawco Steel Access Units

Dust-tight, fireproof, easily installed, to give instant access to pipes, valves, airshafts in or behind walls. Panel closes firmly, dust-tight, on inside flange. Edge of door panel and frame flush with plaster or wall surface. May be painted or papered over. Latched in place by positive locking device.



Lawco Access Unit Installation in Gypsum Tile Block Wall

Left: With door closed, showing the attractive fit. Only screwdriver required to open

Right: Crack between door and frame easy to fill with putty or plaster, making smooth wall surface for papering or painting

Frame and panels of 1/8-in. steel. Strongly reinforced corners; plaster hooks on flanges.

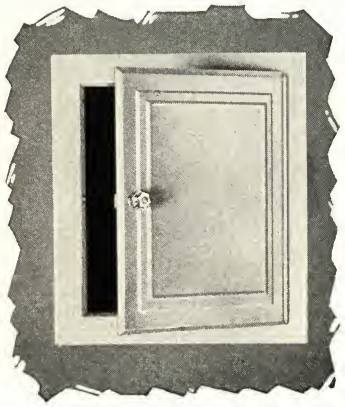
Universal type—door easily removable by removing hinge pin, making unit either hinged or separate panel.

Cost less, last longer, look better.

HORIZONTAL SECTION

Cross Section of Typical Lawco Access Unit Installation

Catalogue Nos.	Panel size, in.	Wall opening, in.	Wt., lbs.	Price, each
5	8 x10	8½x10½	9	$3.50
10	13 5/16x16	13¾x16½	15	4.50
15	13 5/16x24	13¾x24½	24½	6.50
20	19 5/16x24	19¾x24½	28	7.50
22	19¼x30	19¾x30⅝	35	8.50



Lawco All-Metal Clothes Chute Doors

Modern, attractive, convenient. Frames and doors stamped from one piece. Finished in white prime, easily painted to match room decorations.

Invisible hinges, crystal glass knobs. Door held in place by brass bullet catches.

Quickly installed.

No.	Panel size, in.	Wall opening, in.	Wt., lbs.	Price, each
26	10x11¾	9½x11¼	4½	$3.00

THE MICHAELS ART BRONZE COMPANY

Orna-Metal Craftsmen Since 1870

235-241 Court Avenue

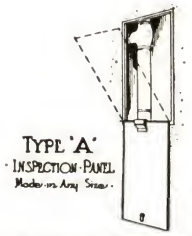
COVINGTON, KY.

(Three minutes from the heart of Cincinnati, Ohio)

REPRESENTATIVES IN PRINCIPAL CITIES

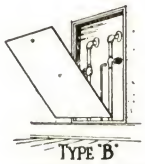
For our pages on Ornamental Bronze and Iron, Weatherstripping and Store Front Construction, see Manufacturers' Index

MABCO SYSTEM OF ACCESS PANELS AND FRAMES



TYPE "A"
INSPECTION PANEL
Made in Any Size

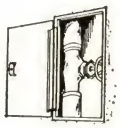
6¾ x9-in. clear opening customary size for inspection of joints at junction of radiator branches and risers and returns. Provided with concealed locking hinge at bottom and "back off cam" at top. Add 1¼ in. to width and height for panel size



TYPE "B"
REMOVABLE PANEL
Made in Any Size

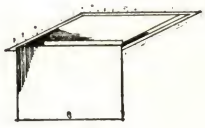
16x22-in. panel size generally used behind bathtubs of built-in type. Deduct 1¼ in. from width and height for clear opening

MABCO SYSTEM
OF FLUSH ACCESS PANELS & GRILLE FRAMES FOR WALLS FLOORS & CEILINGS
(PATENTS APPLIED FOR)



TYPE "C"
FULL SWING HINGE
180° Panel Swing
Made in Any Size

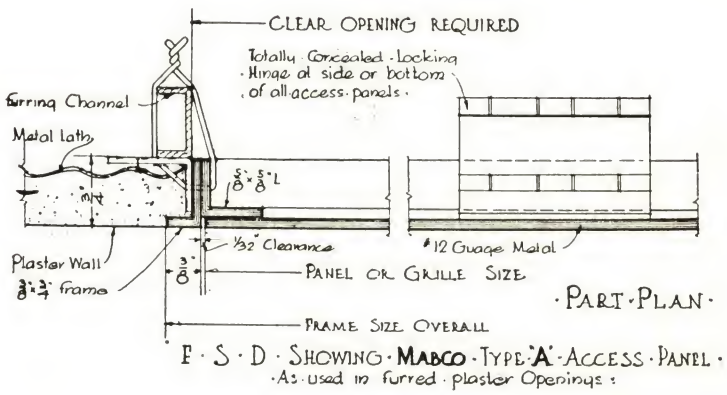
For openings where full 185° swing is desired. Allow 1¼ in. in width and height for clear opening



TYPE "D"
PIVOT HINGE
145° Panel Swing
Made in Any Size

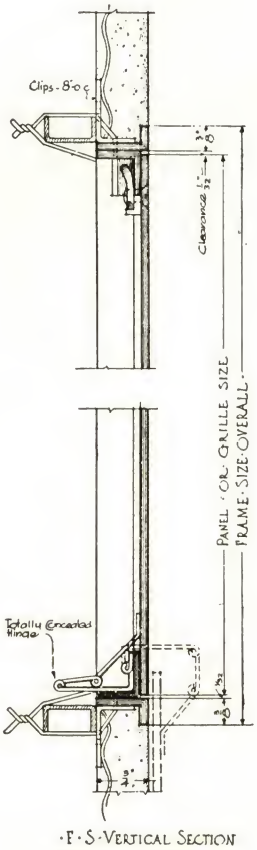
Recommended for ceilings. Also satisfactory for walls where beyond 145° swing of panel is not necessary. Allow 1⅞ in. in width and 1¼ in. in height of panel for clear opening

For further details write for folder "A-P."

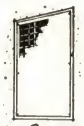


PART PLAN

F·S·D SHOWING MABCO TYPE "A" ACCESS PANEL
As used in furred plaster Openings

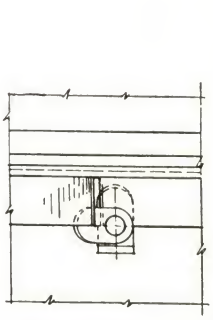


F·S VERTICAL SECTION
Showing Concealed Locking Hinge and "Back off Cam" for TYPE "A" PANEL
AUTOMATIC CAM & PULL FURNISHED ON ORDER

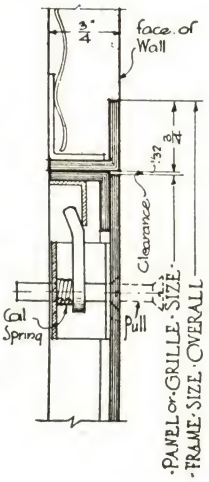


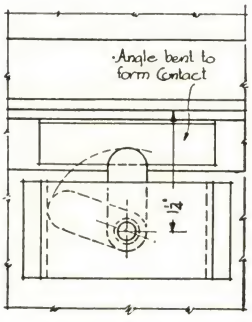
FLUSH GRILLE FRAMES FOR WALLS
Made in Any Size

Grilles secured to frames by screws. When ordering give exact out-to-out grille dimension and thickness. All frames have continuous ⅝-in. rabbet

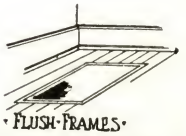


ELEVATION
of "BACK off CAM" for
TYPE "A" PANEL





ELEVATION
from Rear



FLUSH FRAMES

For grilles, registers or panels for floor use. Safe load for ⅛-in. steel panel in floor for span of 22x22 in., approximately, 100 lbs. per sq. ft. distributed. Checkered or smooth panels for floor use.

Note: Inspection "A" and removable "B" panels are furnished with "back off cam" as standard and removable "B" panels "C" and pivot hinge "D" are furnished with "automatic cam and pull" unless otherwise specified. Either type can be used on any panel

THE BASHLIN COMPANY

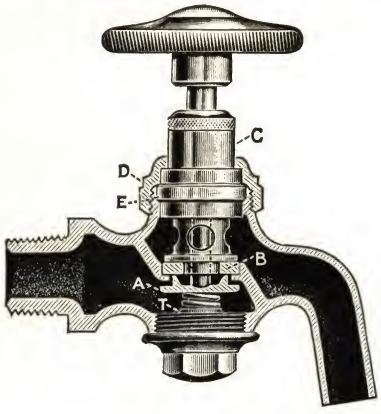
Manufacturers of Faucets
WARREN, PA.

Products

BASHLIN COMPRESSION and SELF-CLOSING FAUCETS, WASH TRAY BIBBS, BASIN COCKS, STOP COCKS, SINK FIXTURES, LAVATORY FIXTURES, PANTRY COCKS, GLASS FILLING FOUNTAINS, PEDAL VALVES, SWING SPOUT FIXTURES, BATH FIXTURES.

Also Bashlin Globe and Corner Valves, Blow-off Valves, Check Valves, etc.

Construction of Bashlin Faucets

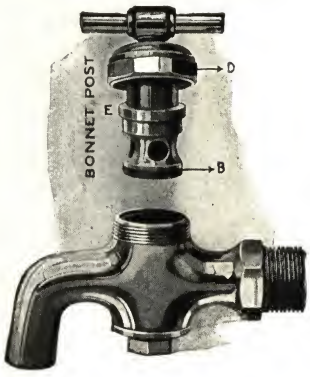


All Bashlin Compression and Self-closing Faucets and Basin Cocks are carefully built from the best material so that they give long and satisfactory service.

One of their chief features is the simplicity with which they may be repaired under water pressure.

Both seat and disc are easily renewed. The seat (B), most subject to abuse, may be replaced under pressure.

An ordinary faucet is liable to get out of repair because of the tendency of some people to exert excessive pressure on the handle. No matter how much force is applied to the handle of a Bashlin faucet neither the seat nor disc is harmed since the excessive strain is not communicated to them. While Bashlin Faucets have not been found leaky in actual use, should one commence to drip, this may be overcome by merely renewing the seat ring. While this repair is being made the water is automatically cut off by its own pressure.



Bashlin Compression and Self-closing Faucets

These faucets are all made for iron pipe size with hexagon, plain or flange end on connection side and plain or hose end on discharge side. Finished in polished brass or heavy nickel or chromium plate. May be fitted with a lock shield at slight extra expense. Flanged inlets can be supplied with adjustable flanges.

Fig. 21

STYLES AND SIZES SELF-CLOSING FAUCETS

Code No.	Spout	Style	Sizes, in.		
Fig. 21	Plain	Hexagon	⅜	½	¾
Fig. 22	Hose	Hexagon		½	¾
Fig. 23	Plain	Straight		½	¾
Fig. 24	Hose	Straight		½	¾
Fig. 27	Plain	Flange		½	¾
Fig. 28	Hose	Flange		½	¾

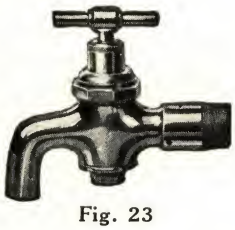


Fig. 23

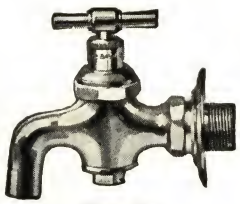


Fig. 27

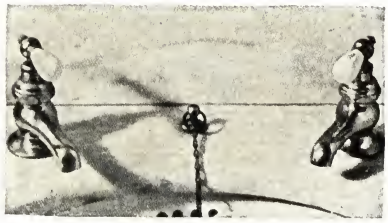
Bashlin Stop Cock

A stop cock for insertion in pipe lines. Made in ¼, ⅜, ½ and ¾-in. iron pipe sizes. Finish is polished brass, nickel or chromium plated. Compression or self-closing styles.

Fig. 36

Basin Cocks

An illustration of two Bashlin Basin Cocks that have been in constant service 30 years under 70 lb. pressure and not one cent has been spent for repairs



Bashlin Low Type Basin Cock

A handsome, well proportioned cock for use in washbasins. Made in three sizes. Fig. 33, distance from center of base to near edge of spout opening 2¾ in. Fig. 33-L, distance from center of base to near edge of spout opening 3½ in. Fig. 48 heavy pattern, distance from center of base to near edge of spout opening 3½ in. Each is made in both compression and self-closing styles with heavy nickel or chromium plated finish. These basin cocks can be furnished in the push button type (Fig. 33-LP) at less cost.

Fig. 33-L

Fig. 33-LP

Bashlin Handles for Cocks and Bibbs

Bashlin Cocks and Bibbs can be furnished with any one of several types of handles as illustrated, at slight additional cost depending on the style selected.

Fig. 39 Fig. 40 Fig. 43 Fig. 41 Fig. 38

Bashlin Sink Fixture

This fixture has concealed valves of the Bashlin patented type, working parts renewable from the front but not under pressure. Flanges are adjustable. All exposed parts are nickel or chromium plated. Valves and connections back of the wall are rough nickel finish. Metal escutcheons and metal handles, china indexed, can be furnished. Holes in sink back, 1¼-in. diameter.

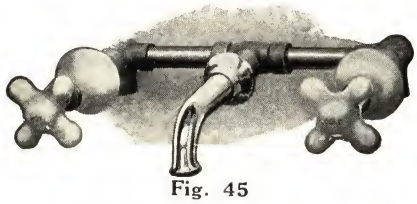
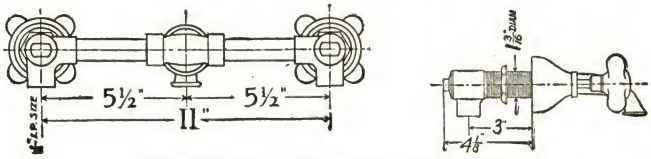


Fig. 45



Roughing-in Dimensions—Fig. 45

Bashlin Lavatory Fixture

A handsome fixture with all exposed metal parts heavily nickel or chromium plated, china escutcheons and solid china four-arm handles. The concealed valves are of the Bashlin patented type which are renewable, under pressure, without shutting off the water. Nozzle is of the semiraised type. Pop-up waste has a china knob. Standard distance between centers of valves is 12 in.; the cock holes in the lavatory should be 1¼-in. diam., the lift rod hole 1-in. diam.

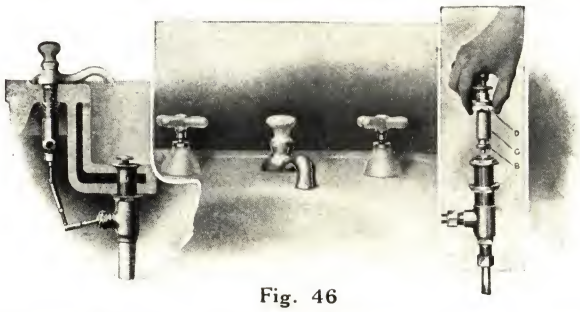


Fig. 46

Bashlin Exposed Slop Sink Fixture

A sturdy fixture for hard service, with pail hook and brace, fitted with Bashlin compression or self-closing cocks. Made for ½-in. iron pipe size male inlets and adjustable flanges. Finish, polished brass, nickel or chromium plated.

Fig. 50-J is a junior size with spread of 6 in. without pail hook or brace.

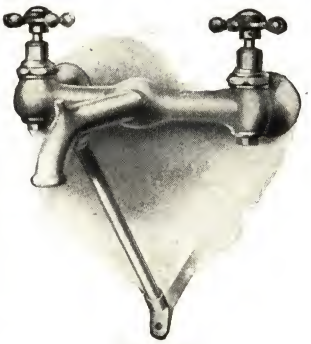
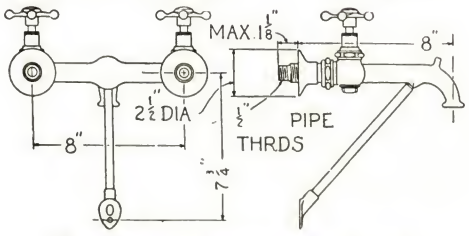


Fig. 50



Roughing-in Dimensions—Fig. 50

Bashlin Pantry Cock

Made in compression and self-closing styles with nickelplated finish. Regularly supplied with bar handle. Furnished with wheel handle at slight extra expense. (Fig. 44.) Can also be furnished with hose end.

Fig. 44

Bashlin Glass Filling Fountain

These fountains have a pan to hold the glass, are operated by a slight depression of the pan, and are self-closing. Finish, nickel or chromium plated. With vertical connection for ⅜ or ½-in. iron pipe female inlet (Fig. 51) or for horizontal connection (Fig. 52). Vertical inlet style 11½ in. high, horizontal inlet style 10½ in. high.

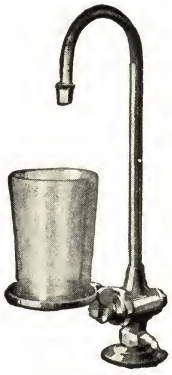


Fig. 51

Fig. 52-C glass fillers are operated by a slight deflection of the stirrup. Inlets, ⅜ or ½ in. inside thread. Center line of inlet to bottom of stirrup, 4½ in., width (front to back) 4⅜ in. Nickel or chromium plated finish.

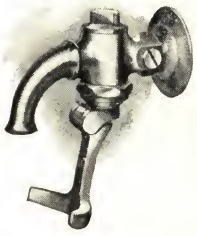


Fig. 52-C

Bashlin Swing Spout Fixtures

This is a well proportioned fixture for use where it is desired to vary the position of the outlet. The spout has a radius of about 6 in.

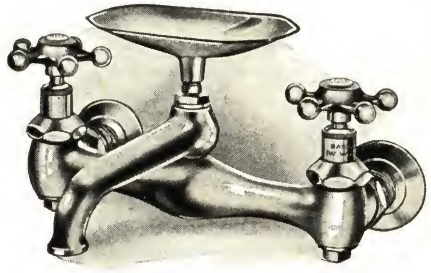


Fig. 53-S

Connections have ½-in. male thread iron pipe size and adjustable flanges. Finish, nickel or chromium plated. Made in three styles: Fig. 53 plain; Fig. 53-S with soap holder, as illustrated; Fig. 53-H, a hospital fixture equipped with special handles which may be easily turned by a touch of the elbow without the necessity of touching with the hands.

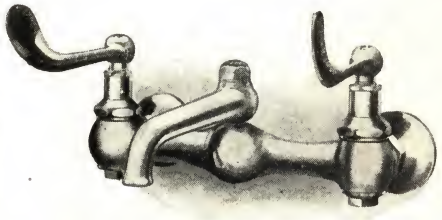
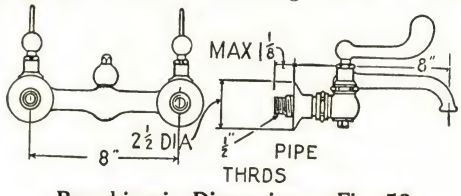


Fig. 53-H

Valves are of the Bashlin patented type which may be renewed under pressure, without shutting off the water.

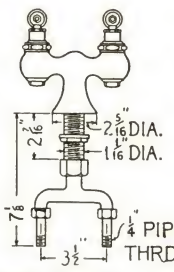


Roughing-in Dimensions—Fig. 53

Bashlin Double Basin Faucet

A compact basin fixture, with a single outlet spout, requiring but one hole in lavatory. Exposed parts heavily nickel or chromium plated. Handles are of porcelain.

Fig. 55-P has a gooseneck instead of the regular spout.



Roughing-in Dimensions—Fig. 55

Fig. 55

Bashlin Concealed Bath Fixture

A superior fixture for use with the modern type of built-in bathtub. Made in two styles: Fig. 54 with spout in the tub and Fig. 56 with spout over the rim. In the dimension diagram Fig. 56 is shown by the dotted lines. Exposed parts nickel or chromium plated. Furnished with china escutcheons and solid china four-arm handles. Valve working parts renewable from front but not under pressure.

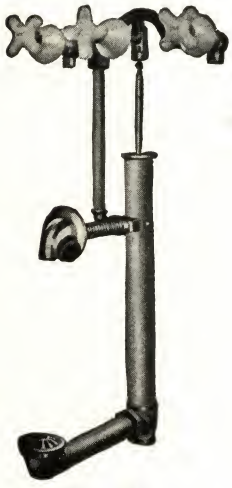
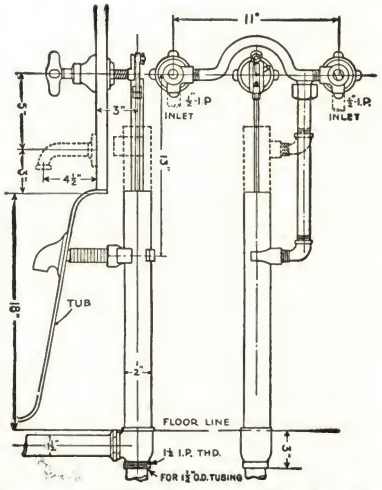


Fig. 54



Roughing-in Dimensions—Figs. 54, 56

Bashlin Double Bath Faucet

A handsome, well proportioned fixture for use on bathtubs. Fitted with Bashlin patent valves which may be renewed, under pressure, without shutting off the water. Nickel or chromium plated finish, regularly supplied with round milled handles or the 4-ball type.

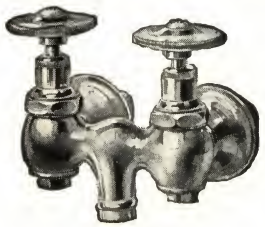
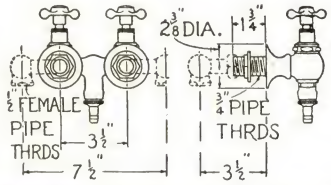


Fig. 35



Roughing-in Dimensions—Fig. 35

Bashlin Industrial Fixtures

For factories and schools; can be supplied in polished brass, rough nickel, polished nickel, or chromium plated finishes. Compression or self-closing.

Fig. 221

Fig. 351

Bashlin Self-closing Pedal Valve

This valve is convenient in hospital operating rooms, dental offices, or wherever necessary to turn on water without hands coming in contact with the cock. Made with bottom inlet only or with both bottom and side inlets, as illustrated. Inlet connections have female threads ½-in. iron pipe size and outlet has male thread ½-in. iron pipe size. Finish, nickel or chromium plated. Valve is Bashlin patent style which may be renewed, under pressure, without shutting off water.

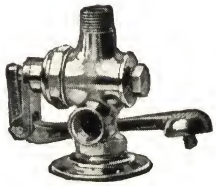


Fig. 37

Bashlin Shower Control and Tub Filler

A combination fixture for controlling the water for the shower and filling the tub. Valve working parts renewable from front but not under pressure. Outlet spout over the rim of the tub. Exposed metal parts are heavily nickel or chromium plated. Furnished with china escutcheons and solid china four-arm handles. In this combination the distances given can be varied to suit the conditions.

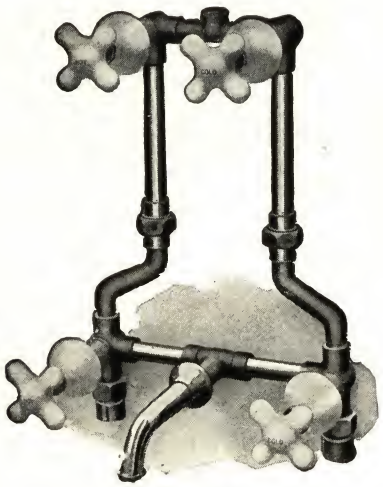
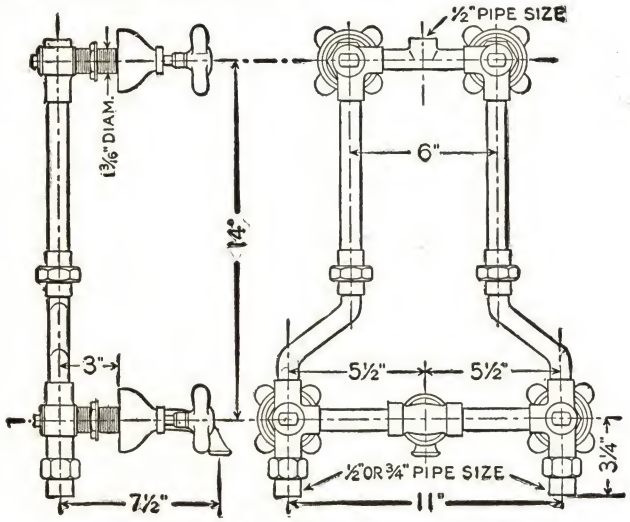


Fig. 58



Roughing-in Dimensions—Fig. 58

HAYS MANUFACTURING COMPANY

ERIE, PA.

For Hays Copper Plumbing Method and Service Connections, see Manufacturers' Index

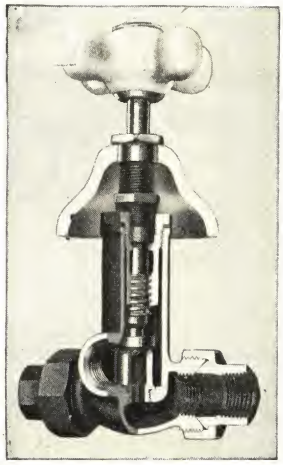
Manufacturing Policies

The HAYS MANUFACTURING COMPANY was established in 1869. From a small foundry, supplying the needs of nearby trade, it has grown to one of the large plants in the industry, with a national distribution. Sixty years ago the founders laid down a policy of manufacture which has been followed so well that brass goods marked "Hays" are known today as having no superior in design or construction. Before a Hays Product leaves the factory, it must pass tests that are more severe than the stresses and strains encountered in actual service.

Common Attributes of Hays Fixtures

Joints are screwed, sweated and thoroughly tested. Supplies to tub are full ¾-in. brass pipe iron pipe size. Standing wastes have 17 gauge tubing; the waste seat is not only carefully machined, but ground in.

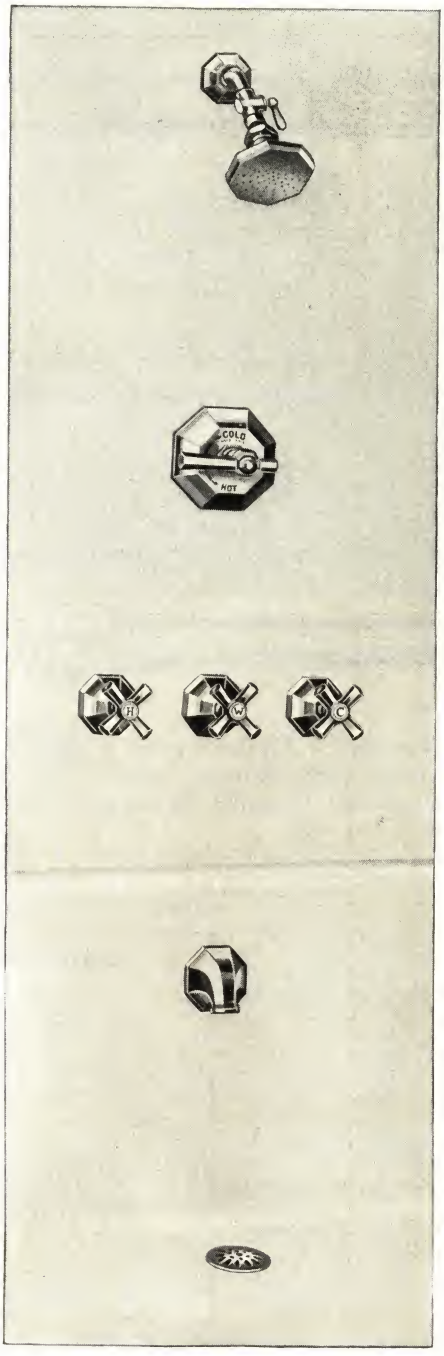
Stems in tub and shower valves are interchangeable with the lavatory fixtures. This is also true of the high renewable seats, bonnet stuffing box nuts, stem packing rings and escutcheon lock nuts. Malleable iron tie plate furnished with all fixtures having standing waste. Vitreous china parts are of selected quality, glazed both outside and inside.



Hays By-pass Valve for Bath and Shower Fixtures

Haysco Valve is constructed so that all parts subject to wear are easily renewable. Valves rough-in at 3 in. to meet the more standardized wall construction, but are adjustable from 2½ to 3½ in. High seat is chromium plated to give longer life. Seat is also renewable with liberal waterway. Stems have swivel seat holders, designed for ample lift, and when valve is closed several deep heavy threads are engaged in bonnet. Bonnet stem packing, durable graphited asbestos.

To make special adjustment of escutcheons possible when necessary, we have adopted ⅜-in. straight iron pipe thread brass nipple with 1-in. adjustment. This nipple can be cut off for shortening or easily replaced for greater adjustment. Valves can be furnished with or without Erico brass ground joint unions.



Center

"Nuart" Hays Built-in Bathroom Fixtures

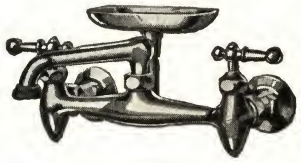
The artistic, octagonal design of "Nuart" Fixtures is finished in the deep silver lustre of Hays chromium plating and harmonizes attractively with the bathroom background whether it is white or brightly colored in the modern style. These fixtures, for shower, tub and lavatory, will not tarnish and do not require polishing.

"Nuart" Fixtures are accurately engineered throughout for efficient performance and durability, with every part correctly proportioned. Easy installation is assured. All parts subject to wear are easily accessible. The renewable chromium plated seats in tub and shower valve are interchangeable with the lavatory fixture—and so are the handles, stems with swivel seat holder, bonnet stuffing box nuts, stem packing rings and escutcheon lock nut.

Send for our latest catalogue "Street to Bath" by Hays for our complete line.

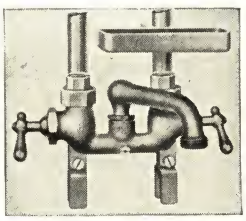
Haysco Lavatory Fixtures with Pop-Up Drain

The valves have high renewable chromium plated seats, swivel seat holders with encased washers; all wearing parts are interchangeable with the bath valve shown on opposite side of page



Hays "Erico" Sink Faucet

The clean, graceful curves of this design give a pleasing appearance that appeals to every housewife. The soap dish rides low to the top of the spout. This faucet fits nicely in any sink, especially those with low backs. "Erico" Faucet, including handles and soap tray, is made of high grade red metal with a bright, long-wearing Hays chromium plated finish. Furnished with flanged female or adjustable screw flanged male iron pipe inlets. Efficient design and expert workmanship are combined to make this Hays Faucet one of the most reliable and durable as well as one of the *finest looking* sink faucets on the market.



Hays "Mova" Laundry Tray Faucet

Not by any means the least of our new designs and improvements is the double laundry tray faucet. Swinging spout directs the water to any tray compartment and swings aside when not in use. Water may be regulated to temperature desired. Faucet is complete, including clamps, unions and bolts. It is all-brass, rough nickelplated; there are no iron parts. Space between clamps is 3 in. Large cast aluminum soap dish can be furnished if desired. For 3-part trays an extension to the spout is furnished, giving the same convenience for all three compartments.

WOODFORD HYDRANT COMPANY

Manufacturers of "Freezeless" Hydrants

505 Fifth Street
DES MOINES, IOWA

WOODFORD "FREEZELESS" WALL HYDRANTS

Woodford "Freezeless" Wall Hydrants assure the convenience of year round outside water service with absolute safety. They cannot freeze. There is no possibility of damage to plumbing, flooding of basements, damage to merchandise stocks, etc., such as may result from the careless use of ordinary sill cocks. It is never necessary to go into the basement to shut off outside water outlets at the approach of cold weather.

These hydrants are extremely easy to operate. In any temperature, they are quickly opened or securely closed with the finger tips. Easily installed.

Woodford "Freezeless" Wall Hydrants, liberally designed, are high quality products. Nothing is spared to make them the finest possible equipment in their field, in both beautiful appearance and mechanical features.

Any style furnished in any finish required to harmonize with architectural surroundings.

Standard Finishes

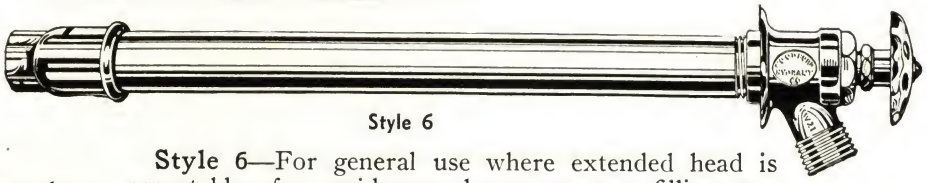
Rough bronze, polished bronze, rough nickel, polished nickel and polished chromium.

Cushion Type Ball Valve

A cushion type ball valve on large spherical brass seat, self-aligning, is pushed straight into seat without rotation, wear or friction.

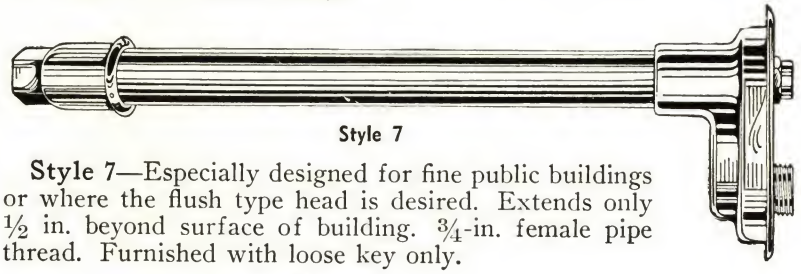
Extra heavy cast brass plunger yoke and square thread brass stem. All inside working parts may be withdrawn for inspection or repair through head by removing large brass cap.

No adjustments necessary. Cannot be damaged or caused to leak by over tightening.



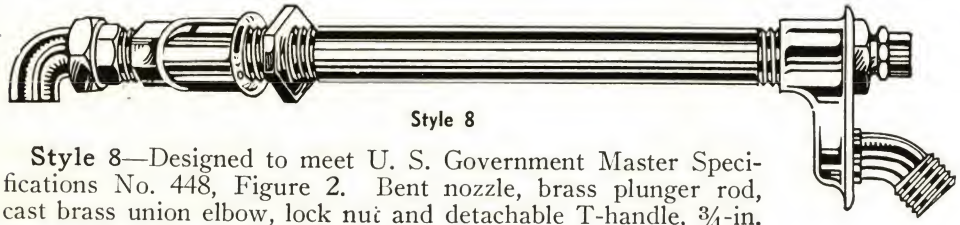
Style 6

Style 6—For general use where extended head is acceptable—for residences, home garages, filling stations. ¾-in. female pipe thread. Furnished with combination wheel and loose key.



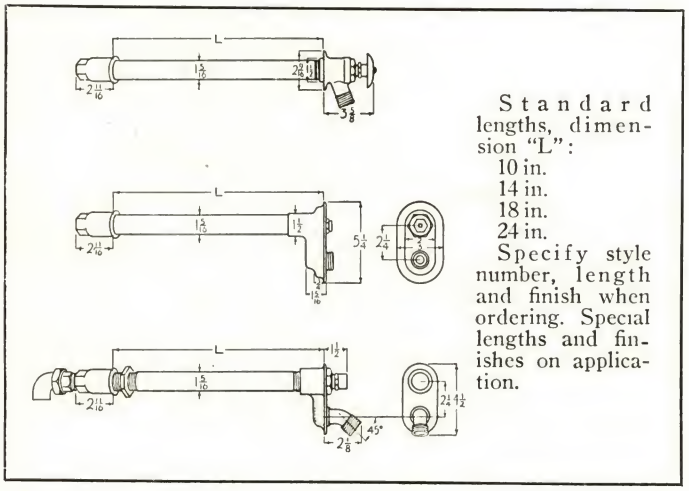
Style 7

Style 7—Especially designed for fine public buildings or where the flush type head is desired. Extends only ½ in. beyond surface of building. ¾-in. female pipe thread. Furnished with loose key only.



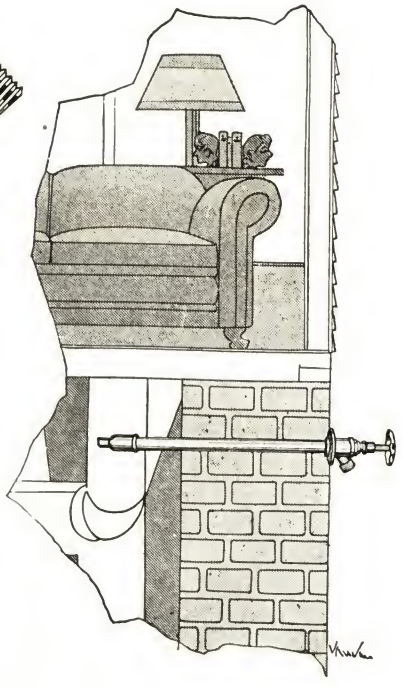
Style 8

Style 8—Designed to meet U. S. Government Master Specifications No. 448, Figure 2. Bent nozzle, brass plunger rod, cast brass union elbow, lock nut and detachable T-handle, ¾-in. female pipe thread. Furnished with loose key only.



Standard lengths, dimension "L":
10 in.
14 in.
18 in.
24 in.
Specify style number, length and finish when ordering. Special lengths and finishes on application.

Order from your jobber



Woodford "Freezeless" Wall Hydrants cannot freeze because the shut-off valve is within the warm basement.

WILLIAM W. KELLOGG

Manufacturer of Kellogg Combination Light and Vent for Shower Stalls

TELEPHONE
DUnkirk 4125

1348 Ingraham Street
LOS ANGELES, CALIF.

Product

KELLOGG COMBINATION LIGHT and VENT for SHOWER STALLS.

Purpose

Provides air circulation for removal of steam and vapor condensation. Permits of the placing of both light and vent in center of shower or toilet stall.

Three Types

(1) Open Vent, no Shutter; (2) Knob Control of Shutter; and (3) Pull Chain Shutter Control. Ceiling flange, glass, holder and electrical assembly are identical in all types.

Construction

Ceiling flange grid and the sliding shutter are heavy brass casting. Glass holder and collar are spun from heavy sheet brass. The use of two rubber gasket rings, in addition to rendering the interior both waterproof and vaporproof, prevents any tendency of corrosion between globe holder and outer threaded collar. This permits easy unscrewing of ring for lamp renewal.

The glass holder, in addition to being locked to the ceiling plate by the porcelain ring of the socket receptacle, is sweated securely to the ceiling flange. This prevents any chance of the assembly being loosened or separated in removing and replacing lamps.

The shutter ring slides easily on top of the grid of the ceiling flange, and the controls, both knob and chain, are sturdily constructed to give long service. The standard length of bead chain on the chain control is 9 ins. Special lengths can be furnished to order for extremely high ceilings.

Electrical Assembly

A standard ring sign receptacle is locked into the flange. The 10-in. rubber covered lead wires are then connected, after which the space above receptacle is completely filled with a melted special heat-resisting insulating compound rendering the entire assembly waterproof and vaporproof. Ground wire connection is provided as required by Underwriters' specifications. *Light must be controlled by wall switch.* Type of lamps used—Mazda 15 or 25 watts—with G 18½ clear bulb.

Finish

All metal work is finely finished and heavily chromium plated, non-tarnishing.

Glassware

The hemispherical holophane glass is scientifically designed to properly distribute light; the texture of the glass harmonizes perfectly with the chromium plated metal.

Packing

Vents are individually packed in special corrugated cartons, complete with 2½-in. chromplated screws and instructions for installation.

Venting

For upper floor installations, vent directly into attic. For lower floor installations, duct between joists to outside through 4x6 or 6x6-in. opening in girt, finishing with tile or metal grille set in outside wall.

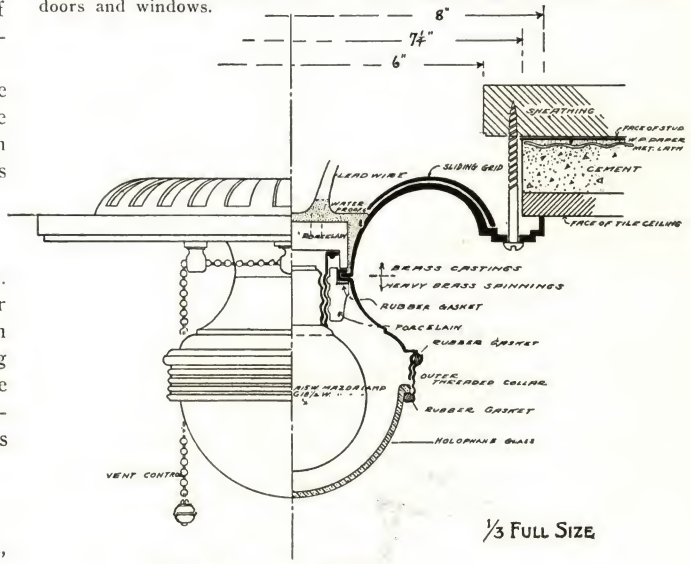
Specifications—Wiring and Installation

For all shower stalls provide center ceiling outlet controlled by wall switch where and as indicated on plans.

Provide and install Kellogg Combination Shower Stall Light and Vents where indicated in accordance with printed specifications and directions accompanying same.

To Be Offered Shortly

In Preparation—A larger size of the same type of combination light and vent suitable for installation in public and residential toilets and baths—to permit a constant circulation of fresh air, irrespective of position of doors and windows.



⅓ FULL SIZE

U. S. LETTERS PATENT 1744270

HOFFMANN & BILLINGS MFG. CO.

ESTABLISHED 1855

Manufacturers of Bath and Lavatory Fittings

MILWAUKEE, WIS.

Products

NIEDECKEN MIXER; SHOWERS AND SHOWER STALLS; BATH AND LAVATORY FITTINGS.

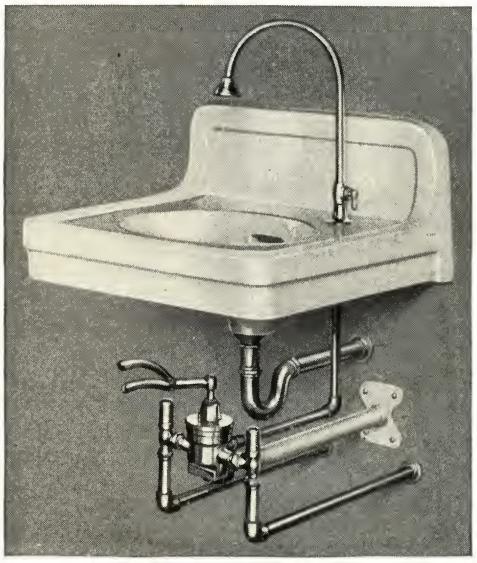
Special literature on request.

SAMPLES DISPLAYED WITH ARCHITECTS SAMPLES CORPORATION NEW YORK, N.Y.

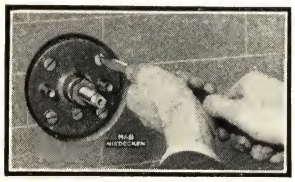
NIEDECKEN

TRADE MARK
Reg. U. S. Pat. Off.

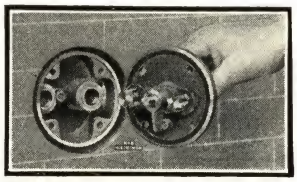
Knee—Elbow—Foot Surgical Lavatory Control



Illustrating above, H.N. 100 Niedecken Knee Type Control, installed with lavatory complete, including H.N. 160 gooseneck spout. Furnished also for elbow or foot control. Equipped with Niedecken Mixer. Continuous water flow at any temperature; need of basin plug eliminated. Can be set for predetermined temperature of water. Applies to any standard lavatory. For remodeling and replacement, as well as new building installation. Complete details on request.



Dial Removed, Only Screwdriver Needed

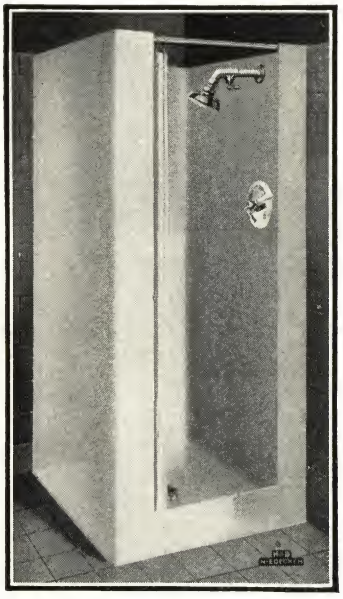


Cover Removed Exposing Valve Discs and Seats

Valves, Seats, etc., Easily Replaced

Simple Accessibility—Niedecken Mixer

Leakproof Shower Stall

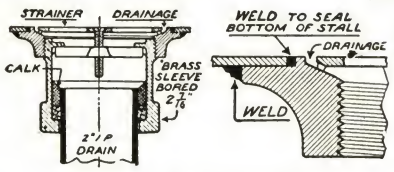


The Niedecken Shower Stall is sanitary, occupies least space and is absolutely *leakproof*.

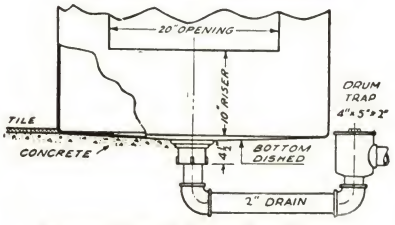
The walls of the stall are made of a continuous sheet of 1/8-in. copper-bearing steel which with the riser are welded to a dished bottom with drain outlet in center.

Equipment — Consists of a special concealed type Niedecken Shower, with Niedecken easy-clean shower head, flow control, curtain rail, duck curtain and nickel-plated strainer arranged for 2-in. drain outlet, for either lead or iron pipe.

After installation, the interior and exposed exterior of stalls must be finished with waterproof enamel paint.



Leakproof Drain Construction



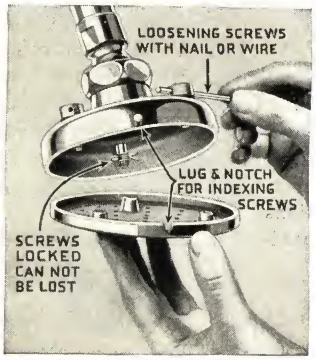
Construction of Niedecken Shower Stall

NC 1100

7000 Niedecken Showers Installed in Statler Hotels

Easy-clean Shower Head

The shower head that *can* be cleaned. Shower head face removable for thorough cleaning, by simple method illustrated. Easily replaced, notch provided for proper alignment as when originally assembled.



INCORPORATED 1913

LEONARD-ROOKE COMPANY

Manufacturers of Leonard Thermostatic Water Mixing Valves

(PATENTED)

PROVIDENCE, R. I.

Leonard Thermostatic Water Mixing Valves

Description—The Leonard Valve mixes hot and cold water and delivers blended water at any temperature desired within its range. Model B valves for ordinary uses have a scale from 80° to 120°; for bakeries and other commercial uses, scale from 40° to 120° or 120° to 180°. Special scales can be furnished on request.

Type L-9 valves have word scale only: Cold, Tepid, Warm, Hot.

Leonard Valves maintain constant temperatures regardless of extreme pressure fluctuations. They are anti-scalding and anti-chilling, shutting off automatically if either the hot or cold water fails.

Castings and interior parts are of bronze and phosphor bronze.

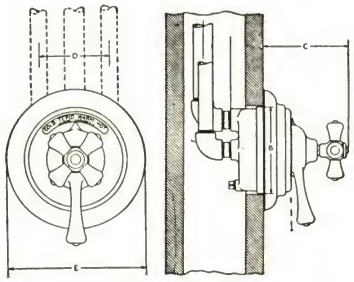
Combination check valves and strainers are furnished with all Model B valves with the exception of Model B-120, which is furnished with strainers only.

Finishes—Nickel, chromium, gold or silver plate, or in colors to match bathrooms.

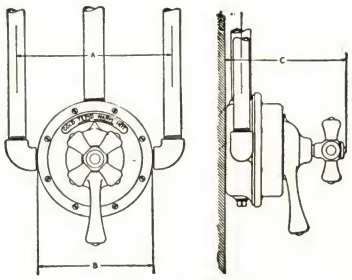
Type L-9-C can be furnished in octagon design. Illustrations and information furnished on request.

Uses—On bathtubs, hammock baths, shower baths, washfountains and lavatories, in clubs, schools, hotels, sanitariums, hospitals, turkish baths, gymnasiums, residences, garages, railroad stations, factories, and office buildings. Also in bakeries, laundries, X-ray developing tanks, laboratories, darkrooms where moving pictures and colored films are developed, tanneries, and many other industrial plants where a predetermined and accurate temperature of water is to be maintained.

Type L-9 Valve

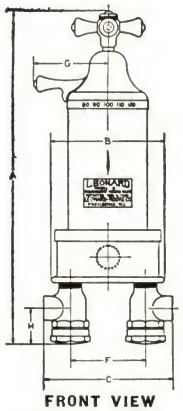


Type L-9-C
For concealed piping

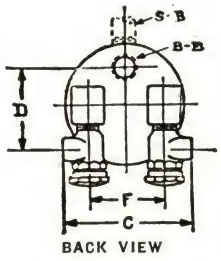


Type L-9-E
For exposed piping

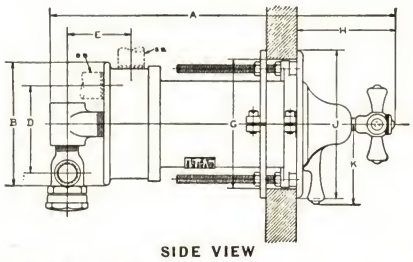
Model B Valve



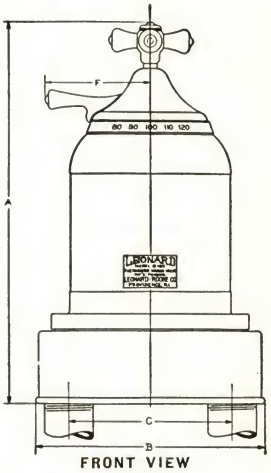
FRONT VIEW
Model B Valve
For exposed piping



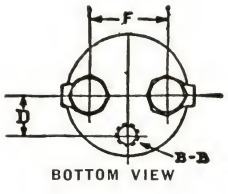
BACK VIEW



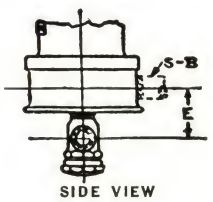
SIDE VIEW
Model B Valve
For concealed piping



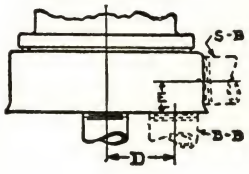
FRONT VIEW
Model B-120
For exposed piping



BOTTOM VIEW



SIDE VIEW



ROUGHING-IN DIMENSIONS LEONARD THERMOSTATIC WATER MIXING VALVES

	For exposed piping							For concealed piping				
Models	B-5	B-10	B-20	B-40	B-60	B-120	L-9-E	B-10	B-20	B-40	B-60	L-9-C
Cap., gal. per minute, 45 lb. pressure	5	15	25	40	55	120	7	15	25	40	55	7
Inlet, inches	½	½	¾	1	1¼	1½	½	½	¾	1	1¼	½
Outlet, inches	¾	¾	1	1¼	1½	2	½	¾	1	1¼	1½	½
A	14 5/8	14 5/8	14 5/8	18 1/4	18 1/4	16 11/16	7 3/4	14 1/8	14 1/8	17 7/8	17 7/8	3 1/2
B	5	5	5	6 7/8	6 7/8	9 1/8	5 3/4	5	5	6 7/8	6 7/8	4 7/8
C	5 11/16	5 11/16	5 13/16	7 3/4	8 3/4	6 1/2	6 1/4	5 11/16	5 13/16	7 3/4	8 3/4	4 3/4
D	1 9/16	1 9/16	1 9/16	2 1/8	2 1/8	3	7/8	3 9/16	3 9/16	4 3/4	4 3/4	3 1/2
E	2 1/4	2 1/4	2 1/4	2 3/4	2 3/4	1 5/8	.....	2 3/8	2 5/8	3 1/2	3 1/2	6 7/8
F	3 5/16	3 5/16	3 5/16	4 3/4	4 3/4	4 3/16	.....	3 5/16	3 5/16	4 3/4	4 3/4	.....
G	3 1/4	3 1/4	3 1/4	4 3/16	4 3/16	.....	.....	5 1/4	5 1/4	5 5/8	5 5/8	.....
H	1 9/16	1 9/16	1 9/16	2	2	.....	.....	4	4	3 13/16	3 13/16	.....
J	.....	.....	.....	.....	.....	.....	.....	6	6	7 1/4	7 1/4	.....
K	.....	.....	.....	.....	.....	.....	.....	3 1/4	3 1/4	4 3/16	4 3/16	.....

THE POWERS REGULATOR CO.

Thermostatic Water Controllers and Shower Bath Mixing Valves

GENERAL OFFICES AND FACTORY
2720 Greenview Avenue, CHICAGO, ILL.
TELEPHONE, Buckingham 7100

GENERAL EASTERN OFFICES
231 East 46th Street, NEW YORK, N. Y.
TELEPHONE, ELdorado 5-2050

BRANCHES AND SERVICE STATIONS
(See Telephone Directory for Local Addresses)

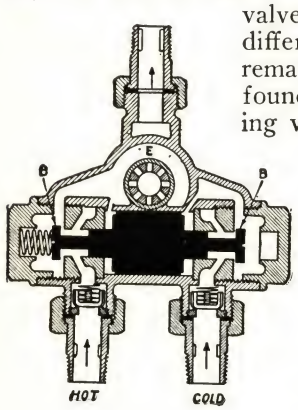
ATLANTA, GA. | BALTIMORE, MD. | BIRMINGHAM, ALA. | BOSTON, MASS. | BUFFALO, N. Y. | BUTTE, MONT. | CHARLOTTE, N. C. | CHATTANOOGA, TENN. | CINCINNATI, OHIO | CLEVELAND, OHIO | COLUMBUS, OHIO | DALLAS, TEX. | DAVENPORT, IOWA | DENVER, COLO. | DETROIT, MICH. | EL PASO, TEX. | HIGH POINT, N. C. | HOUSTON, TEX. | INDIANAPOLIS, IND. | KANSAS CITY, MO. | LOS ANGELES, CAL. | MEMPHIS, TENN. | MILWAUKEE, WIS. | MINNEAPOLIS, MINN. | NASHVILLE, TENN. | NEW ORLEANS, LA. | PHILADELPHIA, PA. | PITTSBURGH, PA. | PORTLAND, ORE. | READING, PA. | ROCHESTER, N. Y. | SALT LAKE CITY, UTAH | SAN FRANCISCO, CAL. | SEATTLE, WASH. | ST. LOUIS, MO. | SYRACUSE, N. Y.

For our pages on Automatic Temperature Controlling Apparatus, see Manufacturers' Index

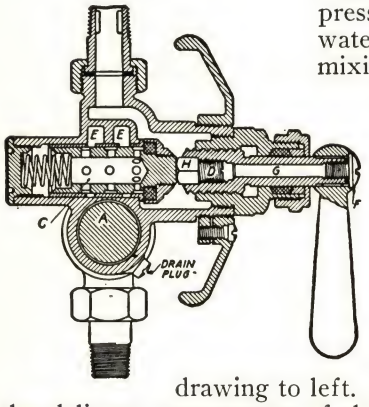
Powers Shower Bath Mixing Valve

Two Remarkable Features

Do not confuse the Powers Mixer with any of the so-called "anti-scald" mixing valves. It is entirely different. It has two remarkable features found in no other mixing valve.



(1) Pressure Equalizing Valve — Shown at B, B, in drawing to left—without this important feature a Powers Mixer would simply be another shower mixer. This valve is a floating piston which controls and equalizes the pressures of hot and cold water before they enter the mixing chamber. It safeguards the bather from the annoying temperature fluctuations caused by pressure changes in supply lines due to use of nearby showers, faucets, flush valves, etc.

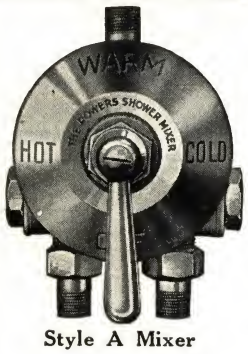


(2) Safety Stop —Shown at D in drawing to left. This can be set to limit the delivery temperature of the shower. Two important advantages are gained through its use:

(1) It protects the bather from scalding caused by a "dead end" in the hot water supply line.

(2) It saves fuel by eliminating waste of hot water.

Write for this Book—Get our 20-page book which completely describes this mixing valve. It gives an impartial analysis of the various types of mixers, test data, testimonials and other interesting information.



Style A Mixer

Description

Style A is for exposed piping. Has nickelplated dial and handle. If wall flange is required, distance from center of inlets to wall should be specified.

Style B is for concealed piping, accessible from the rear. The neck of the mixer is provided with a 1½-in. extension to accommodate thickness of marble slab, tile or panel on which dial and handle are mounted. Has nickelplated dial and handle.

Style C is for concealed piping, accessible only from the front. For this is provided a metal box to be inserted in wall flush with surface, to receive pipe connections and mixer. The large dial is afterwards placed against the wall, and when removed makes the instrument accessible. Has nickelplated dial and handle. We can furnish shells 3 in. deep for thin partitions.

Note: Porcelain dials and handles can be furnished for styles B and C. No extra cost.

Powers Mixers are now provided with built-in check valves as standard equipment.

Unless otherwise specified, all mixers are provided with standard straight union connections. Distance between pipe centers is $2\frac{5}{16}$ in.

Elbow connections will be substituted if desired. Horizontal dimension from end to end of elbows is 6¾ in.

For chromium plated dials, handles and exposed parts—additional cost 10%.

Octagonal dials and handles can be furnished at an additional cost.

Capacity

The Powers ½-in. Mixer has a capacity of 6 gal. per minute under a pressure of 40 lb.

When a larger quantity of water is required for kidney baths, needle baths, douche baths, etc., we can furnish the Powers Mixer in a special ¾-in. size with a capacity of 18 gal. per minute under a pressure of 40 lb. Write for further details if interested.

Specifications

Note: All notes are explanatory only and should not be included in the specifications. Portions of text in bracketed italics are selective or require specific data inserted.

(A) **Shower Mixers**—(A1) *General*—In shower compartment[*s*] [*locate*], furnish and install [*a*] Powers Shower Mixer[*s*] as made by The Powers Regulator Co., Chicago, Ill.

(A2) *Description*—Mixer[*s*] shall be ½ in., style [*A*], [*B*], [*C*] with [*nickelplated*] [*chromium plated*] [*porcelain*] *dial*[*s*] and handle[*s*].

Note: Specify—
Style A for exposed piping.
Style B for concealed piping, accessible from rear of wall or partition where working space is available.
Style C for concealed piping, accessible only from the front of wall or partition.

(B) **Supplies**—(B1) Both hot and cold water supply mains shall be provided with Powers [*specify sizes*] Self-cleaning Strainers.

Note: Strainers are made ½ in. to 3 in. in size.

(B2) Cold water line to each mixer shall be provided with loose key stop valve [*with porcelain escutcheon*].

(B3) Hot water line to each mixer shall be provided with a hand valve marked "Volume" [*with porcelain escutcheon*].

Note: This valve is to be used as a combination volume control and stop valve.

(B4) All exposed portions of piping, valves, etc. shall be [*nickelplated*] [*chromium plated*].

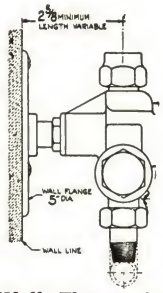
(C) **Shower Heads**—(C1) Furnish and install brass discharge pipe[*s*] with [*goose neck*[*s*]] [*straight wall turn down*[*s*]] and 4-in. diameter cast brass, adjustable, ball joint shower head[*s*] with tightly fitting removable face[*s*] and without gasket[*s*].

(C2) There shall be no valve or throttling device installed in the discharge line from mixer to shower head.

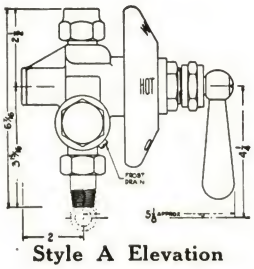
(C3) All exposed portions of piping, shower head[*s*], etc., shall be [*nickelplated*] [*chromium plated*].

(C4) Discharge line from mixer to shower head when exposed shall be securely anchored to wall or partition.

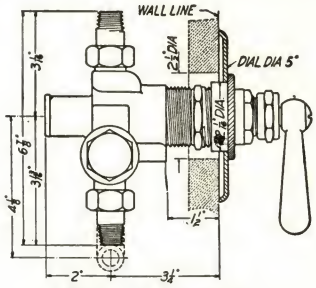
Principal Dimensions of the Powers Shower Mixers



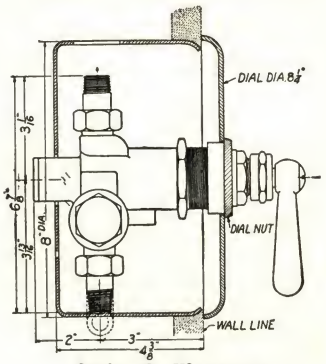
Wall Flange for Style A Mixer



Style A Elevation



Style B Elevation

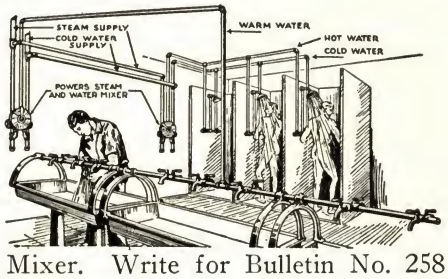


Style C Elevation

Powers (Style D) Steam and Water Mixer

Steam at 10 to 100 lb. pressure and cold water at any pressure, piped to this mixer will give you cold—warm—or hot water instantly for individual showers, or under proper conditions will supply warm water to group or gang showers and wash sinks. These conditions are that the steam must have a minimum of 15 lb. and must not exceed the cold water pressure by more than 15 lb. If necessary, a Powers Style A Reducing valve may be used—see our Bulletin No. 256.

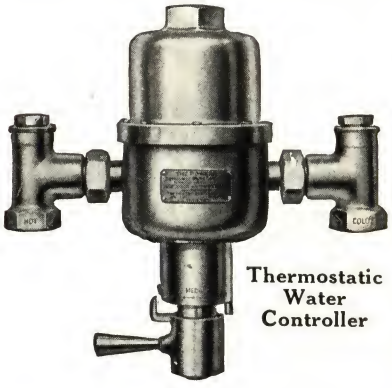
This mixer is constructed with the same safety features and has the same dimensions as the Powers Style A Shower Mixer. Write for Bulletin No. 258 giving complete details.



Powers Thermostatic Water Controller

Description

For shower baths, singly or in gangs, continuous flowing baths, baby baths, hot water lines, lavatories, factory washrooms, garages, laundries, and various industrial processes where warm water at a constant temperature is required.



Thermostatic Water Controller

This controller is accurate, dependable and reasonably priced. Mixes hot and cold water, and delivers warm water at any desired temperature between 70° and 135° F. Entirely automatic in operation, positively scaldproof. Failure of cold water supply cuts off delivery. Can be provided with variable or locked adjustment.

Write or telephone for booklet giving full details and showing applications.

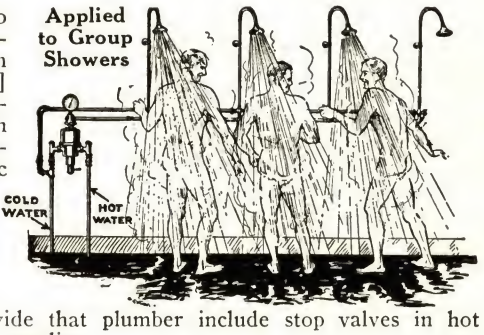
Unless otherwise specified, controller will be furnished with a maximum temperature of 110° F. Hot water line controllers should be so specified and will be set to deliver at a maximum of 135° F. For continuous flowing baths, specify downward discharge if wanted, otherwise upward discharge will be supplied.

Controllers Nos. 1 to 4, inclusive, are made of brass, in either plain finish or full nickelplate. Nos. 1 to 4 only can be furnished chromium plated for 10% additional cost. Made in special metals if desired—prices on application. Standard controllers Nos. 5 and 6 have iron bodies, aluminum paint finish, with bronze inner parts. They can be furnished in all brass construction at additional cost. Controllers have inlet check valves and removable filter screens. Hot and cold water should always come from the same original source, or at least be under substantially the same pressure, which for best results should not exceed 100 lb. Use a pressure reducing valve if necessary.

In ordering, state fully the purpose for which controller is to be used, with temperature required, and range of adjustment desired.

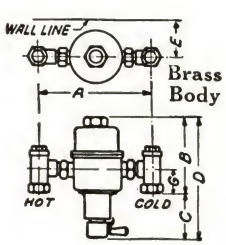
Specification

In supply to groups of showers [fixtures] in [shower room] [toilet] [bathroom], furnish and install Powers Thermostatic Water Controller No. .., placing it as close to fixtures as possible.



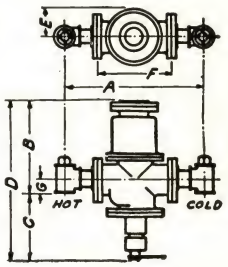
Applied to Group Showers

Note: Provide that plumber include stop valves in hot and cold water supplies.



CAPACITIES AND PRINCIPAL DIMENSIONS
Capacities are based upon 40 lb. water pressure, both hot and cold

No.	Capacities		Connections, in.		Dimensions, in.							Shipping weight, lb.
	Number of shower heads	G. p. m.	Inlet	Outlet	A	B	C	D	E	F	G	
1	1	15	½	¾	9	6 5/8	6 5/8	13 1/4	4 1/4	.....	1 7/16	35
3	4	25	¾	1	10 1/2	6 13/16	6 7/16	13 1/4	4 1/4	.....	1 5/8	35
4	8	50	1	1¼	12 1/4	8 7/8	5 3/4	14 5/8	4 1/4	.....	2	50
5	15	80	1¼	1½	16	13 1/2	9 1/4	22 3/4	4 1/4	9	1 3/4	85
6	20	100	1½	2	16 3/4	13 11/16	9 1/16	22 3/4	4 1/4	9	1 15/16	90



INCORPORATED 1889

SPEAKMAN COMPANY

Showers and Brass Plumbing Fixtures

WILMINGTON, DEL.

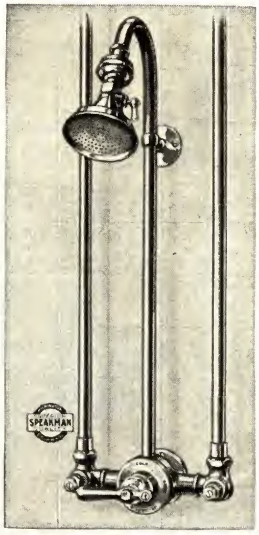
Products

SPEAKMAN SHOWERS for all classes of buildings; COMBINATION FIXTURES for bathtubs, lavatories and sinks. Also other Brass Plumbing Material.

Regular finishes are either nickel plate or Speakman Chromium Plate. The latter, because of its non-tarnishing qualities, is the most practical finish for plumbing fixtures.

K-2601-M. Speakman Built-in Mixometer Shower

Size ½-in. Mixometer with metal wall plate and metal handle. Bent arm with heavy metal wall flange and Anystream Self-cleaning Head, K-3395



K-2675. Speakman Institution Mixometer Shower

½-in. size, with lock-shield controlling valves on supplies to overhead, gooseneck discharge pipe with cast brass supporting strap, ball joint and 4-in. Anyforce cast brass head. For use in a stall or in an open battery

K-2635-M. Speakman Built-in Heavywate Shower

½-in. size, with Hi-Seat valves having unions, renewable seats, metal escutcheons and handles, 4-in. cast brass head with ball joint, bent arm and heavy metal wall flange

Facilities

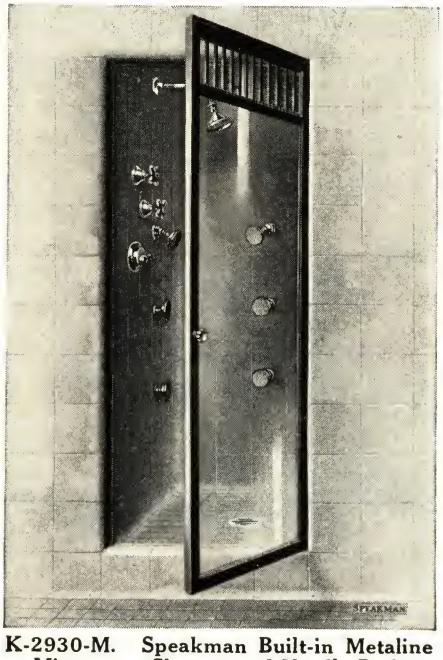
SPEAKMAN COMPANY'S factory is modernly equipped, including engineering department. It has ample capacity to handle large orders. For 62 years this company has built a reputation for efficient, dependable and prompt service.

Prices

Wholesale plumbing supply dealers and plumbing contractors throughout the United States can immediately furnish estimates and quote prices on Speakman products.

Complete Catalogue

In addition to the illustrations on this and the following pages the complete catalogue of SPEAKMAN COMPANY shows many more types of showers and fixtures. It will be sent upon request.



K-2930-M. Speakman Built-in Metaline Mixometer Shower and Needle Bath

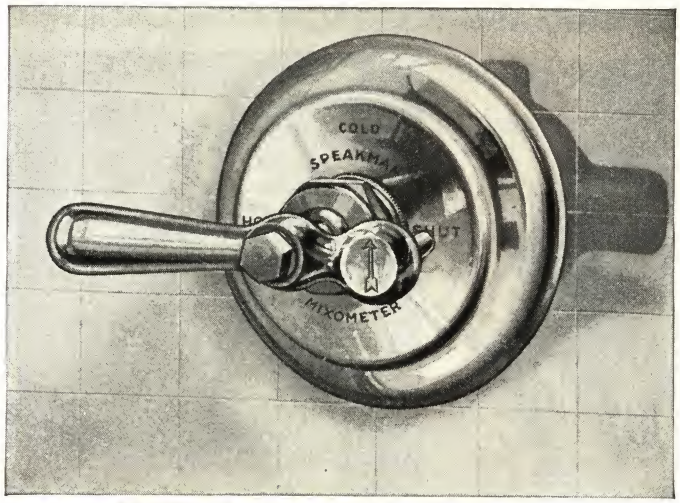
Size, ¾-in. Mixometer with unions, check valves, metal wall plate, and metal handle. Nine cast brass sprays; top sprays adjustable. Bent arm with metal escutcheon, ball joint and 5-in. cast brass head

K-4039-M. Speakman Mixometer Shower and Tub Combination

½-in. size. All-metal handles and escutcheons. Has Speakman Anystream self-cleaning shower head and Act-Easy pop-up waste. Valve connected by brass pipe and tested

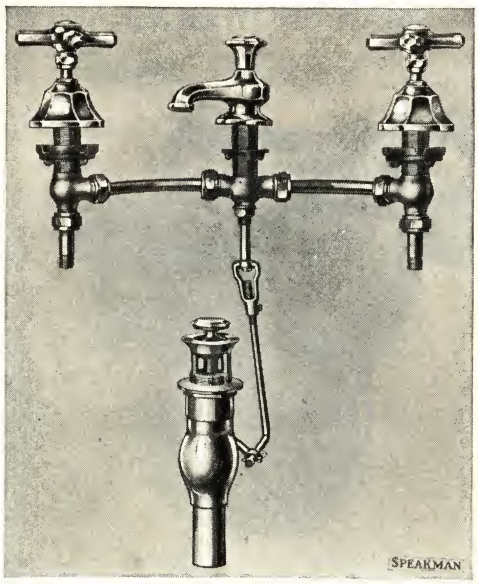
K-4037. Speakman Artline Waldin Tub and Shower Combination

½-in. size, with Hi-Seat valves having unions, renewable seats, metal escutcheons and handles. Mixometer with metal wall plate and handle. Bent arm with metal wall flange, ball joint and 5-in. cast brass Anyforce head. Willard pop-up waste, 1½-in. size, operated by 4-arm metal handle on wall. All exterior parts special art design



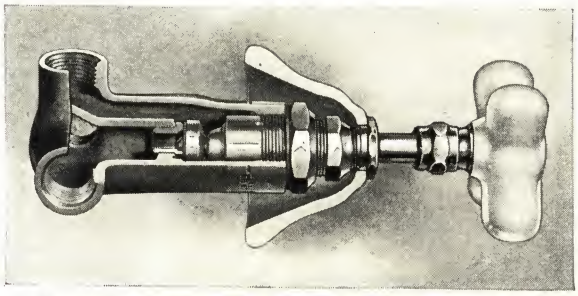
K3365. Speakman Built-in Mixometer

The name Mixometer, pronounced Mix-om′eter, means to mix and measure. The Mixometer mixes the hot and cold water to a mechanical exactness and measures the volume so that an equal amount of water passes through the shower at all temperatures. With the Mixometer, cold water follows the first fractional turn of the handle, then warm, and finally hot, if desired; but it is impossible to get hot water first



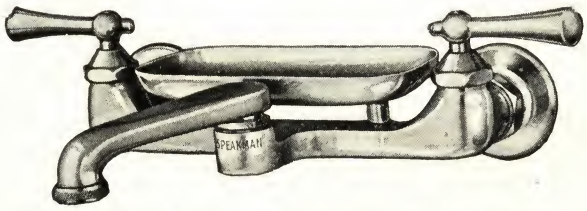
K-5017. Speakman Artline Unit-Acto Lavatory Fixture

Raised nozzle 4½ in. long. Valves with ¼-in. threaded tails, renewable seats, swivel discs and encased washers. Pop-up waste with metal knob and 1¼-in. diameter tail. All parts above lavatory special art design



K-6500. Renewable Hi-Seat Valve (Patented)

In the Speakman Hi-Seat valve the seat is only 1⅜ in. from face of wall, making it easy to examine and remove the seat if renewal is necessary. All working parts are renewable from face of wall. Escutcheon adjusts from 2⅝ to 3½ in. Regularly furnished with china handle and escutcheon. It can also be furnished with metal handle and escutcheon when so specified

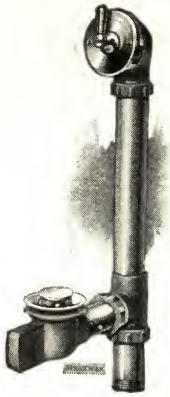


K-5503-M. Speakman Grace Line Sink Fixture (Design Patented)

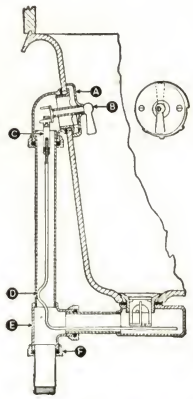
The Grace line sink fixture is finished in sparkling Speakman chromium plate, and has half inch male connections, although half inch female inlets will be furnished when specified. Adjustable flanges are threaded. Center of inlets 8 inches. The soap dish drains, is removable, and is extra large

K-4583-M. Speakman Metaline Waldin Tub Combination

Size, ½ in. Hi-seat by-pass pattern valves with integral stops, unions, renewable seats in valves, metal escutcheons with openings to operate stops with screwdriver. Metal handles with black enamel indexes. Metal nozzle over tub. Willard pop-up waste, 1½-in. size



K-4656. Speakman Act-Easy Pop-up Bath Waste



K-4656. Speakman Act-Easy Pop-up Bath Waste in Detail

Size, 1½ in. For built-in tub. Slip connections with metal expansion ring. Slip nut for tail has 1½-in. iron pipe thread, so nut and tail can be discarded and iron pipe size connection used if desired. Waste tee can be reversed, bringing the outlet parallel with the arm for shallow floor construction. Full overflow area through slots around edge of overflow cover. Adjustment made by removing overflow cover. No wall panel required. Easy to install. Nothing to stick or get out of order

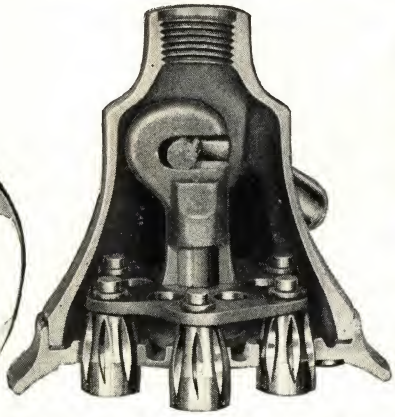
K-4660. Speakman Heavy Pattern Concealed Connected Waste and Overflow

With heavy cast brass overflow grate with integral shank that screws into the overflow elbow. Heavy solid link chain with extra heavy rubber stopper and bronze rings, soldered. Made in 1½ and 2-in. sizes. Especially recommended for hotels and public places where fixtures get hard usage

SPEAKMAN SHOWER HEADS FOR REGULAR AND SPECIAL INSTALLATIONS

All from the Same Head

Flood shower — Normal shower — Needle shower



K-3395. Speakman Anystream Self-cleaning Head (Pat. Jan. 2, 1923)

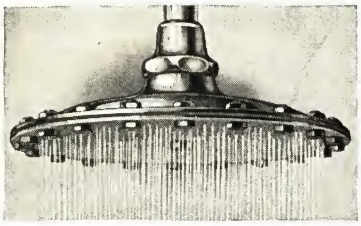
Has six tapered plungers, each having eight tapered grooves which are moved in and out by the lever handle permitting the bather to enjoy all degrees of shower volume and force. The head can never stop up. Ball joint furnished only when specified

K-3416. Speakman Anystream Self-cleaning Unit Control Triple-cluster Shower Head

For use where a large amount of water is desired. Because of the large size of the head it should be braced to the ceiling. 1-in. iron pipe female inlet. (Patented)

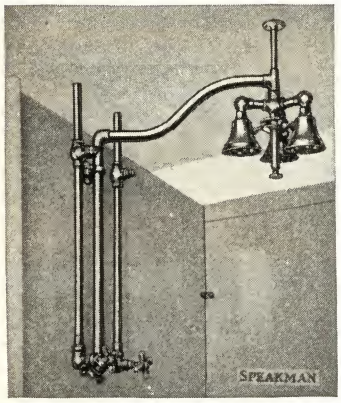
K-3397. Speakman Anystream Self-cleaning Head

Arranged to be operated with a screwdriver



K-3415. Speakman Cast Brass Club Shower

Has 12-in. bolted face. 1-in. iron pipe female inlet. This type has proved very popular for club installation



K-2756. Speakman Niagara Club Shower, with Anystream Self-cleaning Unit Control Triple-cluster Head

Supplies from over head. ¾ inch size with screwdriver controlling valves. Pet cock in center for draining

K-3396. Speakman Anystream Self-cleaning Shower Head

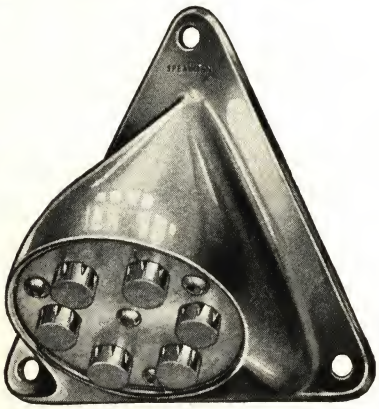
Arranged to be operated by a key

K-3476. Speakman Combined Ball Joint and Screwdriver Stop

½-in. iron pipe female by ½-in. iron pipe male. For gooseneck and bent arm showers

K-3478. Speakman Combined Angle Ball Joint and Screwdriver Stop

½-in. iron pipe female by ½-in. iron pipe male. For straight horizontal arm showers



K-3399. Speakman Anystream Self-cleaning Wall Type Shower Head

With ½-in. iron pipe female inlet in center of back, arranged to operate by a 5/16-in. hexagon wrench

K-3412. Speakman Wall Type Shower Head

With ½-in. iron pipe female inlet in center of back. Face held on by three screws with counter sunk head. To be operated by a 5/16-in. hexagon wrench

Literature

The new Speakman Bulletin on special types of shower heads, and new and special types of showers is possibly the most complete of its kind ever offered to architects. Among the heads shown are some especially designed for institutions, clubs, Y. M. C. A.'s, etc.

Complete roughings-in are given for the showers. There are also two pages of suggestions on installing shower baths over tubs, and in stalls, which will be valuable at any architect's office. This will be sent promptly.

G. M. KETCHAM MFG. CORP.

Manufacturers of Shower Doors, Bath Tub Enclosures, Medicine Cabinets

TELEPHONE
TRiangle 5-6306

81 Washington Street, BROOKLYN, N. Y.

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CHICAGO, ILL., 230 No. Canal St.—Telephone, Franklin 6263
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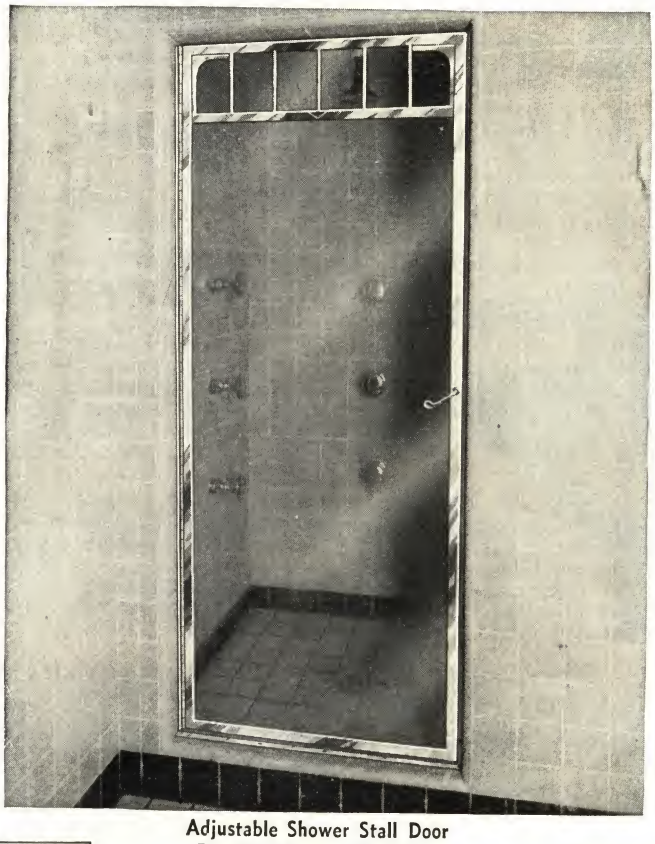
DETROIT, MICH., Architects' Exhibit Inc., Barlum Tower

Products

SHOWER STALL DOORS, TUB SHIELDS and SHOWER ENCLOSURES in nickel silver, chromium and gold plate.

Shower Stall Doors

Made in stock sizes 26 in. wide, 72, 75 and 78 in. high. Model A shower stall door equipped with patented adjustable jamb feature takes care of inaccuracies in tile setting as well as expansion or contraction of tile. Frame and jamb are of solid nickel silver throughout. Hinge specially constructed and continuous, the entire length of door. Glass, ¼-in. polished plate, frosted or tapestry. Corners reinforced by solid nickel silver castings. Door handles of solid nickel silver, also water deflector of the same material on the inside.



Adjustable Shower Stall Door
Patented October 21st, 1926

Bathtub Shower Enclosure

Represents an ideal arrangement where tub is recessed between two walls. Constructed so as to consist of two partitions extending from each wall with a door in the centre or one stationary panel with door on each side. Door can be made with or without grille.

Shower Enclosure

A practical enclosure affording means of saving space and obtaining an extremely light shower stall. Illustration below shows enclosure placed upon a receptor.

We can also construct same to fit over a tile base.

Two-piece Hinged Shield

A practical means of converting a bathtub into a shower compartment.

The hinged shield folds back against the stationary shield when not in use, giving perfect access to the tub. Shield is supported by a bar extending from the shield to the wall. Standard size is 5 ft. high, 36 in. wide, and consists of two panels, one hinged and the other stationary, each 18 in. wide.

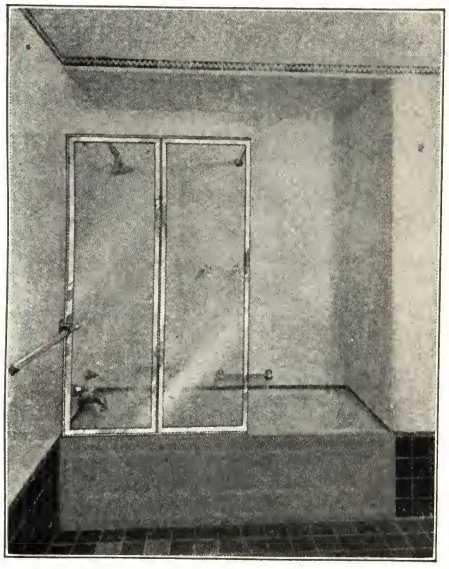


Plate VI. Two-piece Hinged Tub Shield

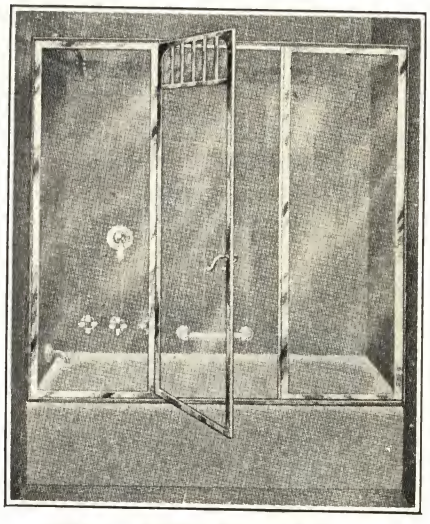


Plate II. Bathtub Shower Enclosure

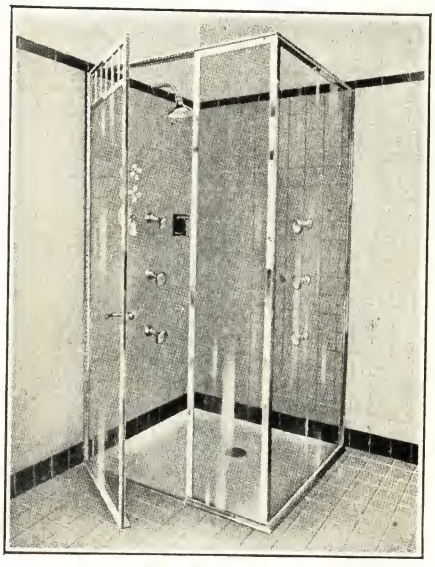


Plate VII. Shower Enclosure

FIAT METAL MANUFACTURING CO.

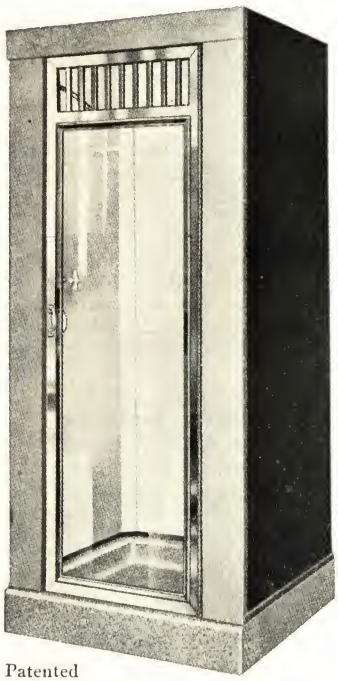
Fiat Shower Bath Compartments, Brass Chrome Plated Shower Doors

1201 Roscoe Street, CHICAGO, ILL.

NEW YORK OFFICE, 101 Park Avenue BOSTON OFFICE, 11 Beacon Street

For Fiat Toilet Partitions, see Manufacturers' Index

FIAT SHOWER BATH COMPARTMENTS PERMANENTLY LEAKPROOF



Patented

No. 1 Admiral with Regular Receptor and Chrome Plated Door

Other models No. 6 Ensign; can be used with extended receptor and without door

Fiat

TRADE-MARK

Fiat Shower Bath Compartments are complete water-tight enclosures forming the room in which the shower bath is taken. The floor is of polished precast art marble. The walls can be furnished in vitreous enamel (the same finish as on ordinary bathtubs), or high grade specially prepared galvannealed steel. The latter is furnished with waterproof prime coat of paint to be refinished after installation so as to harmonize with prevailing decorations. It can also be furnished in various colors of lacquer duco enamel.

Fiat Compartments are of knocked-down construction—very easily handled and installed. When assembled, they provide a permanent, leakproof compartment throughout.

The precast art marble receptor provides a permanent, leakproof, finished, decorative flooring and can be just as easily installed on the finished floor as on the rough flooring, thus eliminating tiling, the laying of lead pan, grouting and the necessity for expensive drains. Receptors are made in regular, extended, double entrance, corner and chrome style types and can be used with tile, marble and slate enclosures.

Fiat Compartments can be just as easily installed in completed rooms or buildings as in those under construction, without excessive redecorating or tearing up of floors and walls.

They are shipped knocked down, accessible through any size door opening and easily assembled at point of installation.

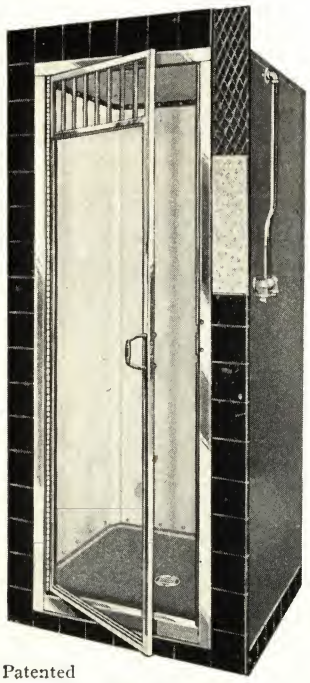
Fiat Admiral

A shower compartment having vitreous enameled walls. Every requisite and refinement that could be desired is embodied in this fixture. The dazzling white porcelain walls, the hand polished marble inlaid surface of the receptor, give an air of ultra completeness and refinement. Walls are armco iron with vitreous enamel fused on at a temperature of 1600°. Models 1, 2, 3, 4, 5.

Patented

Two-way Entrance Utility Shower Compartment

Can be furnished in Ensign No. 7 and Admiral No. 2 models



Patented

No. 4 Admiral-Chrome Front Stiles Designed to Receive Tile

Other model No. 9 Ensign

Fiat Ensign

A shower compartment especially designed where economy is desired without sacrifice of refinement and beauty of appearance. Walls are high grade specially prepared galvannealed steel, finished in various colors of duco enamel, or in prime coat of paint and refinished at point of installation to harmonize with prevailing decorations. Models 6, 7, 8, 9, 10.

Chrome Stile

Specially designed so that tile or plaster can be applied adjoining the brass chromium plated door frame without cracks occurring. Receptor has removable chromium plated threshold. Furnished in either Admiral Model 4, 5, or Ensign Model 9, 10.

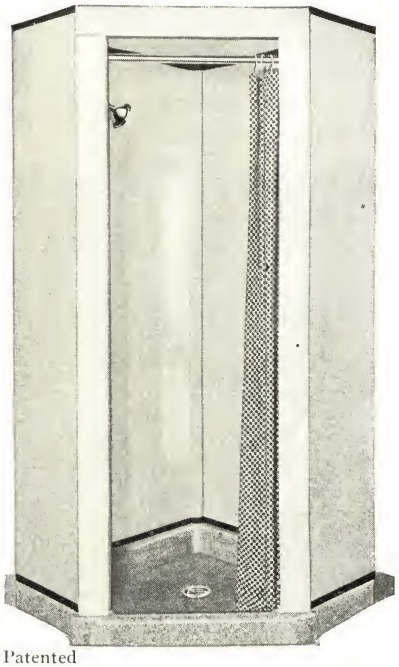
MANY SIZES AND DESIGNS

Over-all dimensions, in.			
With regular receptor		With extended receptor	
Width, in.	Depth, in.	Width, in.	Depth, in.
30	30	30	*30
30	32	32	*32
32	32	34	*34
34	34	36	*30
30	36	36	*36
36	30	42	*36
36	36		
36	42		
42	36		
46	36		
48	30		
48	36		
46	44		
36	36 Corner		

*Plus 12-in. front extension.

Chrome stile Admiral and Ensign, 36x36 and 32x32-in.
Two-way Entrance Utility Shower Compartment, 36x42, 42x36 and 42x42-in.

For Specifications, see second page following.



Patented

No. 3 Admiral Corner Compartment

Other models:
No. 8 Ensign (same as above)
No. 5 Admiral Chrome Stile
No. 10 Ensign Chrome Stile

FIAT SHOWER BATH RECEPTORS

A leakproof base for any type of shower enclosure.

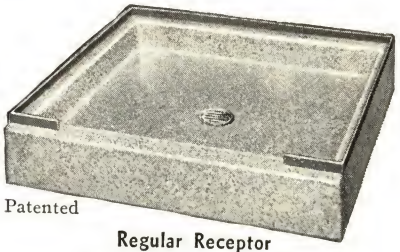
A complete one-piece watertight shower floor—eliminates use of lead pan, special drain fittings, grouting—and all expensive methods of shower floor construction. Can be installed on any kind of floor, either rough or finished.

Fiat receptors are made of the very finest quality of waterproof white cement and Vermont marble chips (chemically treated). These ingredients are thoroughly tamped and puddled in a steel mould, making a mass of maximum density which insures its superior watertight qualities. The receptor is then placed in a curing room for thirty days, and then hand-polished.

The polished black marble inlay and white background produce an extremely attractive surface which will harmonize with art marble, tile, or any bathroom floor.

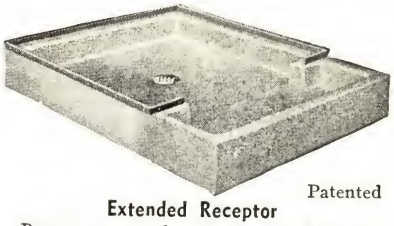
The receptor has a smooth floor surface, but is so finished as to prevent slipping, whether wet or dry.

The Fiat Receptor is not "built-in" as part of the floor on which it rests, nor of the room walls which surround it. This is of the utmost importance as it prevents the future possibility of the receptor cracking, caused by settlement, vibration, shrinkage, expansion or contraction of the building walls and floors.



Patented

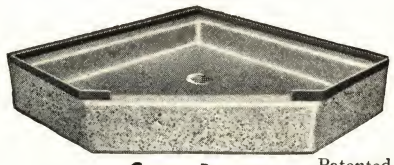
Regular Receptor
Used with Door or Curtain



Patented

Extended Receptor

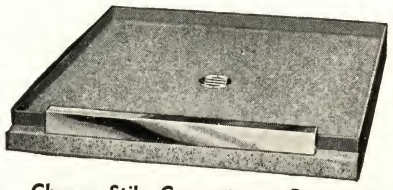
Receptor extends 12 in. in front of shower compartment. Specially designed for showers equipped with curtain so that receptor will catch spray, splashing and drippings from curtain. Keeps floor in front of shower dry. Water in extension drains back to receptor



Patented

Corner Receptor

This receptor is especially fitted where a corner of the room is the most adaptable place for the installation of a shower compartment and is designed to conserve space and give a maximum amount of bathing facilities as well as to produce distinct lines of beauty in appearance



Chrome Stile Compartment Receptor

With removable brass chromium plated threshhold. Specially designed for Fiat chrome stile compartment. This receptor with removable brass chromium plated threshold can also be used with various other shower enclosure walls

Note: The waste openings are always in center of receptor, except in corner receptors.

DETAILS OF FIAT SHOWER COMPARTMENTS

Leakproof—Knock-down Construction

Galvanized steel flange thoroughly embedded in body of receptor encases bottom of compartment, making leakage impossible.

4½-in. flat head chromium plated metal strainer and drain with removable face, set flush with the receptor floor, allows for inside calking of 2-in. waste pipe connection or where so desired, lead connection can be used by soldering to the inside shoulder of the drain provided for that purpose.

Height at which receptor is set with relation to finished floor can vary several inches. Installation on rough floor with finished floor laid to sides of receptor is recommended.

Drain fixture integral with receptor is set over 2-in. iron drainage P trap. To make waste connection to receptor remove strainer and use an ordinary lead calk joint. This insures an inexpensive and permanent leakproof connection.

Valves—Standard equipment consists of 2 individual compression valves and head. Compartments can be drilled to accommodate any kind of valves or shower head.

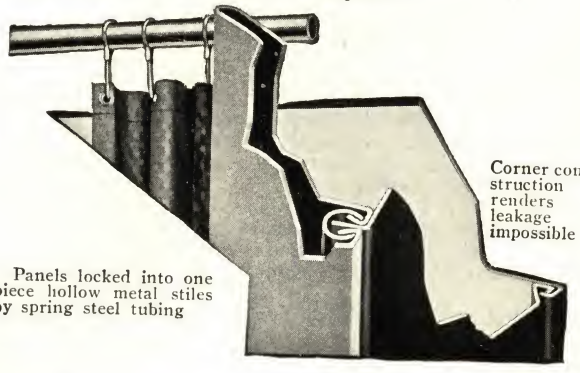
Corrosion—Fiat Compartments are absolutely immune to corrosion.

Leakage—Being an independent unit, Fiat Compartments are not subject to the detrimental effects of shrinkage, vibration, settling, expansion, contraction, and other potential elements so prominent in buildings, which create crevices through which leakage takes place.

Stiles and Headrail—Can be furnished either in hollow metal or designed to receive tile, plaster or other material on the outer surface. The latter makes it possible to carry out wainscot design.

Door Openings—All Fiat Shower Bath Compartments are made with door openings of standard size, so that compartments not originally furnished with doors may be so equipped at any subsequent time.

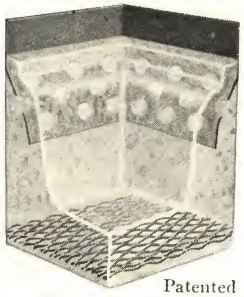
Compartment Walls—Rest on receptor shoulder, fitting snugly inside of receptor flange. Walls are shipped in knocked down form to facilitate handling and installation



Panels locked into one piece hollow metal stiles by spring steel tubing

Corner construction renders leakage impossible

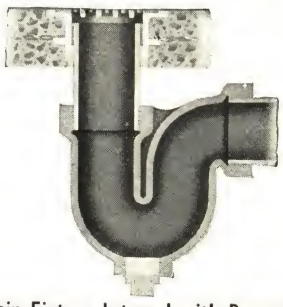
Simple—Practical—Permanent



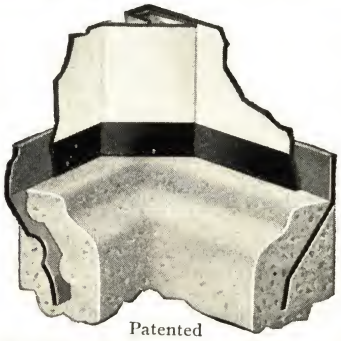
Patented

- ← The wall of shower enclosure is secured directly to 1-in. extension of galvanized steel flange.
- ← Perforations in flange insure bond.
- ← ½-in. expanded steel mesh reinforcing extends across entire receptor.
- ← No sharp corners or crevices.

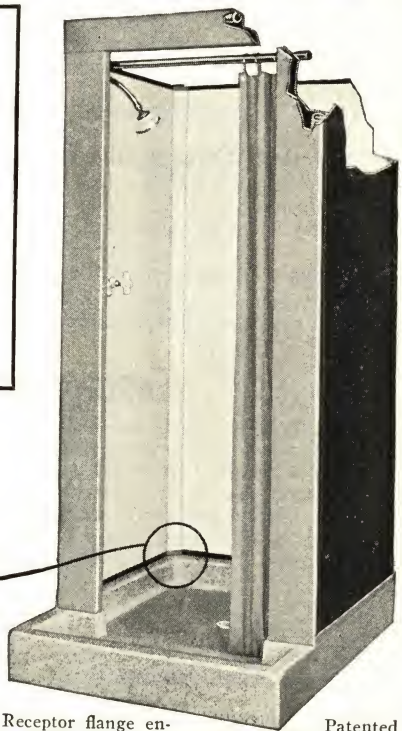
Corner Section of Fiat Shower Receptor



Drain Fixture Integral with Receptor



Patented



Receptor flange enters stile and is concealed from front

Patented

For Specifications, see following page.

ARCHITECTS' SPECIFICATIONS

Fiat Shower Bath Compartments—Receptors—Shower Doors

(Include in Plumbing Specifications)

Architect's Note: *Insert in blank space provided below (paragraph 1) model required. Models are as follows:*

No. 1 Admiral	No. 6 Ensign
No. 2 Admiral Double Entrance	No. 7 Ensign Double Entrance
No. 3 Admiral Corner Type	No. 8 Ensign Corner Type
No. 4 Admiral Chrome Stile	No. 9 Ensign Chrome Stile
No. 5 Admiral Corner Chrome Stile	No. 10 Ensign Corner Chrome Stile

(1) General

Furnish and install Fiat *(insert model)* Shower Bath Compartments as manufactured by FIAT METAL MANUFACTURING Co. of Chicago, Illinois.

Architect's Note: *Insert in blank space provided below (paragraph 2) type of receptor required. Types are as follows:*

Regular	(use with Admiral No. 1—Ensign No. 6)
Extended	(use with Admiral No. 1—Ensign No. 6)
Corner Type	(use with Admiral No. 3—Ensign No. 8)
Double Entrance	(use with Admiral No. 2—Ensign No. 7)
Regular Chrome Stile with Chrome Plated Threshold	(use with Admiral No. 4 and Ensign No. 9)
Corner Chrome Stile with Chrome Plated Threshold	(use with Admiral No. 5 and Ensign No. 10)

(2) Receptors

Receptors *(insert type)* type, to be reinforced, waterproof precast art marble, galvanized steel flange embedded in body of receptors to extend 1 in. above receptor shoulder to encase bottom of shower enclosure. White metal chrome plated strainer and drain fitting for 2-in. waste connection to be integral part of receptor; a 2-in. drainage "P" trap to be placed under the drain and a lead caulk joint shall form the connection between waste pipe and receptor.

Inside of receptor flange to be given a coat of Reign-On Caulking Cement before enclosure is set in place on receptor so that bottom edge of enclosure is set in Reign-On Caulking Cement as furnished by the manufacturers.

(3) Admiral (all models) Walls, Top, Stiles, Headrail

(3a) Walls to be of knocked-down construction of 16 gauge patent leveled stretcher armco iron finished in vitreous enamel fused on to the metal under a temperature of 1600 degrees.

Note: *The above applies to Admiral Models Nos. 1, 2, 3, 4, 5.*

(3b) Front stiles and headrail, hollow metal construction of 16 gauge galvannealed steel finished in three coats of waterproof enamel.

Note: *The above applies to Admiral Models Nos. 1, 2, 3.*

(4) (Admiral) Chrome Stile and Headrail

(4a) Front stiles and headrail to be of 1¾-in. square brass tubing, chrome plated.

Note: *The above applies to Admiral Models Nos. 4, 5.*

(5) Ensign (all models) Walls, Top, Stiles, Headrail

(5a) Walls and top to be of knocked-down construction of 16 gauge rustproof galvannealed patent leveled and stretcher steel to have specially prepared smooth surface and treated so that paint will adhere. Furnished in one coat of metal primer by manufacturer and final finish applied by others after installation.

Note: *The above applies to Ensign Models Nos. 6, 7, 8, 9, 10.*

(5b) Front stiles and headrail, hollow metal construction of 16 gauge galvannealed steel finished in shop coat. Same material as above.

Note: *The above applies to Ensign Models Nos. 6, 7, 8.*

(6) (Ensign) Chrome Stile and Headrail

Front stile and headrail (chrome stile) to be 1¾-in. square brass tubing, chrome plated.

Note: *The above applies to Ensign Models Nos. 9, 10.*

(7) Curtain Rod

Curtain rod to be of 1-in. brass, chrome plated with two flange elbow curtain rod holders attached to front stiles on inside of compartment.

Note: *The above applies to all models when door is not used.*

(8) Valves and Shower Head

(8a) To be Fiat combination shower valves *(hot and cold)* with chrome plated or china handles and escutcheons *(insert which)*. Valves to have removable seats.

(8b) Mixing valve to be Fiat of ½-in. concealed type with china or metal chrome plated handle and dial *(insert which)*. Valve so constructed that all interior working parts are accessible for repairs.

(8c) Shower head 4-in. chromium plated ball joint with arm and flange.

(9) Soap Dish

Soap dish to be Fiat two piece cast white metal, chrome plated.

Note: *Above to be used with all models.*

(10) Special Notes

(Pertaining to Fiat Shower Bath Compartment Specifications)

(10a) Ensign Models—Various colors of lacquer duco can be applied at factory if so desired.

(10b) Chrome Stile (all models)—It is strongly recommended that Fiat Brass Chrome Plated Shower Doors be used in order to obtain maximum utility and appearance.

(10c) Fiat Shower Receptors—Can be used with tile, marble and slate shower enclosures.

(10d) Fiat Shower Valves and Heads—Are especially designed for Fiat Shower Bath Compartments but should other makes be desired, compartments can be drilled for any type specified.

(10e) Headrail, Stiles and Inside Walls of Compartment—Should be protected during building construction by paper or canvas put on with paste by plumbing contractor.

(10f) For sizes, see page D4342.

ARCHITECTS' SPECIFICATIONS—FIAT SHOWER DOORS

(1) General—Furnish and install Fiat Brass Chrome Plated Shower Doors to fit opening *(insert size)* as manufactured by FIAT METAL MANUFACTURING Co.

(2) Frame—To be of ¾-in. .040 yellow brass seamless tubing with corners reinforced with heavy brass angles.

(3) Jambs—Extruded yellow brass mouldings.

(4) Hinges—Leakproof continuous brass piano hinge entire length of door, swinging outward from stall.

(5) Lock—Double action (non-binding) friction catch fastened into frame.

(6) Handles—Full size offset design, on both sides of door.

(7) Grille Vent—Seven inches high with ⅜-in. square brass bars.

(8) Water Deflector—To be of sheet brass with adjustable rubber trailer and gutter shaped drain extending into receptor preventing water dripping on floor when door is opened. Outer edge to be of double metal rounded and bent so as to eliminate raw edge, extending into receptor.

(9) Panel—To be of ¼-in. plate clear or obscure *(state which)* glass. Set in heavy continuous rubber channel, held in place and fitted into heavy extruded brass moulding in such a manner so that glass can be replaced without dismantling door.

(10) Finish—Extra heavy chrome plating on all metal.

(11) Adjustable Jambs—When door is used for other than Fiat Compartments* specify—*Fiat adjustable jambs—maximum adjustment ½ in.*

Note: *Fiat adjustable jambs can be adjusted to take up irregularities after jambs are installed.*

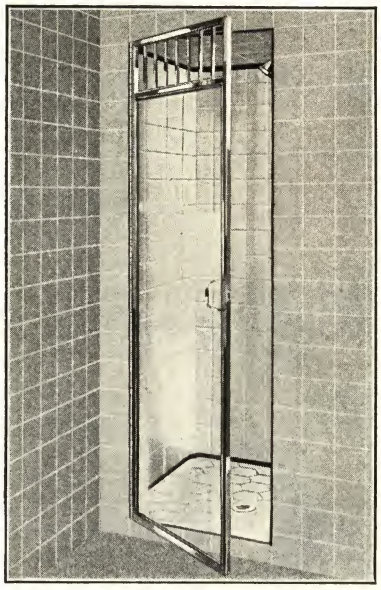
Note: *Regular stock sizes for openings: 24x72, 25x74, 26x76, 27x78.*

Note: *Special sizes manufactured to order.*

Note: *Door can be furnished with or without grille.*

Fiat Shower Bath Compartment with Fiat Brass Chromium Plated Door

Fiat Brass Chromium Plated Shower Door



Tile Shower Enclosure with Fiat Brass Chromium Plated Shower Door

FIAT SHOWER STALL DOORS FOR ALL MODERN SHOWER ENCLOSURES

The Fiat Shower Door presents the finest appearance and contributes the maximum of cleanliness in the modern bathroom. Because of its many exclusive features of construction and finish, architects and plumbing contractors specify Fiat Shower Doors on all modern shower enclosures.

Fiat Shower Doors are pre-eminently adaptable. They create effects which are livable as well as beautiful and from the standpoint of cost are very economical.

Note exclusive feature of drain gutter on water table, eliminating water dripping on floor when door is opened after use. Water drains back into receptor and *not on floor.*

Construction Features

Frame—Heavy yellow brass tubing, with extruded brass mouldings.

Jambs—Extruded yellow brass mouldings.

Hinge—Specially constructed, leakproof continuous piano hinge runs entire length of door, swings outward from stall. Brass.

Corners—Reinforced by extruded heavy brass angles.

Lock—Double acting friction catch fastens into the frame and is guaranteed against door binding.

Glass—¼-in. plate set into heavy waterproofing channel.

Handles—Special offset design, on both sides of door.

Water Deflector—*Exclusive feature—drain gutter on water table* eliminating water dripping on floor when door is opened after use. Water drains back into receptor and *not on floor.* Outer edge is of double metal rounded and bent so as to eliminate raw edge extending into receptor. Sheet brass.

Grille Vent—7 in. high, ⅜-in. square bars in opening.

Panels—Can be furnished in either obscure or clear glass.

Finish—Heavy chromium plating.

Regular Stock Sizes for Openings:

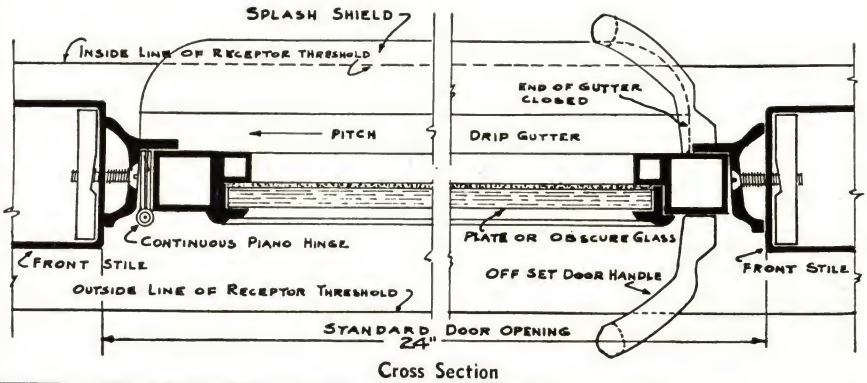
24x72 in. 25x74 in. 26x76 in. 27x78 in.

Special sizes furnished upon details and specifications.

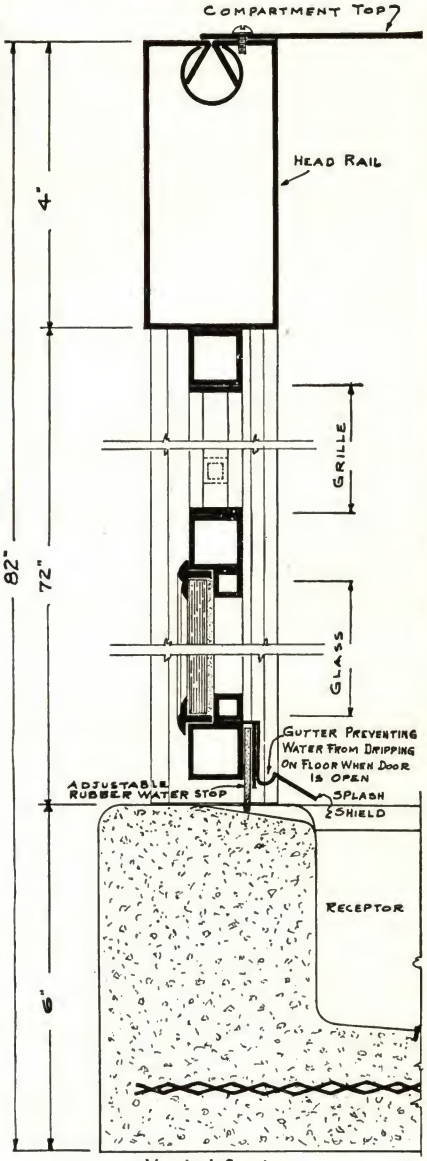
When door is used for other than Fiat Compartments use Fiat Adjustable Jambs.

Fiat Adjustable Jambs have a maximum adjustment of one-half inch and can be adjusted to take up irregularities after jamb has been installed.

For specifications, see preceding page.



Cross Section



Vertical Section

THE HIMMEL BROTHERS CO.

Manufacturers of Shower Doors and Shields

200 Commerce Street, NEW HAVEN, CONN.

For Our Complete Catalogue on Modern Store Front Construction, see Manufacturers' Index

Copyright 1931 by THE HIMMEL BROTHERS CO.

"HIMCO" EXTRUDED SHOWER DOORS AND SHIELDS

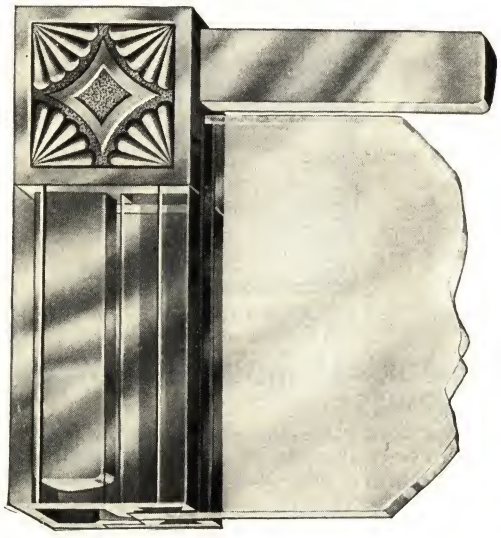
Sag-proof Waterproof Crack-proof

Based on "Himco" Patented Principle of Extruded Store Front Construction

The new "Himco" sag-proof, waterproof and crack-proof shower door and shields offer a real custom built construction at a reasonable price. All sections are made of heavy 10-gauge extruded bronze, heavily chromium plated.

The Doors Are Sag-Proof—Because the heavy extruded members are reinforced with mechanically forged, decorated corner angles. This construction adds stiffness and prevents twisting or weaving of the door, which is generally the cause of cracked glass.

Doors Are Waterproof—On account of the special grooved shaped rubber packing used on the edge of the jambs. The packing also takes up any inequalities in the jambs. A continuous piano hinge is used on the door and it has a wide lap on the latch side. The bottom of the door is protected by a heavy rubber guard, which fits snugly against the sloped curb of the enclosure or top of the tub. A metal drip also carries back any water from the face of the door. The rubber guard is easily replaced by unscrewing the metal drip which holds it in place.



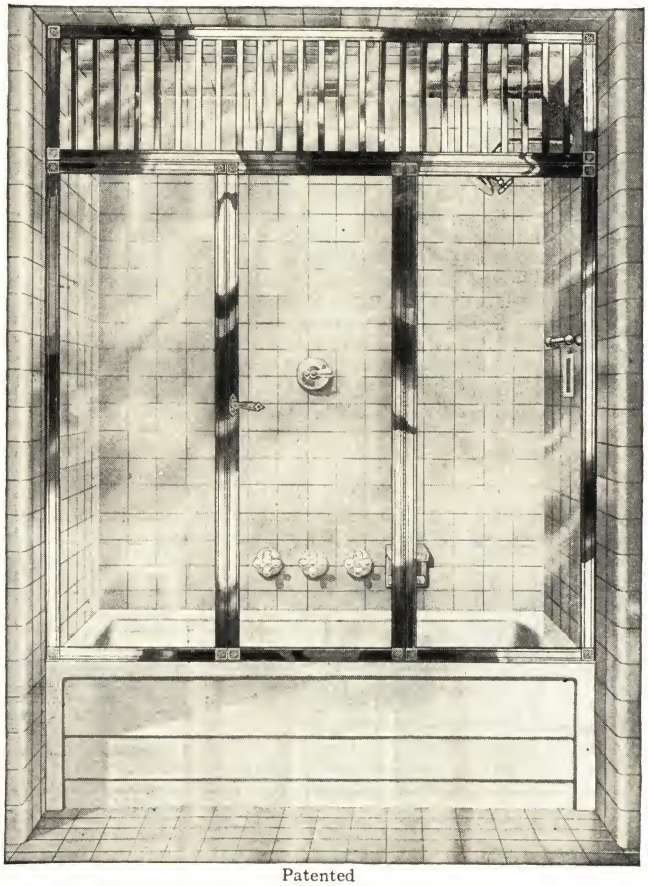
Patented

Illustration of the forged brass corner reinforcement showing one end in frame in phantom and one end exposed.

Glass Is Crack-Proof—It is set in our patented extruded System No. 400 line rubber cushion construction, which allows the glass to expand and contract as well as to take up the jars and the shocks.

In case the glass is broken by accident, it is readily removed by simply unscrewing the cover mould on the inside of the door.

Patented



Patented

Ventilating the Enclosure

In the single door to a shower stall the grille is placed in the top of the door. In the enclosures over tubs the grille is carried to the ceiling and is fixed, the bottom of the grille acts as a transom over the door.

Standard Sizes of "Himco" Shower Stall Doors

Doors with grilles and frames are made in standard sizes for the following clear opening sizes:

24 in. x 72 in.	24 in. x 78 in.
26 in. x 72 in.	26 in. x 78 in.
28 in. x 72 in.	28 in. x 78 in.

Other sizes will be made to order.

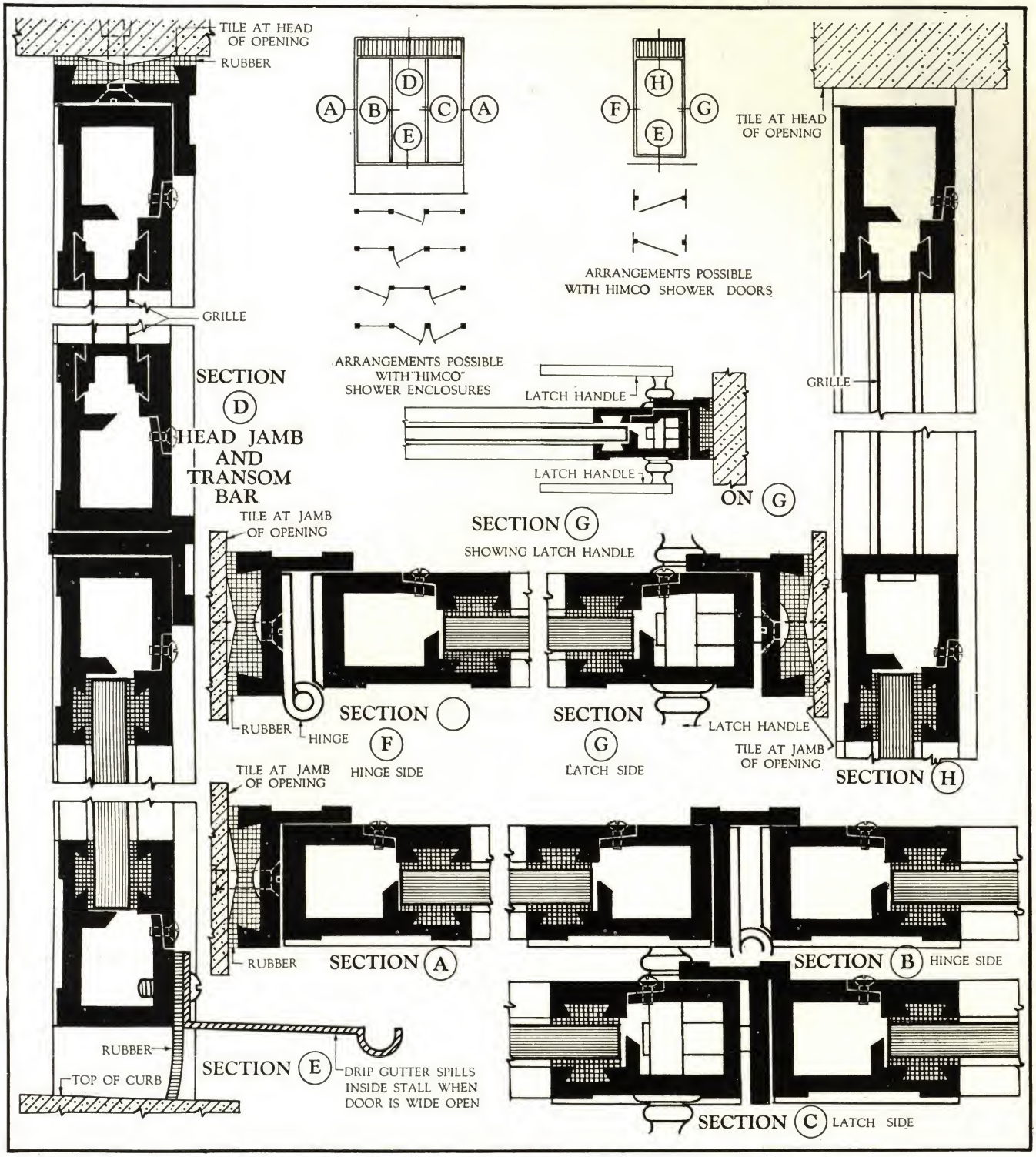
The "Himco" Three Panel Glass Enclosure

For recessed tub showers, can be obtained with one section stationary and two sections to serve as doors or with two sections stationary and one section to serve as the door. Various combinations are shown on drawing below. The "Himco" can be built to any dimensions required. The lengths of the tub ordinarily determines the width of the enclosure.

Quotations will be gladly submitted for etched or special glass, special finishes, or other special requirements.

Hardware and Finish

The entire door and enclosure is finished in heavy chromium plated finish. The hardware is designed especially for the doors. The doors and stationary panels are glazed with the finest quality clear polished plate glass.



LEHMAN SPRAYSHIELD COMPANY

Patent Shower Stall Doors and Bathtub Sprayshields

2514-2518 North Broad Street, PHILADELPHIA. PA.

Custom Built Shower Bath Doors

Have watertight hinge and easy fitting adjustments

No. 4 Door

Swan, Mermaid or Gem models, in nickel or chromium

All Lehman doors are made to measure with a selection of designs, glass and finish, yet they cost no more. They increase the comfort, beauty, and sanitation of the modern bathroom.

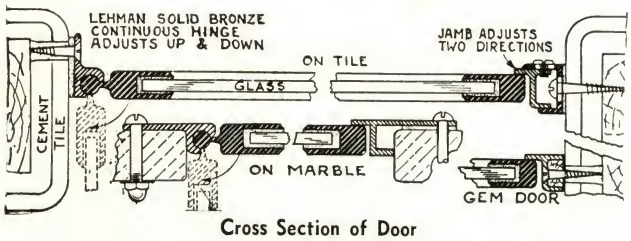
Build doorway reasonably square and send us finished dimensions in the clear. Do not build stall for us, as we make our door for you to fit either tile or marble. Prompt shipment of any model or quantity.

Heavy Architectural Bronze Frames—All doors are built of heavy metal specially extruded from our tools into our patent interlocking bars. They are solid bronze and can not sag. The watertight hinge saves installing time and expense and insures a permanent perfect fit even in settling buildings which would otherwise need new tile.

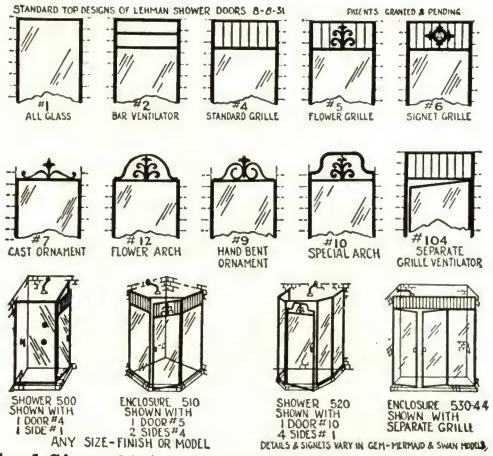
(Mermaid doors available in german silver also.)

Patent Hinge Simplifies Erection—Saves time and expense. Always watertight. Saves door or tile replacement in settling buildings. Runs full length of door. Reverses right or left. Fits marble or tile. Allows raising or lowering door after hanging.

Easy Fitting Features—Adjustable in width, in height and in alignment for doorways out of square or off dimension. Patent expanding jambs and apron. Four types of metal or rubber threshold seals to suit all conditions.



Cross Section of Door



Standard Size—24x72 ins. finished clear measurements of tile or marble doorway. Slope threshold inward ½ in. for drainage. Standard model M-C-4.

Patent Sprayshields for Built-in Bathtubs

Swing Inward and Outward Clearing Faucets

Sprayshield gives any built-in bathtub the convenience of a stall shower. A single Sprayshield will confine all splash with a properly arranged shower. Since Sprayshields do not wear out or require laundering, they actually cost less than curtains if upkeep is considered.

Only Lehman shields fold out of the way both in and out, requiring no extra space.

Protects Health and Bathroom—Sprayshields are sanitary with no corners for germs or dirt. They are modern permanent equipment which does not mildew or require replacement.

They beautify any bathroom, and being transparent make it appear larger.

Full Use of Tub—Access to Valves—Sturdy brackets hold Lehman Patent Sprayshields 6 in. from the end wall permitting clearance for an easy access to the valves in all positions.

No interference with tub bathing or cleaning.

They swing ½ in. above the tub rim, hanging slightly inside for drainage, with watertight rubber sealing strip.

Easy Fitting—No Tub Drilling—Erected quickly in new or old buildings after the tilework is completed.

No special roughing-in needed.

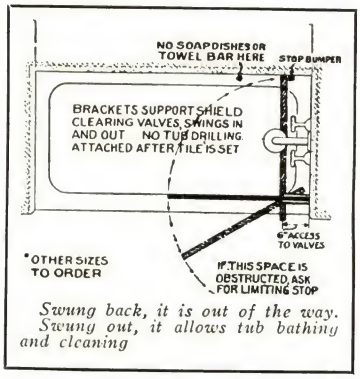
The lower bracket resting on the tub carries all weight and relieves the tile of strain.

All Sprayshields fit either right or left end tubs.

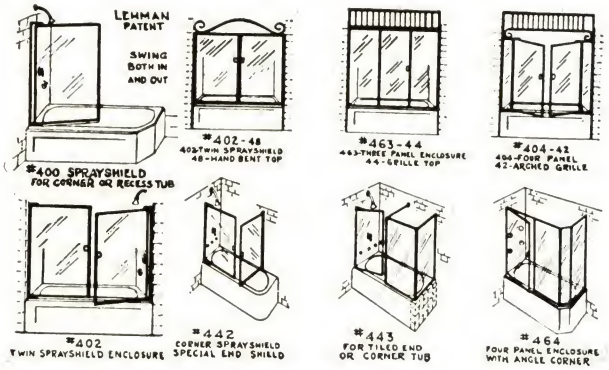
No. 400 Sprayshield

Clears top of bathtub—drains inside of rim.

In use, a rubber seal makes the bottom watertight



Swung back, it is out of the way. Swung out, it allows tub bathing and cleaning



Standard Size—No. 400 Sprayshield, 32 in. wide, 50 in. high. Standard model M-C-400.

Choice of Models Provides Six Price Ranges

Lehman Sprayshields and Shower Bath Doors are made in three different models in nickel and chromium offering six price ranges. They are similar in general construction but differ in weight of frames, quality of glass, and minor details.

Swan	DeLuxe Model
Mermaid	Standard Model
Gem	Economy Model

FERROMETAL SHOWER COMPARTMENTS

(FORMERLY MANUFACTURED BY LITTERER BROS. MFG. CO.)

MILWAUKEE STAMPING COMPANY

MILWAUKEE, WIS.

CHICAGO OFFICE, 150 No. Wacker Drive
Telephone: Randolph 4227-28

NEW YORK OFFICE, 416 Broadway
Telephone: CAnal 6-1131

REPRESENTATIVES IN ALL PRINCIPAL CITIES

For Milwaukee Stamping Company's Metal Partitions, Metal Doors, Hinges and Garment Fixtures, see Manufacturers' Index

UNIT SHOWER BATH COMPARTMENT SPECIFICATIONS

FERROMETAL

UNIT SHOWERS

FERROMETAL Shower Bath Compartments are *complete* units designed and constructed to be absolutely watertight and leakproof, and can be used singly or in batteries.

Type B is constructed of keystone copper-bearing steel sides and galvanized receptor with front, sides and back formed of one continuous sheet to give maximum strength and rigidity. Heavy beaded formation at door opening leaves no raw edges exposed. Units are given a coat of special primer before shipment. Final finishing color to be applied after installation.

Type F-T is same as Type B but has three-piece top made of galvanized steel and has terrazzo receptor.

Type K is constructed of kupraluminum metal sides and receptor, with front, sides and back formed of one continuous sheet to give maximum strength and rigidity. Heavy beaded formation at door opening leaves no raw edges exposed. Unit shipped in aluminum prime finish. Final finishing color to be applied after installation.

Type K-T is the same as Type K but has terrazzo receptor.

Kupraluminum is a special alloy of Alcoa aluminum, and has greater strength than ordinary commercial aluminum, also being absolutely rustproof, corrosion resistant, long wearing and light weight.

Metal receptor is made with inverted bottom construction which eliminates filling or grouting under the shower, and also gives additional strength. Bottom slopes to drain, making easy drainage. Standard drain is centered in bottom, but can be located as desired. Drain should not be placed nearer than 6 in. to side of stall.

Terrazzo receptors are made of finest material and are hand polished to give an attractive finish. Construction provides superior watertight qualities and easy assembly. Drain is in exact center of receptor.

Each unit is furnished with nickelplated brass curtain rod, soap dish, and strainer (strainer furnished for Josam Drain or 2-in. pipe calking connection). Specify type desired. Can furnish chromium plated finish instead of nickel, if desired.

Following equipment furnished if desired: Nickelplated mixing valve and shower head, or two individual nickelplated compression valves and shower head; heavy white or colored duck curtain and nickelplated hooks; nickelplated metal and glass door. (See illustration of door). Can furnish chromium plated finish instead of nickel if desired.

If valve and shower head are not furnished with unit, units are furnished without drilling. Can be drilled for valves and shower, but the exact location must be specified. Specify left or right-hand drilling and size of holes. Shower valve and head should be near entrance to permit regulating water temperature before entering, and to direct shower spray away from opening.

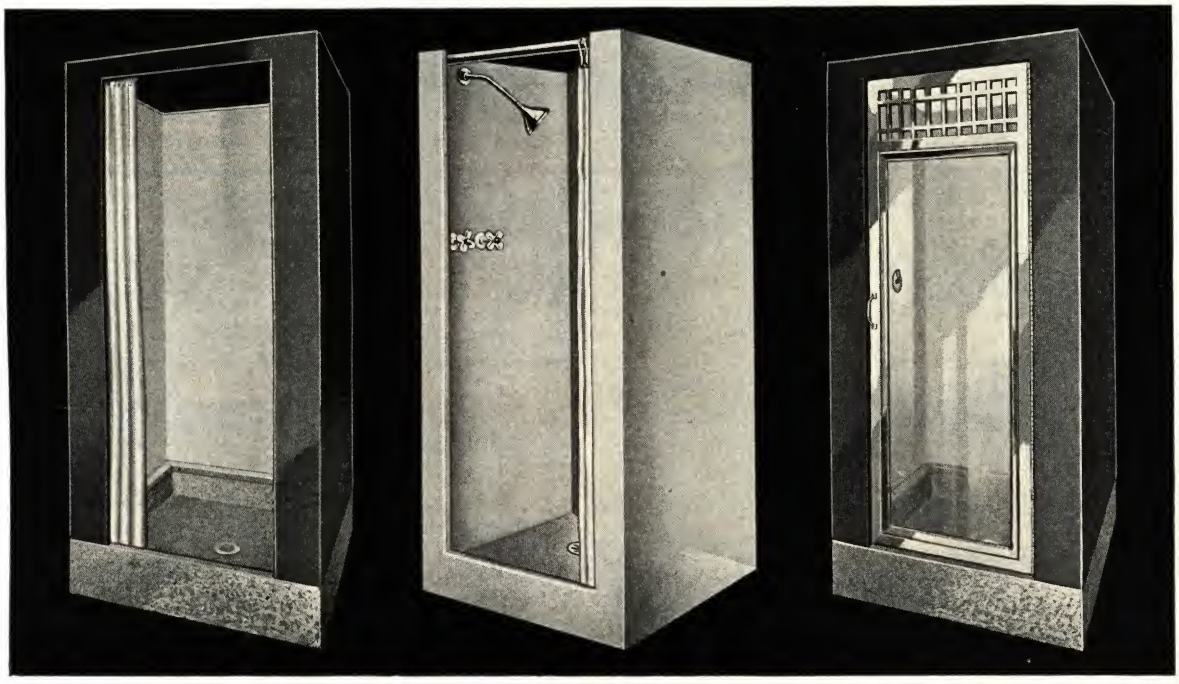
Shower head should be placed approximately 5 ft. 6 in. from floor for residences and hotels, and for use by women. For use in men's shower rooms in clubs or gymnasiums, head can be located slightly higher.

Size 28x40 and 40x28 in. recommended for use in buildings where door and window openings are completed. Size of shower specified must be regulated by size of openings through which shower can be taken into building.

Metal units are made in special sizes when required.

STANDARD SIZES IN INCHES

Metal Receptor					Terrazzo Receptor				
Width	Depth	Height	Weight, lb.		Width	Depth	Height	Weight, lb.	
			Steel	Kupraluminum				Steel	Kupraluminum
28	40	72	380	180	32	30	78	450	400
32	32	72	360	160	32	32	78	460	410
36	36	72	400	200	36	36	78	500	450
40	28	72	380	180					

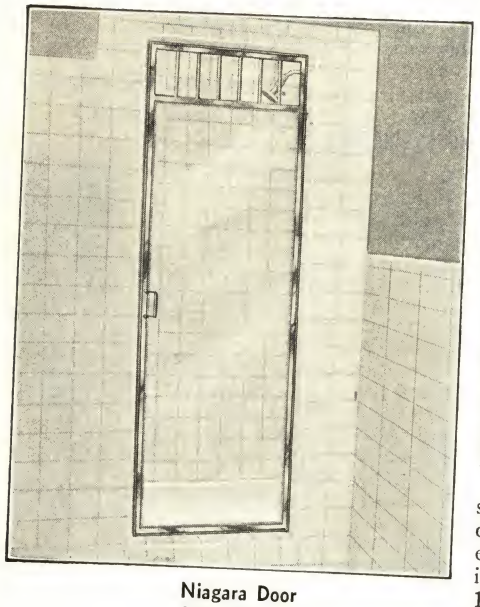


Type FT and KT | Type B and K | Type FT and KT with Door

PEERLESS SHOWER DOOR CO., INC.

192 Water Street, BROOKLYN, N. Y.

SAMPLES AND DISPLAY: Architects' Samples Corporation, 101 Park Avenue, NEW YORK, N. Y.



Niagara Door
Hinged right

Peerless Shower Doors, Bathtub Shields and Enclosures

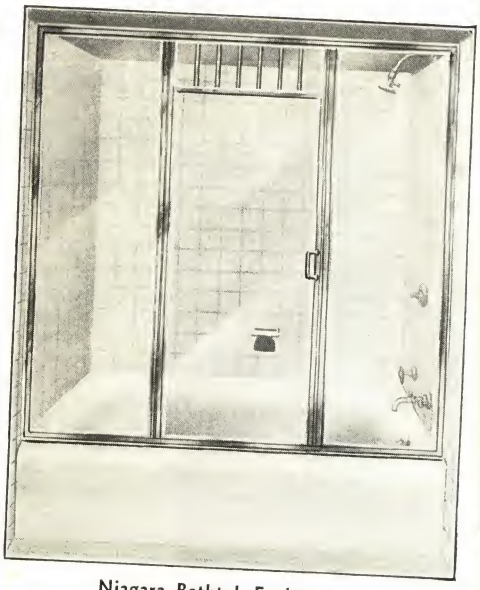
Designed for use in residences, apartments and hotels, and especially adapted for distant shipments.

The Peerless line consists of The Plymouth, The Niagara and The Aristocrat models.

A New Exclusive Feature

We have succeeded in making Peerless Shower Doors *absolutely water tight.* A new adjustable saddle is fastened on the step of the shower stall and fitted to the bottom of all Peerless Doors.

Forget the annoyance of water seeping through at the bottom of the door. Our new seepproof saddle entirely eliminates this trouble. It is illustrated and described in our new 1932 catalog. Write for your copy now.



Niagara Bathtub Enclosure
Door Hinged left

Installation

Anywhere within a radius of 50 miles from New York. We offer our services gratis in supervising construction of shower stalls and measuring for doors in this territory.

Construction

Peerless Shower Doors are built of brass and bronze throughout and are unconditionally guaranteed against any defect of any character at any time.

Doors are hinged right or left (facing door), Niagara door shown above is hinged right, while door shown in bathtub enclosure is hinged left.

New KA-2 Chrome Nickel Door

New Plymouth Model constructed of KA-2 chrome nickel displayed at Architects' Samples Corporation.

Sizes and Prices

All Peerless Shower Doors are custom built to individual sizes and are hinged either right or left. Prices include all necessary hardware and instructions for installing. Our catalogue with roughing instructions, complete prices, trade and quantity discounts will be sent on application. Approximate weight of door crated and boxed, 150 lb. Full freight allowed.

Specificational Data Niagara Model

Solid Grille—Integral part of door—not separate frame. Rods ½-in. solid brass, screwed direct to frame, adding strength and longer lines to door.

Frame—¾x¾-in. Chase seamless drawn brass tubing with outside frame to hold glass and removable inside frame to permit reglazing on job.

Handles—Cast bronze, stationary type bolted together, not fastened to frame, with offset to protect hands from contact with tile.

Hinge—Continuous entire length of door and riveted to joint and door—no screws used.

Adjustable Jambs—¾ in. width, with $\frac{5}{16}$-in. adjustment, built to our specifications of Chase architectural bronze drawn moulding.

Latch—Double action spring latch, holding door securely, yet releasing instantly at slight pressure on any part of door.

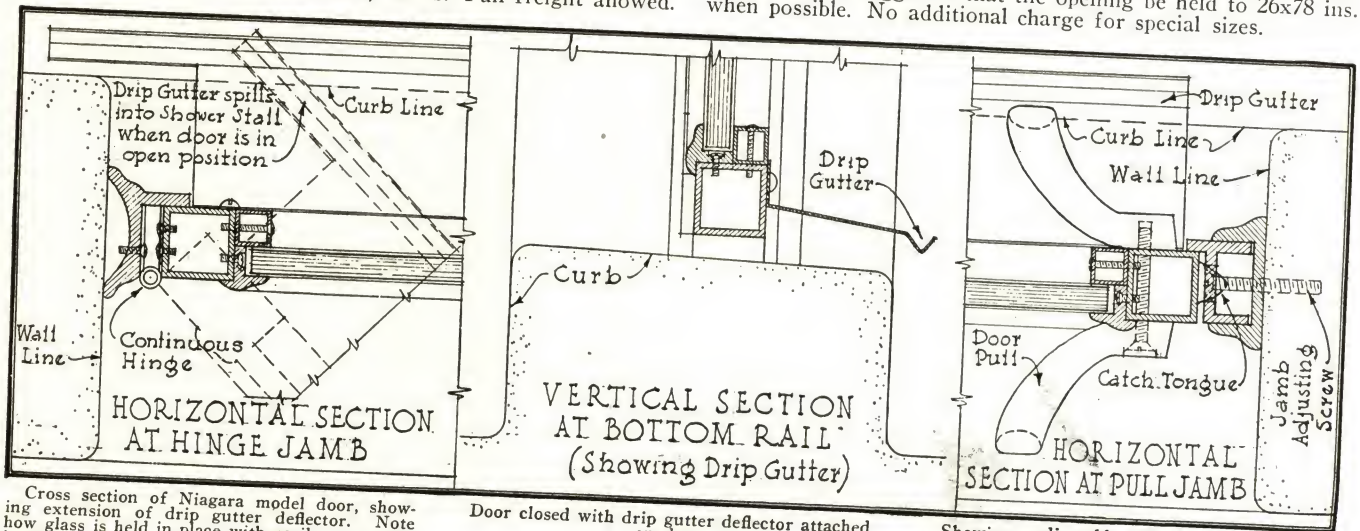
Deflector—2 ins. in width, on inside of door, all ends and corners rounded, with extension drip gutter.

Corners—Mitred and reinforced with solid brass block forced in (drivefit) on all joints.

Glass—¼-in. polished plate or ¼-in. tapestry glass.

Weight—26x78-in. door, complete 75 lbs. Door cannot sag.

Sizes—It is suggested that tile opening be held to 26x78 ins. when possible. No additional charge for special sizes.



Cross section of Niagara model door, showing extension of drip gutter deflector. Note how glass is held in place with easily removable inside tubing

Door closed with drip gutter deflector attached on door

Showing adjustable jamb, with adjusting screws, interlocking handles and position of the double action latch

HENRY WEIS MANUFACTURING CO., INC.

SHOWER CABINET DIVISION

ELKHART, INDIANA

(See Manufacturers' Index for 20-page Catalog of Weis Metal Toilet, Shower and Dressing Room Compartments and Stall Doors and Hardware)

Products

WEISWAY Shower Cabinets (Art Marble or Art Stone Receptors with assembled side walls in a variety of metals).

WEISTEEL and WEISALLOY (Aluminum Alloy) Integral Shower Cabinets. (See second page following.)

Patent Applied For

THE WEISWAY SHOWER CABINET

The Weisway Shower Cabinet is a combination of an Art Marble or Art Stone receptor with which the sidewalls and top are assembled at the job and locked so as to form what is really a single unit, absolutely leak-proof. The appearance of the Weisway Cabinet is in keeping with the finest of bathroom fixtures.

The receptor is placed in position, on either rough or finished floor, and the three sections which make up the sidewalls are assembled from inside the receptor without the use of bolts or screws. (See illustration reverse side of this page.) It is therefore particularly easy to install in recesses or alcoves in old or new buildings. One man can do the job alone in thirty minutes. The side walls lock into a groove on the inside of the receptor (see illustration reverse side of this page). The side walls themselves are locked together at the two rear corners by means of an ingenious lock moulding. The Weisway Cabinet may be used as a single unit or in batteries with or without provision for pipe spaces between the cabinets.

There are two standard sizes, No. 36 (36x36 in.), and No. 32 (32x32 in.). Standard height is 81 in., for either size, overall. The material used in the side walls is identified by a series letter. Series "A" is Aluminum Alloy, Series "B" is Super-finished Galvannealed Steel, and Series "D" is Galvannealed Steel. The receptors are identified by series number, Art Marble being Series 10, and Art Stone being Series 20. Thus, the specification of a cabinet 36x36 in. with Aluminum Alloy side walls and Art Marble receptor, would be—No. 36-A-10. Specifications should include the color and finish desired, prime or Weisway enamel for the side walls and nickel or chromium plate for the trim.

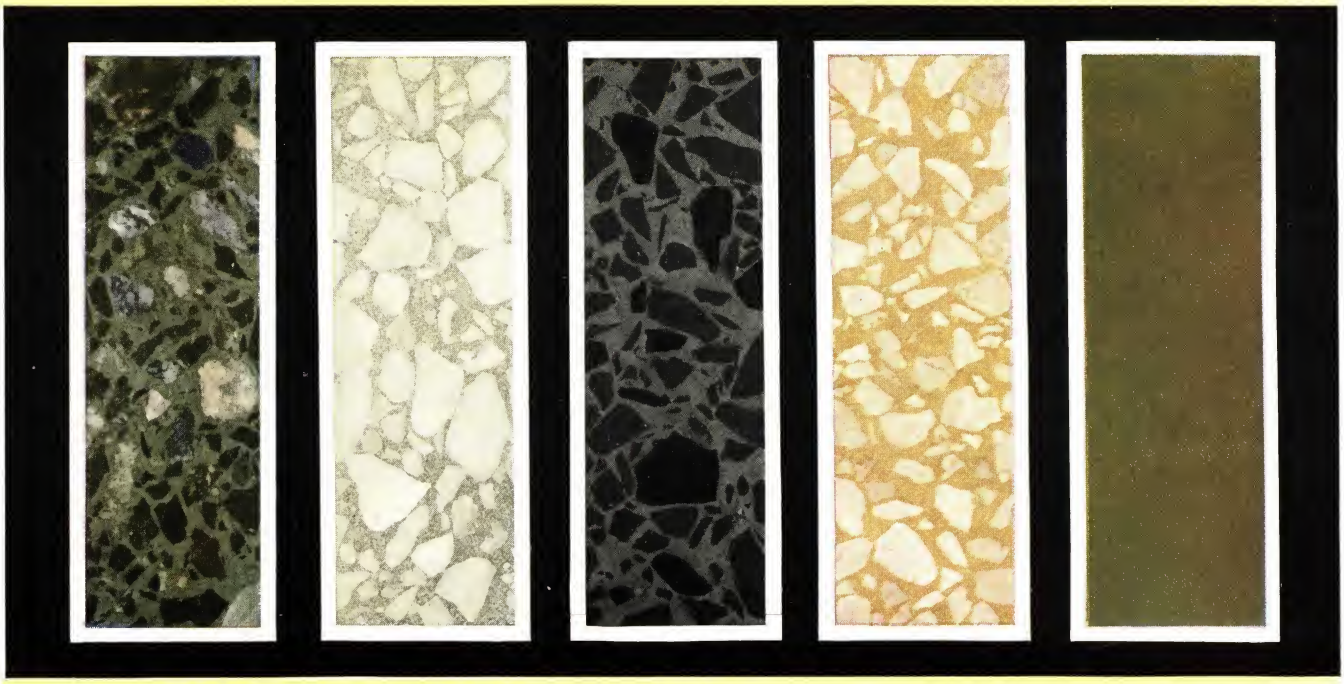
Curtain rod, soap dish and strainer plate of brass, either nickel or chromium plated, are included as standard equipment. Curtains and hangers furnished as an extra. Plate glass door of brass, nickel or chromium plated, with piano hinge and jambs, furnished as an extra. Holes are drilled at the factory for supply pipes when guaranteed sizes and locations are furnished—head and valve furnished by others. (For recommended shower head heights, etc., refer to Weisteel Integral Shower Notes, second page following.)

Side walls and receptor are boxed separately. Net weight of side walls is approximately 206 pounds for steel and 98 pounds for aluminum. Net weight of receptor is 260 pounds.

Weis Shower Cabinets are sold through the plumbing trade and should be written in the plumbing specifications. Information and prices can be obtained from plumbers or plumbing wholesalers or from any one of the representatives of the shower cabinet division listed below.

Weis Shower Cabinet Representatives

COLO.: Denver—Geo. Hamburger Co., 1715 California St.
CONN.: Hartford—C. D. Crocker, 116 Grennan Rd., W. Hartford
ILL.: Chicago—Henry Weis Mfg. Co., Inc., 228 No. La Salle St.
Peoria—Samuel J. Smith & Co., 510 Lehmann Bldg.
IND.: Fort Wayne—Carl H. Penningroth, 1617 Curdes Ave.
Indianapolis—Hoover Bros. Co., 1008 Majestic Bldg.
ME.: Portland—Wm. S. Wade, 158 Walnut St., So. Portland
MICH.: Detroit—C. M. Hargrave, 13623 Wark Ave.
Menominee—Ben B. Holmes Co.
MO.: Kansas City—I. L. Roark Co., 207 Mutual Bldg.
St. Louis—Marcus T. Donahue, 546 Warder Rd., University City
OHIO: Cincinnati—Jos. M. Beglen, 622 Broadway
Cleveland—R. L. Hanschke, 2029 Morrison Ave., Lakewood
Columbus—H. H. Leukart, 297 So. High St.
PA.: Philadelphia—Derbyshire, Mack & Morgan, Inc., Delaware Ave. and South St.
Pittsburgh—M. A. Sisk, 1108 House Bldg.
WIS.: Madison—Builders Specialty Co., 9 So. Pinckney St.

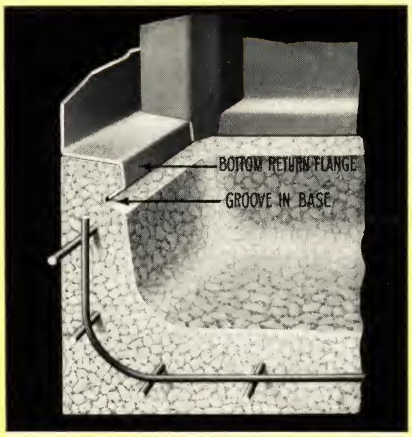


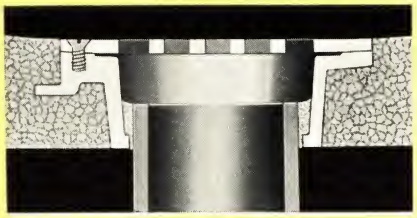
Green Art Marble | Gray Art Marble | Black Art Marble | Ivory Art Marble | Green Art Stone

Weisway Cabinets can be made to harmonize with the color scheme of any bathroom decorations. Side walls are supplied in special Weisway baked enamel in any one of the standard colors adopted for the sanitary ware manufacturers. Side walls are also shipped with a red oxide prime coat baked on at 350° F. which may subsequently be finished to suit the purchaser. The direct color photographs reproduced above illustrate the five standard Weisway receptors. The Art Marble receptors are composed of select marble chips, Portland Cement, and color-fast mineral pigments.

The Art Stone receptor is furnished only in one color, as illustrated. It is similar in design, general construction and reinforcement to the Art Marble receptor. It is made of water-proof white Portland Cement, select aggregate and color-fast mineral pigments.

Leak-proof Construction—Simple Installation





The illustration to the left shows the leak-proof joint between bottom return flange of the side wall and the groove in the receptor. Also shown is the ample reinforcement in the receptor itself. Receptors may be set on rough or finished floors—no lead pan is required.

At the lower left is shown a section through the outlet with removable strainer. The outlet is cast integral with receptor. The outlet, standard for 2-in. waste pipe, provides for inside lead caulked joint. The drain outlet is always located in the center of the receptor.

One man can easily assemble the Weisway Shower Cabinet from inside the receptor—no bolts or screws are required. The illustration to the right shows how assembly is accomplished. The arrow indicates the front of the receptor.

WEISTEEL INTEGRAL SHOWER CABINETS

The sides and back of Weisteel Integral Shower Cabinets are fabricated from one continuous sheet of 1/8-in. copper bearing steel, with bottoms of 1/8-in. galvanized steel, in accordance with the manufacturer's standard construction. Cabinets are also manufactured of aluminum alloy under the trade name, WEISALLOY. The sides and back are $\frac{3}{32}$-in. aluminum alloy and the bottom is 1/8-in. aluminum alloy. Construction is similar to the steel cabinet and the same accessories are included.

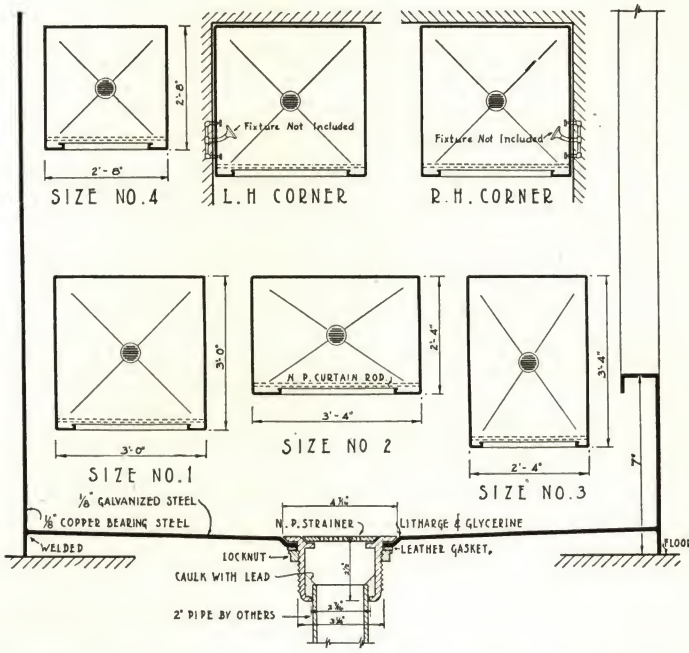
Patented April 15, 1919
HENRY WEIS MFG. CO., INC.
Licensed Manufacturers

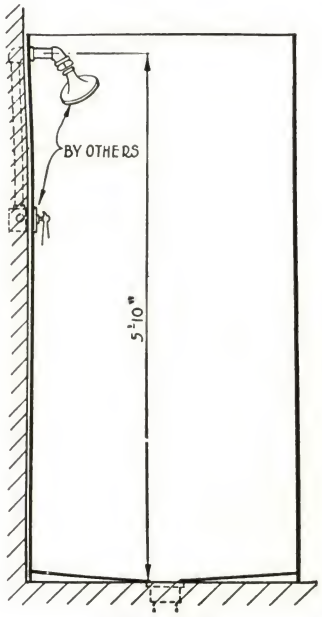
Architect's Specifications

(Shower Cabinets should be included in the plumbing specifications.)

All shower cabinets, where shown on plans, shall be Weisteel or Weisalloy (state which) Integral Cabinets as manufactured by the Henry Weis Mfg. Co., Inc., Elkhart, Ind. Each cabinet shall have sides 6 feet high, fabricated from one continuous sheet of metal and fitted with bottom sloping to the drain and welded to the sides. Bottom to be equipped with a standard brass outlet for 2-in. waste pipe, including sole leather gasket and lock nut, and nickel plated strainer. Entrance to be fitted with riser or splash plate 6 in. high, and brass, nickel plated, curtain rod and brass, nickel plated soap dish to be furnished. (Note: Specifications may include curtain hangers and/or chromium plated accessories, for which there is an extra charge. Head and valve equipment and trap by others.)

All cabinets are to be furnished with one coat of special oxide water-proof primer, baked on at 350° F., and one additional coat of Weisteel acid-proof paint on the bottom and sides to be placed against masonry walls. After installation is completed, the interior and exposed exterior shall be finished in water-proof enamel paint. (See painting specifications.)





Detail No. 5

The drawing reproduced here shows the four standard sizes which are carried in stock. Shipping weight of these sizes is approximately 360 pounds per cabinet in steel, and 200 pounds in aluminum alloy. Special sizes other than standard, either larger or smaller, or requiring special construction for openings, etc., can be furnished. Quotations and shipping schedules for such special sizes will be furnished upon request. For remodeling work, sizes Nos. 2 and 3 are especially recommended because they can be readily moved through 2 ft. 6 in. doorway or window openings.

Weisteel Integral Shower Cabinets can be used in combination with Weisteel Dressing Room Compartments. Details and complete information upon request.

Drain is located in the center of the bottom. An extra charge is made where drain is specified in any other position. Drain should not be placed nearer than 6 in. to side of stall.

Cabinets are regularly furnished with openings 2 ft. wide requiring curtain 2 ft. 8 in. by 5 ft. 8 in., using six hangers. Curtain and hangers are not standard equipment but are furnished at an extra charge.

Location of Shower Head

Detail No. 5 shows the shower supply placed 5 ft. 10 in. with shower head approximately 5 ft. 6 in. from the floor. This height is preferred for residence and hotel use as it permits the bather to take a shower without wetting the head. For men's gymnasium installations, the shower head should be placed slightly higher, while for women's gymnasium installations the shower head should not be over 5 ft. from the floor. In some installations, it is more convenient to place the supply pipes above and inside the shower cabinet.

The shower head should always be placed on the side and near the front of the cabinet to enable the bather to adjust the water temperature before entering and to assure direction of the spray to the rear away from the entrance.

At no extra cost, holes will be cut at the factory for receiving supply pipes when guaranteed sizes and locations of holes are given.

THE REINHARDT MANUFACTURING CO.

"Sealtite" Shower Stall Doors, Shields and Enclosures

110-112 East Second Street, CINCINNATI, OHIO

"SEALTITE" SHOWER STALL DOORS

Door Covered by Patent No. 1,590,206. Jamb Patent Applied For

"Sealtite" Shower Stall Doors represent a forward trend in the sanitation, beautifying and comfort of the bath in the modern hotel, apartment building, and residence.

Features—They are made of non-ferrous metals throughout and are of hollow construction, thereby combining maximum strength with minimum weight. They are guaranteed not to sag or warp, and to be waterproof when installed in accordance with our instructions. The waterproof sealing members are attached without the use of screws or rivets and are thus easily replaced. Being of pure white rubber they blend harmoniously with the finish of the metal.

Construction—Stiles and rails are made of No. 16 B&S gauge seamless brass or nickel silver, hollow construction with welded corners. Exterior glass stops are integral parts of stiles and rails; interior glass stops removable. $\frac{3}{16}$-in. crystal glass panel set in white rubber channel. Doors are hung on continuous hinge and equipped with friction catch and pulls to permit utmost ease of opening. Jambs and water-drip each in one piece of extruded brass or nickel silver, formed to engage white rubber sealing strips, without the use of screws or rivets, to permit easy replacement. Strike jamb constructed to permit $\frac{3}{16}$-in. two-way horizontal adjustment (patent applied for). The use of coil springs makes it possible to vary this adjustment at any point and make a perfect fit in irregular openings without difficulty.

The entire equipment produces a thoroughly waterproof installation.

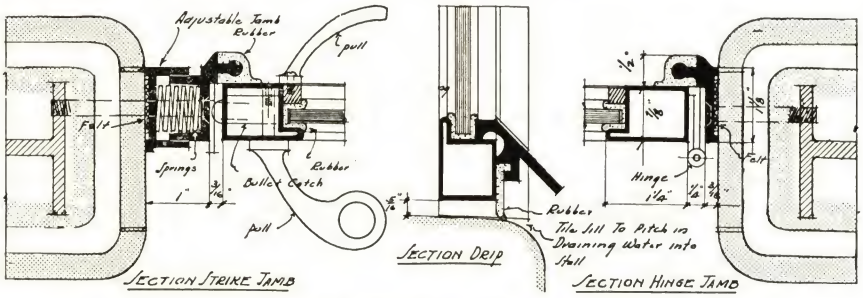
Price List No. 6—Doors for openings up to and including 27x78 in. and glazed with $\frac{3}{16}$-in. crystal glass panel.

Metal	Finish	Price
Brass	Nickel plate	$ 95.00 each
Nickel silver	Polished	105.00 each
Brass	Chromium plate	100.00 each

For ¼-in. plate glass panel add $5.00

For shatterproof glass panel add $20.00

Prices for larger sized doors, gold, silver and other special finishes or fancy glass panels, furnished on application.

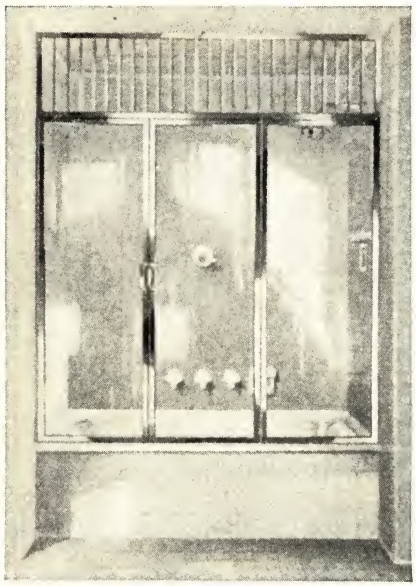


Details of "Sealtite" Shower Stall Door

Prices are f.o.b. cars, Cincinnati, Ohio.

Shipping weight approximately 135 lbs.

Installation—Complete specifications and blue prints for "Sealtite" installations are available upon request.



Design 100E "Sealtite" Bathtub Shower Enclosure
Two or three panels with single or double hinged door. Standard height 72 in. over grille

"Sealtite" Doors in Presidential Suite, Starret's Netherland Plaza Hotel, Cincinnati, Ohio
Walter W. Ahlschlager, Architect
Delano & Aldrich, Associate Architects
Starrett Bros., Inc., Contractors

Design 200S "Sealtite" Bathtub Shower Shield
Standard size, 32 in. wide by 52 in. high

ZAHNER MANUFACTURING CO.

Manufacturers of Shower Bath Doors

1213-1215 Walnut Street, KANSAS CITY, MO.

PRODUCTS DISTRIBUTED THROUGH PLUMBING SUPPLY HOUSES

Product

SHOWER BATH DOORS with patented concealed buck (Patented July 13, 1926).

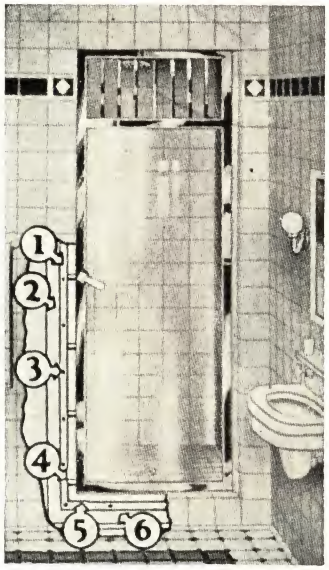
For our page on All-metal Sinks, see Manufacturers' Index.

Advantages

The reduced labor cost of erection, due to the patented concealed buck (an exclusive feature), makes the cost of the door completely installed exceedingly reasonable.

Special Features

Concealed Buck—A rigid, rectangular steel angle buck is furnished with each door. The buck is punched for attachment to wood, hollow tile or metal partition studs, and is set back from and covered by finished tile, marble or glass door opening jambs, sill and head. Attached to each steel buck at intervals on the hinge and jamb sides of door are temporary angles which are exact duplicates in size and shape of the finished door jambs. These angles are attached to the buck with machine screws passing through brass ferrules. After the tile work has been finished, the temporary angles used as a guide are removed and the finished door jambs are rigidly attached through the brass ferrules, to the steel buck with plated machine screws. No drilling of tile for insertion of expansion bolts or screws is necessary, thus eliminating time and expense in erection and the hazard of damage to completed tile work and a jamb attachment which will not be permanently rigid. The tile opening always fits accurately the finished door jambs; the buck reinforces the opening. Buck can be set and door hung by any mechanic in less than an hour.

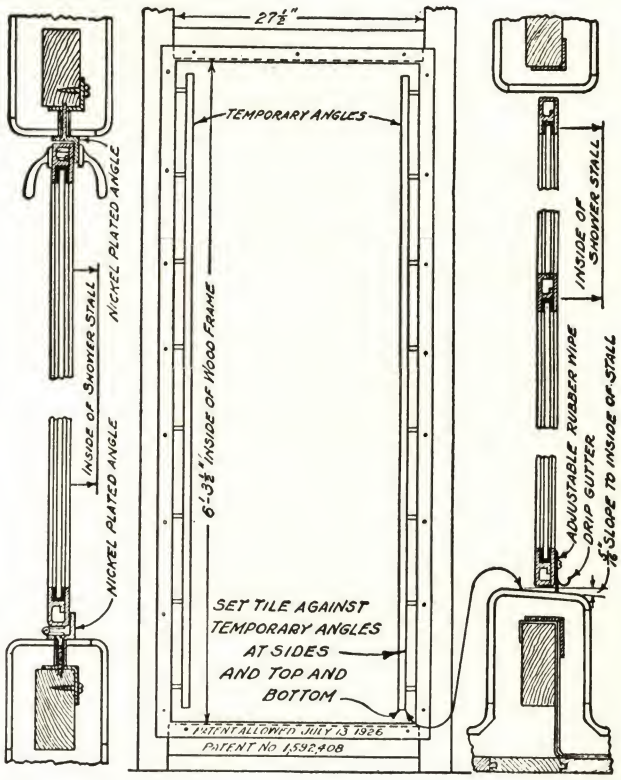


Concealed Buck Showing Simplicity of Construction

Nos. 1 and 5—Welded angle iron frame or buck.
Nos. 2 and 6—Wood studding to which buck is nailed.
No. 3—Nails to secure steel buck to studs.
No. 4—Ferrules that are welded to buck and which protrude to face of tile, and through which nickel-plated brass bolts go that screw into angle iron buck for hanging door

Metal Drip Gutter—Attached, permanently, to the bottom rail of each door is a drip gutter which prevents water that may be on door from dripping on floor when door is open. Gutter empties into stall basin.

Door and Door Jambs—Door stiles and rails, grille and angle jambs are of extruded bronze, heavily plated. Stiles and rails of door are mitered at all corners and are rigidly welded at all joints which makes it a one-piece door. Door is hinged to hinge-jamb with a continuous plated bronze hinge (piano type). Drip gutter is of monel metal. Door handles are of plated cast bronze, lever type (no springs or latches) fitted with a cam that holds the door closed. Door panel is of ¼-in. polished plate glass. Glass is set in a continuous rubber channel gasket. Bottom of door is furnished with an adjustable rubber flap. A high class highly finished product. Standard doors are 2 ft. wide by 6 ft. high. They may hinge to either jamb and swing in or out, as desired (swing out preferred).



Note: Finished doors may be obtained in chromium, gold or nickel plate; glass panel may be of any special plate glass, plain or decorated. Grille may be omitted.

Specifications

Furnish and install in each shower stall, one Zahner Shower Bath Door, Type No. 230, with concealed steel buck as made by ZAHNER MANUFACTURING CO., Kansas City, Mo.

Note: If of standard size (2x6 ft.), so note. If of special size, give door sizes. Give door swing (in or out, right or left).

Note: Specify whether with or without grilles.

Glass shall be [polished clear plate] [other plate glass] [mirror].

All exposed metal work (except drip gutter) shall be heavy [nickel] [chromium] [gold] plated.

Installation shall be in accordance with the manufacturer's directions.

Literature and Service

Complete new catalogue showing other style doors, glass tub enclosures, decorated glass panels, etc., will be sent on request. Further information or details from our Service Department are yours without obligation.

THE ZOURI COMPANY

Manufacturers of "Sturdiweld" Shower Stall Doors

FACTORIES AND GENERAL OFFICES

CHICAGO HEIGHTS, ILL.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA

Products

Zouri "Sturdiweld" Shower Stall Doors.

For Zouri Safety Key-set Store Front Construction in Bronze or Aluminum Alloy, see Manufacturers' Index.

For Extruded and Ornamental Bronze for store and shop windows, see Modern Bronze Store Front Co., in Manufacturers' Index.

Zouri "Sturdiweld" Shower Stall Doors

Narrow, trim lines and rigid construction make this door particularly desirable for the modern bathroom. The solid bronze members, designed to give maximum strength, are firmly *welded* at corners to avoid sagging and bending.

Specifications

Material—All-bronze (no steel or wood).

Frame—Special design (No. 14 B&S) gauge seamless tube.

Glass Moulding—Heavy extruded.

Jambs—New design extruded members with rounded corners. Felt caulking strip 1/8 in. thick to take up inequalities in tile between jambs and tile.

Hinges—Continuous piano type.

Handles—Offset type.

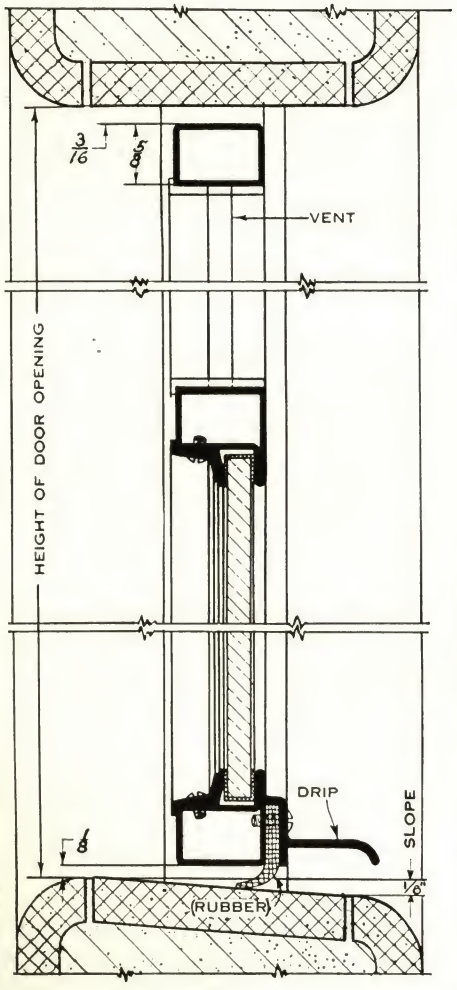
Splash Shield—Rounded extruded member.

Catch—Improved double-acting spring catch.

Rubber Strip—Held in place by splash shield at bottom of door; has featheredge and can be easily adjusted to height.

Glass—Polished plate; ribbon mitered, edges bound in 3/4-in. rubber tape.

Finishes—(1) Duplex nickel plate. (2) Chromium plate (all chromium plate doors are first copper plated, then duplex nickel plated before undergoing the chromium plating process). All doors are welded before plating.

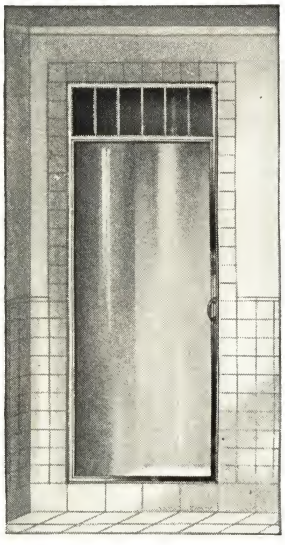


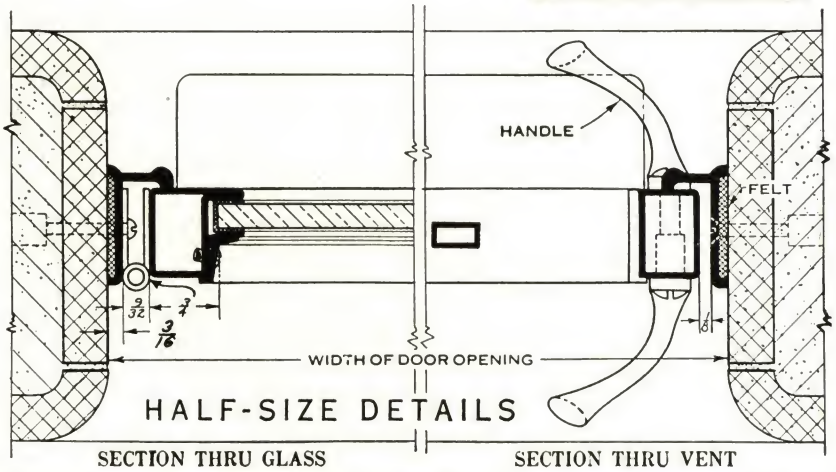
Standard Sizes

24x72 in., 27x72 in., 27x78 in. These are tile opening sizes. We make all necessary allowances.

Standard sizes carried in stock for immediate shipment.

Special sizes made to order.





HALF-SIZE DETAILS

SECTION THRU GLASS

SECTION THRU VENT

ROYAL LINE

DE LUXE

AND OTHER

BATHROOM ACCESSORIES

ELABORATION AND ORNAMENTATION

APPLIED FOR THE FIRST TIME TO

MODERN CHINA BATHROOM ACCESSORIES

FAIRFACTS SYMBOL

OF QUALITY

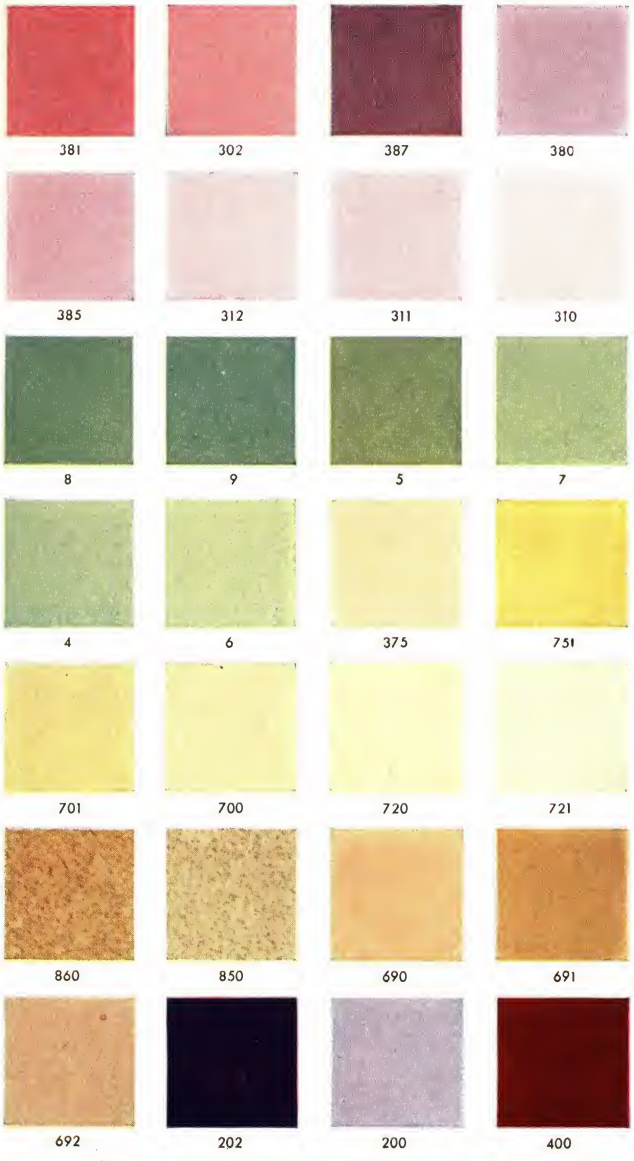
The Fairfacts Company
INCORPORATED
234-236 WEST FOURTEENTH ST.
NEW YORK, U.S.A

CABLE ADDRESS
FAIRFACTS
CODE: A B C. 6TH EDITION
AND BENTLEY'S

CATALOGUE 32

THE FAIRFACTS CO., INC.

VITREOUS CHINA COLORS



A REMARKABLE DEVELOPMENT
Fairfacts "Eternité Colors"

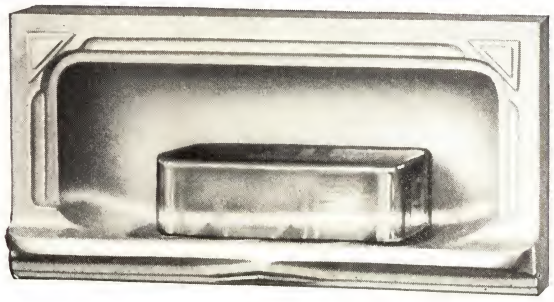
Colors fired into genuine vitreous china. Colors shown are available at short notice. Many other shades are made, and also special colors to order from your samples. White, "Mellotone white," and Black are regular glazes. "Mellotone white," is a beautiful, soft light cream; when applied to accessories, goes well with the usual white tile and with colors that harmonize with light cream. Color samples gladly furnished.

These colors we call "ETERNITÉ COLORS," because of their extreme durability.

Satin matt and gloss finishes

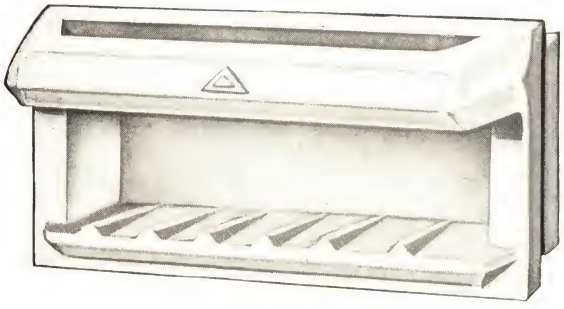
"Eternité colors," on vitreous china are a real achievement, the work of several years by our chemists. It was not an easy task.

"ROYAL LINE" DELUXE



R 200

Regular "F LINE" New Design



F 196

The fixtures shown above illustrate our **two lines** of china accessories.

The "Royal Line," is conservatively modernistic, and is the most elaborate and decorative line of china fixtures made. It harmonizes with the newest and most modern bathroom equipment.

The "F Line," is our regular line, new however, in design and in keeping with the present demand. The former severely plain fixtures served their purpose but are now out of date and old fashioned.

Fairfacts "Eternité Colors" on Fairfacts Vitreous China Bathroom Accessories and on Fairfacts Vitreous China Tile, make a fine combination, either in matched colors or contrasting shades.

"FAIRFACTS TILE IS CHINA TILE"

SEE FAIRFACTS CHINA TILE AND TRIM, IN SWEET'S TILE SECTION

Look for the *Double Triangle*

Vitreous China
Accessories

Vitreous China
Tile

FAIRFACTS FIXTURES

For 1932

VITREOUS CHINA BATHROOM ACCESSORIES

White, Black and Colors

"ROYAL LINE"—DE LUXE

A Conservative Modernistic Design

No finer accessories of the china type ever produced. Recommended for the finest and most modern bathrooms. Royal Line white finish is our "Mellotone," a very light cream satin, a decidedly superior finish that is unusually attractive, a good match for white tile, and a finish that looks well with colors that you would use with a very light cream.

"F-LINE"—THE ORIGINAL LINE

With a New Design with More Attractiveness

The first recessed china accessories made in the world. Patented February 13, August 21, August 28, September 11, October 23, 1917; February 12, May 28, July 16, 1918; April 15, July 29, 1919. See outside back cover for large detail of this new design.

GENERAL

The Double Triangle, a small one superimposed on a larger one, now appears on the exposed surface of Fairfacts Accessories; an attractive identification of a fine product. This symbol is our "Hall Mark" and your guarantee.

THE FAIRFACTS COMPANY, INC. is the only company, so far as we know, that produces its white, black and colored vitreous china accessories and tile, its entire product, in its own plant.

Fairfacts Accessories and Tile are set by the tile contractor, and for this reason should be included in the tile contract.

THE FAIRFACTS COMPANY

INCORPORATED

234-236 West 14th Street

NEW YORK

CABLE ADDRESS: "Fairfacts"
CODES: A.B.C. 6th Edition and Bentley's

Made in U. S. A.

CATALOGUE No. 32, Copyrighted 1931
PLANT: Fairfacts Street, Trenton, N. J.

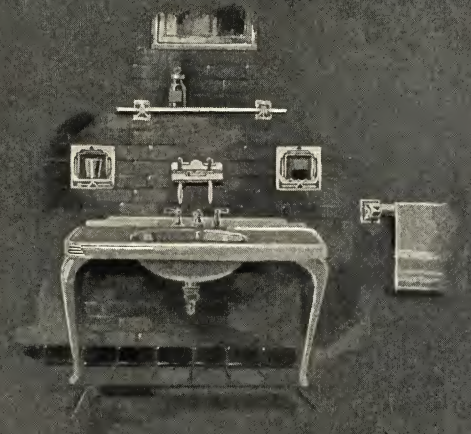
BILTIN TYPE

ROYAL LINE
DE LUXE

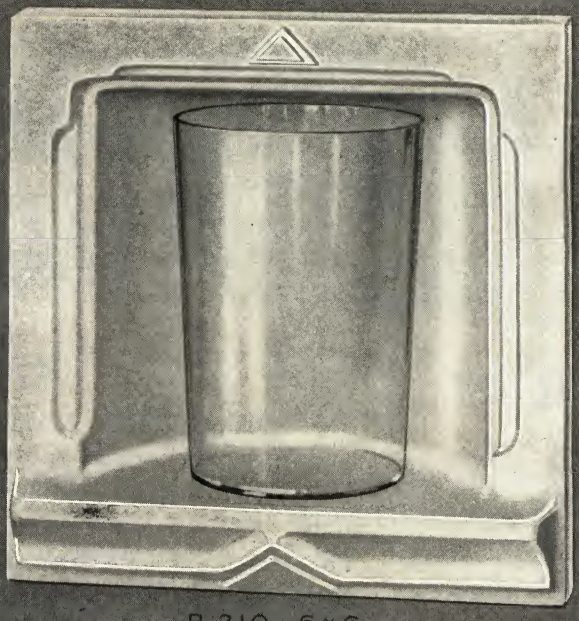
ELABORATE AND ORNAMENTAL
CHINA
BATHROOM ACCESSORIES

AVAILABLE IN
WHITE, BLACK, COLORS
AND SPECIAL FINISHES

R 201 - 6 × 6
SOAP HOLDER

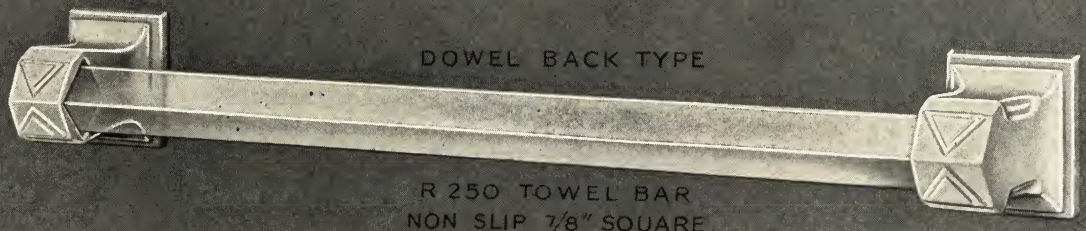


BILTIN TYPE



R 210 - 6 × 6
TUMBLER HOLDER

DOWEL BACK TYPE



R 250 TOWEL BAR
NON SLIP 7/8" SQUARE

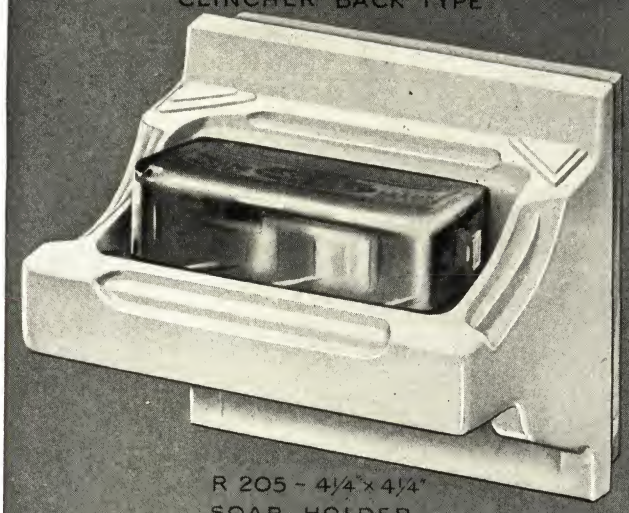
FOR MORE DETAILS
SEE F 300 ON
ANOTHER PAGE

Fairfacts

LOOK FOR THE DOUBLE TRIANGLE

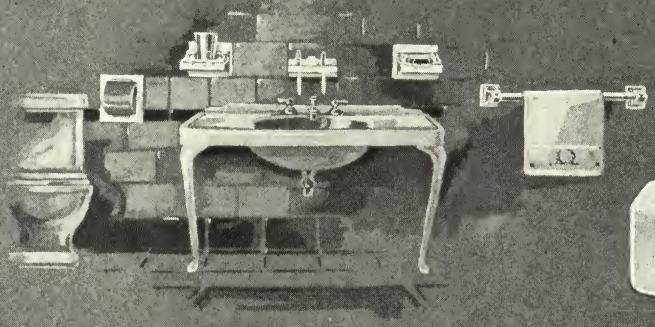
PATENTS APPLIED FOR
MADE IN U.S.A.

CLINCHER BACK TYPE



R 205 - 4¼" × 4¼"
SOAP HOLDER

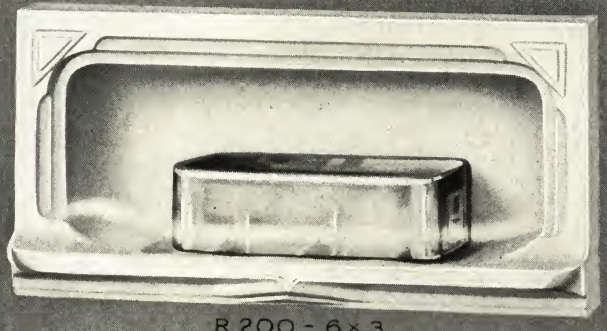
ROYAL LINE
DE LUXE
ELABORATE AND ORNAMENTAL
CHINA
BATHROOM ACCESSORIES
AVAILABLE IN
WHITE, BLACK, COLORS
AND SPECIAL FINISHES



CLINCHER BACK TYPE

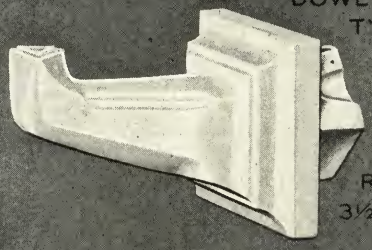
R 215 - 4¼" × 4¼"
TUMBLER HOLDER

BILTIN TYPE



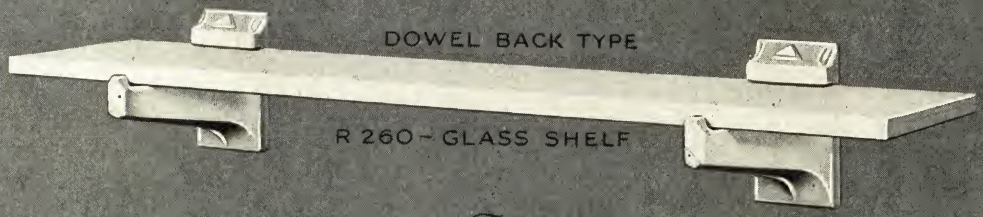
R 200 - 6 × 3
SOAP HOLDER

DOWEL BACK TYPE



R 260
3½" LONG

DOWEL BACK TYPE



R 260 - GLASS SHELF

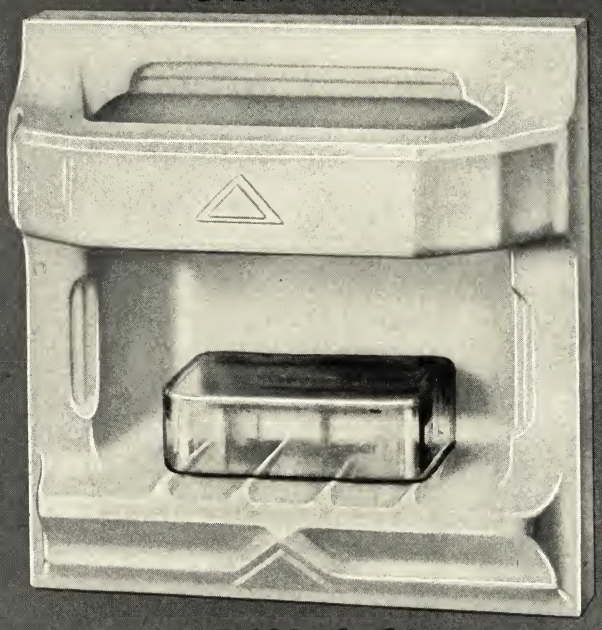
SHELVES ARE
WHITE, BLACK OR CRYSTAL
7/16" THICK, 4½" WIDE
20"-24"-30"-36" LONG

Fairfacts

LOOK FOR THE DOUBLE TRIANGLE

PATENTS APPLIED FOR
MADE IN U.S.A.

BILTIN TYPE

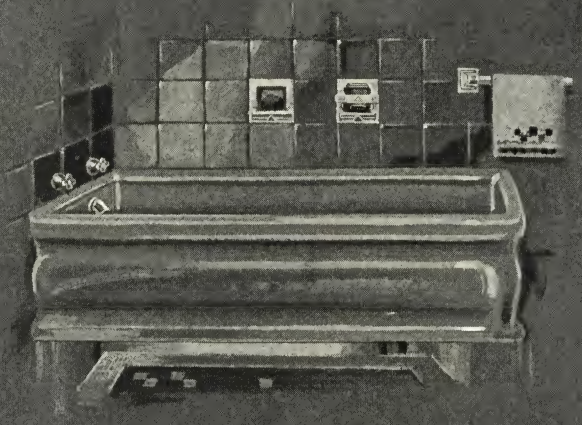


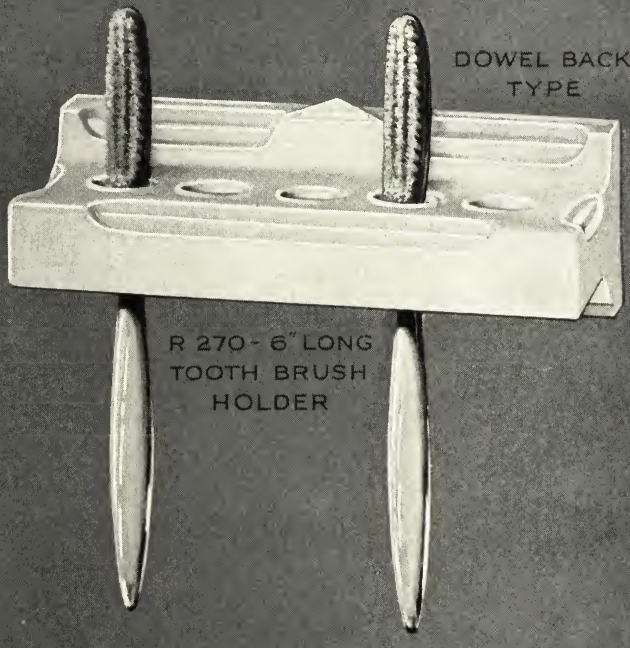
ROYAL LINE
DE LUXE

ELABORATE AND ORNAMENTAL
CHINA
BATHROOM ACCESSORIES

AVAILABLE IN
WHITE, BLACK COLORS
AND SPECIAL FINISHES

R 220 - 6 x 6
SOAP HOLDER AND GRIP COMBINATION
SELF DRAIN

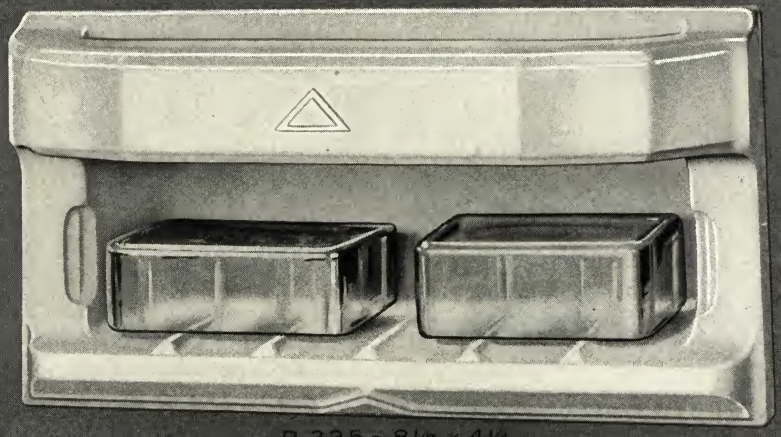




DOWEL BACK
TYPE

R 270 - 6" LONG
TOOTH BRUSH
HOLDER

BILTIN TYPE



R 225 - 8½ x 4¼
SOAP HOLDER AND GRIP COMBINATION, SELF DRAIN

Fairfacts

LOOK FOR THE DOUBLE TRIANGLE

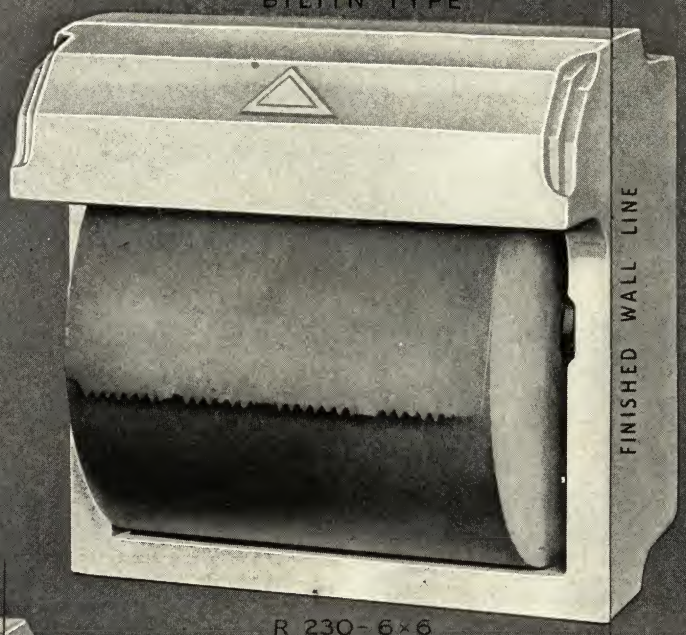
PATENTS APPLIED FOR
MADE IN U.S.A.

ROYAL LINE
DE LUXE

ELABORATE AND ORNAMENTAL
CHINA
BATHROOM ACCESSORIES

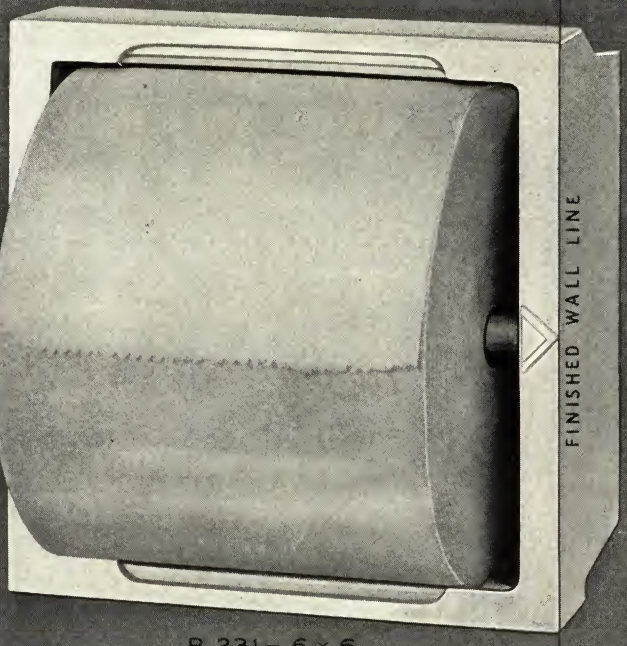
AVAILABLE IN
WHITE, BLACK, COLORS
AND SPECIAL FINISHES

BILTIN TYPE



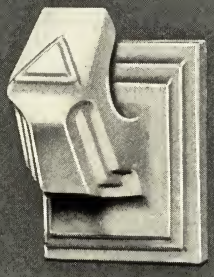
FINISHED WALL LINE

R 230 - 6 × 6
PAPER HOLDER WITH PATENTED
REWIND ROLLER



FINISHED WALL LINE

R 231 - 6 × 6
PAPER HOLDER WITH PLAIN ROLLER



DOWEL TYPE
R 281 - 2" LONG
DOUCH HOOK
OR STROP HOOK

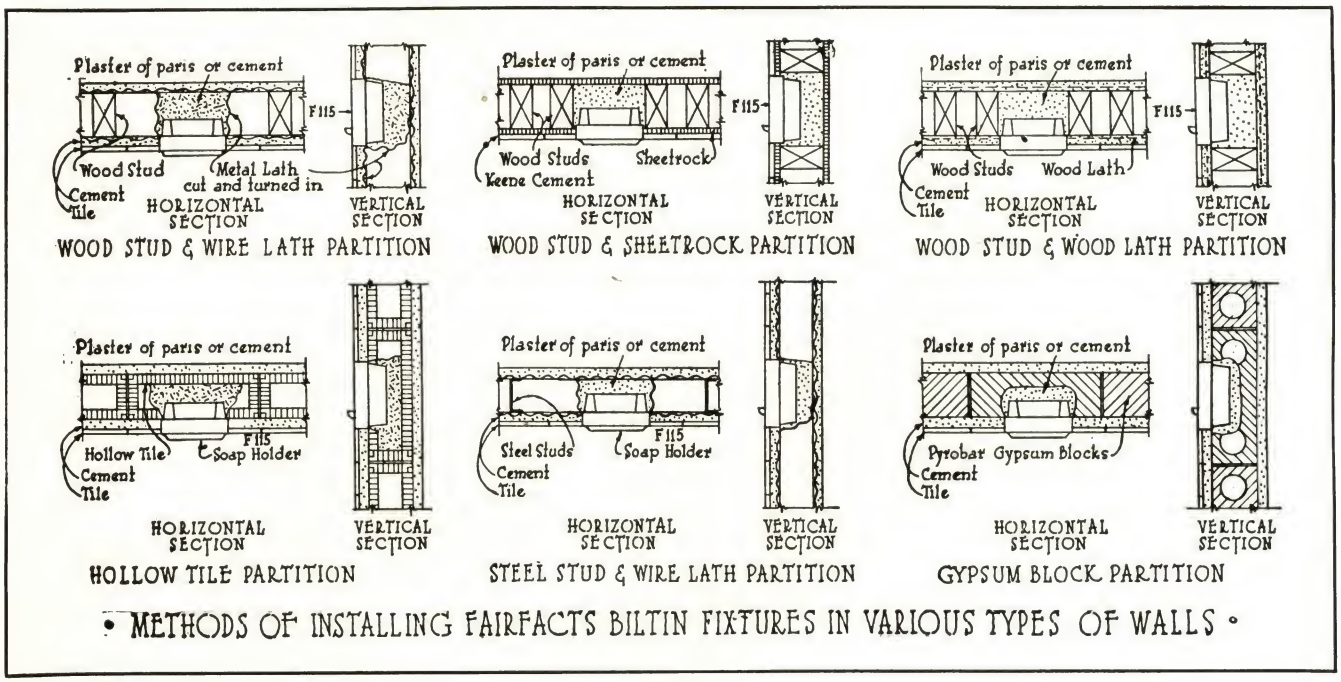
BILTIN TYPE

R 240 - 6 × 6
SPONGE HOLDER

Fairfacts

LOOK FOR THE DOUBLE TRIANGLE

PATENTS APPLIED FOR
MADE IN U.S.A.



• METHODS OF INSTALLING FAIRFACTS BILTIN FIXTURES IN VARIOUS TYPES OF WALLS •

Fairfacts Fixtures Should Be Included in the Construction Work and Mentioned in the Tile Specifications

Used with Any Type of Wall Construction or Surface Finish

Interior Construction	Bond	Wall Finish
Wood stud	Metal lath	Tile
Terra cotta or hollow tile	Wood lath	Plaster
Brick	Plaster board	Keene's cement
Gypsum block	Sheetrock	
Metal stud walls (thin)		

Made in tile sizes—select proper size to fit the tile.

Fairfacts Accessories are made to fit these unit sizes or their multiples, namely, 6x3, 6x6 and 4¼x4¼ in.

Types of Fairfacts Fixtures and Methods of Installation

Biltin or Recessed Type—These are recessed almost entirely into the walls, and cemented in place when the tile or other wall finish is put on. Greatest depth required in the wall is 3¼ in., except F-180 radiator, which needs 5 in. When used on tiled walls they should be included in the tile contract.

Recessed fixtures that are 6x3, 6x6, 6x9 and 6x12-in. require little cutting of tile when set in 6x3 or 6x6-in. tile. These fixtures can be set in 4¼x4¼-in. tile, but require more cutting. All 4¼x4¼, 6x4¼ and 8½x4¼-in. recessed fixtures are used with 4¼x4¼-in. tile.

Semi-recess Type—Recessed into the wall but 1 in. Are set like recess type and are used in thin partition, or where piping or other obstructions are found in walls. Are cemented in place and have a flange that overlaps the aperture.

Projecting Types—Have special backs or wall attachments cementing to wall.

These backs are of two kinds: "Dowel Back Type" and "Clincher Back Type."

Dowel Back Fixtures—Depth required in wall is 1 in. Dowels are heavy and strong and make a substantial wall attachment.

When Set in Tile Walls—Usually set after the tile is in place. A hole of size and depth of dowel, but slightly larger, is made in wall. Dowel is covered with rich cement or plaster of paris and fixture pushed into place.

Note: Make holes in tile preferably at intersection of tile joints. Be sure hole is not too large to be concealed by fixture.

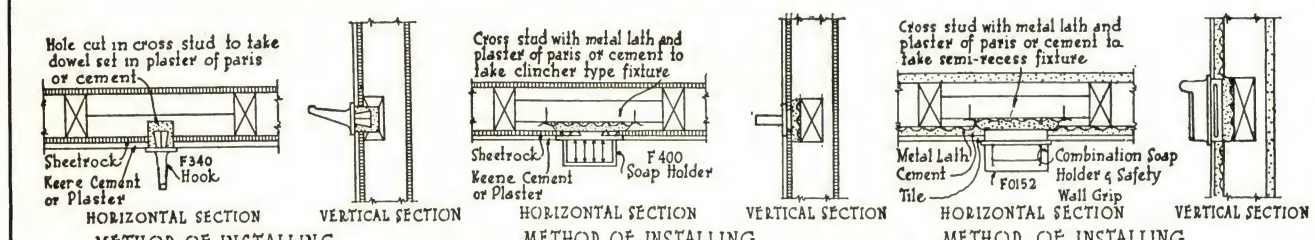
When Set in Keene's Cement or Plaster Walls—Hole is cut in wall and fixture pushed into place as for tile wall, but it is desirable that pieces of studding with their wide sides towards front be nailed to studs (flush with face of studs) and hole cut in the pieces of studding (see illustration).

Clincher Back Fixtures—Made in tile sizes to avoid cutting the tile. Depth needed in wall is ¾ in.

When Set in Tile Walls—Installed when setting tile or opening of right size is left in tile work and fixtures set later. Make openings deep enough for liberal quantity of rich cement or plaster of paris and also cover the **back of fixtures and fill** the clinchers with the cement. Then tamp fixtures into place until glazed surface is flush with the finished wall.

When Set in Keene's Cement or Plaster Walls—Set fixtures before applying finish coat to wall. Expose the lath where fixtures are to go and set as for tile walls.

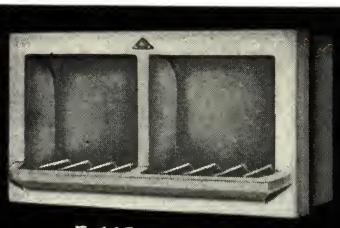
Note: For walls with wood stud interior and sheetrock or plaster board bond, see illustration for method of preparing opening. After opening is prepared set fixtures as described for "When set in Tile Walls." See page 10 for more installation data.

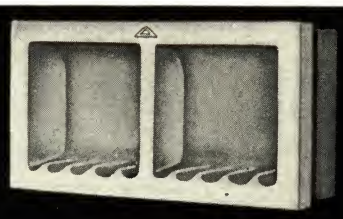


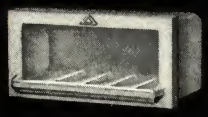
• INSTALLATION OF DOWEL. CLINCHER & SEMI-RECESS TYPE OF FIXTURE •

Fairfacts Fixtures

SOAP HOLDERS

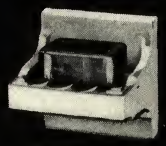

F 118 12x6


F 128 12x6


F 100 6x3

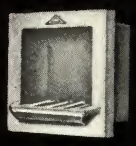
F 120 6x3

F 400 6x3 CLINCHER BACK

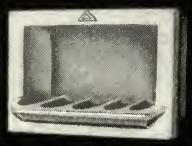

F 500 4¼x4¼ CLINCHER BACK

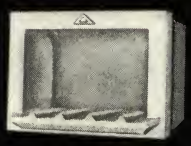
F 130 DOWEL BACK

F 135 DOWEL BACK

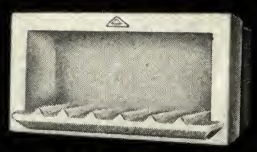

F 105 4¼x4¼

F 121 4¼x4¼

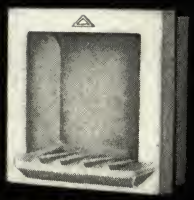

F 110 6x4¼


F 122 6x4¼

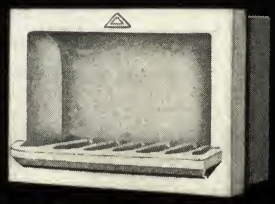
F 112 8½x4¼

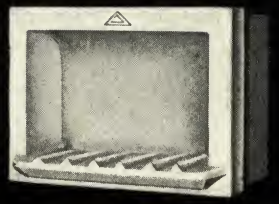

F 123 8½x4¼

F 115 6x6


F 125 6x6

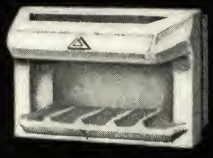
F 129 6x6


F 116 9x6


F 126 9x6

COMBINATION SOAP HOLDERS AND SAFETY WALL GRIPS

F 190 6x4¼


F 195 6x4¼

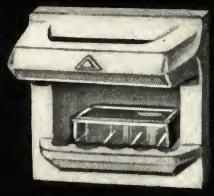
F 191 8½x4¼

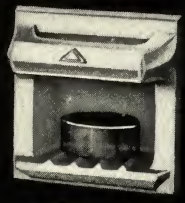
F 196 8½x4¼

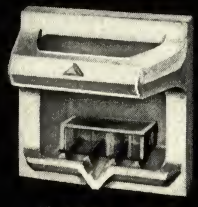
F 192 8½x4¼

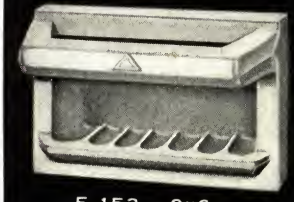
F 158 6x3

F 150 6x6

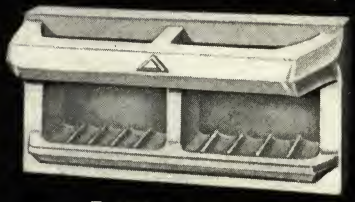

F 151 6x6

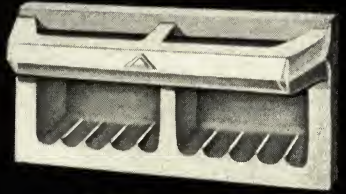

F 152 6x6


F 149 6x6

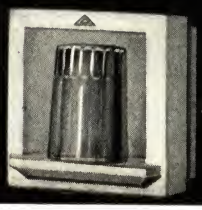

F 153 9x6

F 154 9x6

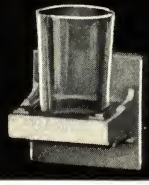

F 155 12x6


F 156 12x6

TUMBLER HOLDERS


F 160 6x6

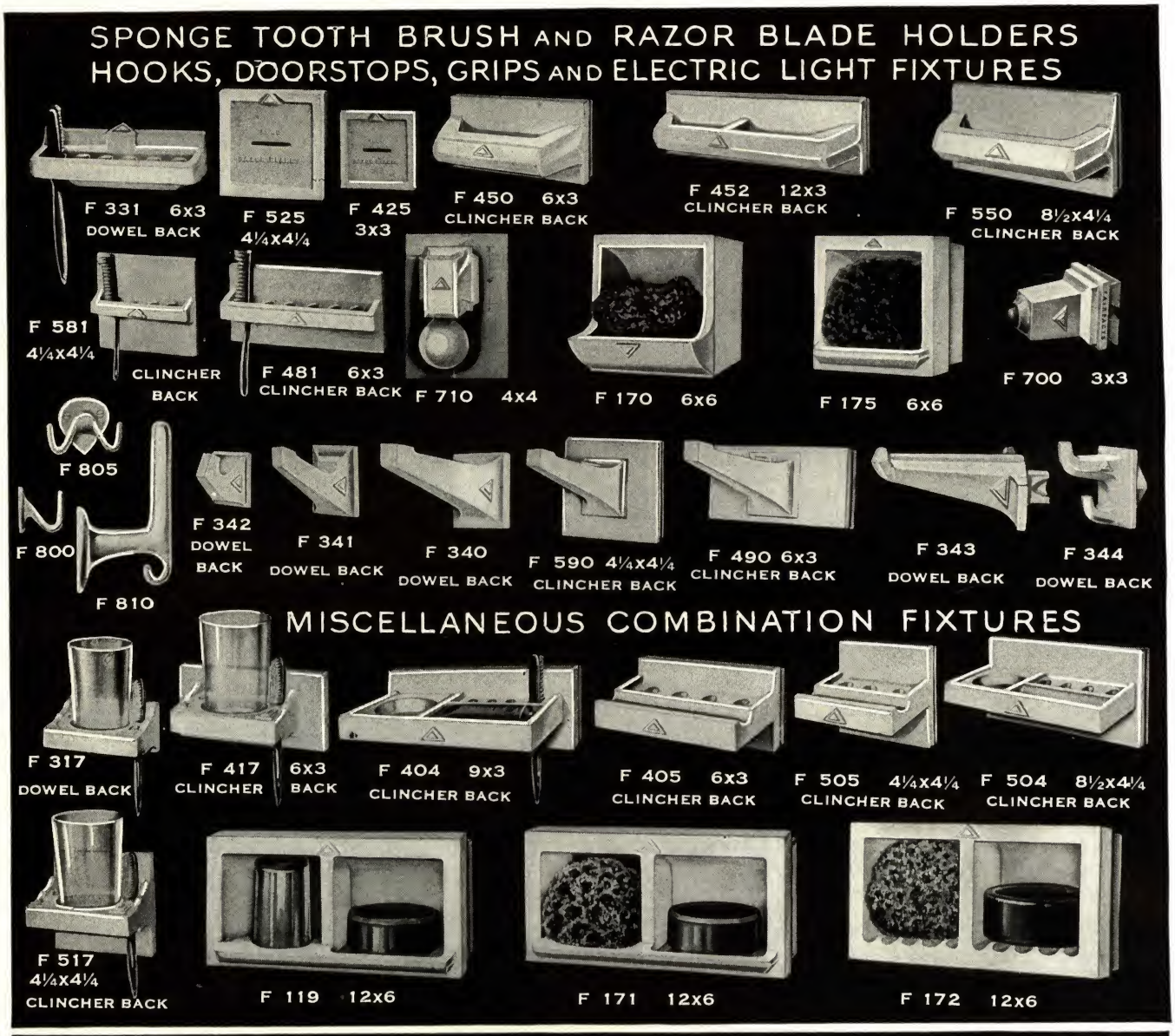
F 403 6x3 CLINCHER BACK

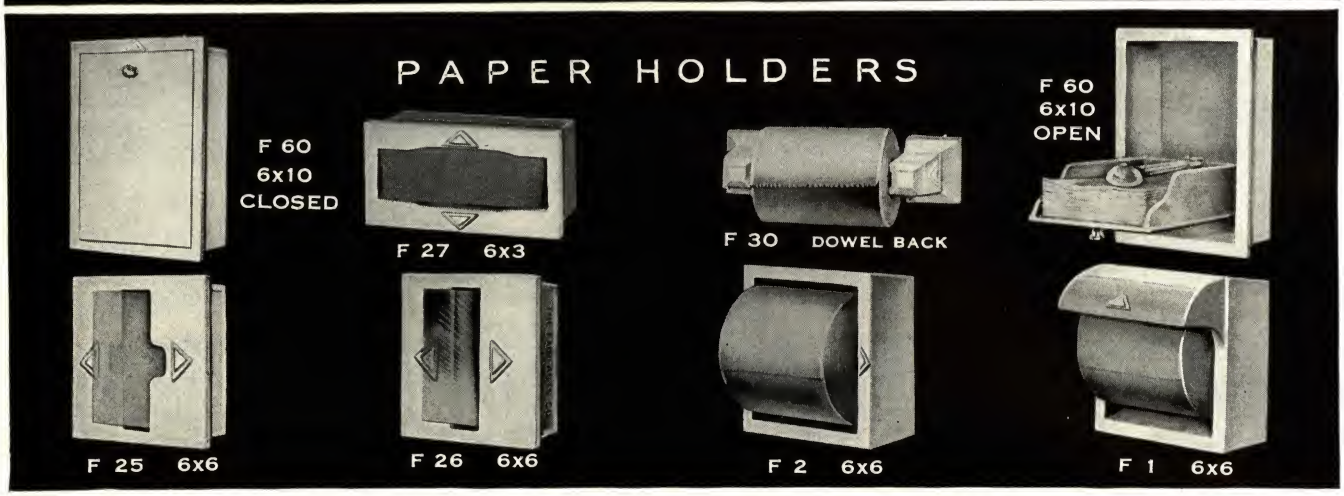

F 503 4¼x4¼ CLINCHER BACK

F 165 DOWEL BACK

FAIRFACTS "F LINE"—REGULAR LINE, NEW DESIGNS

Look for the *Double Triangle*



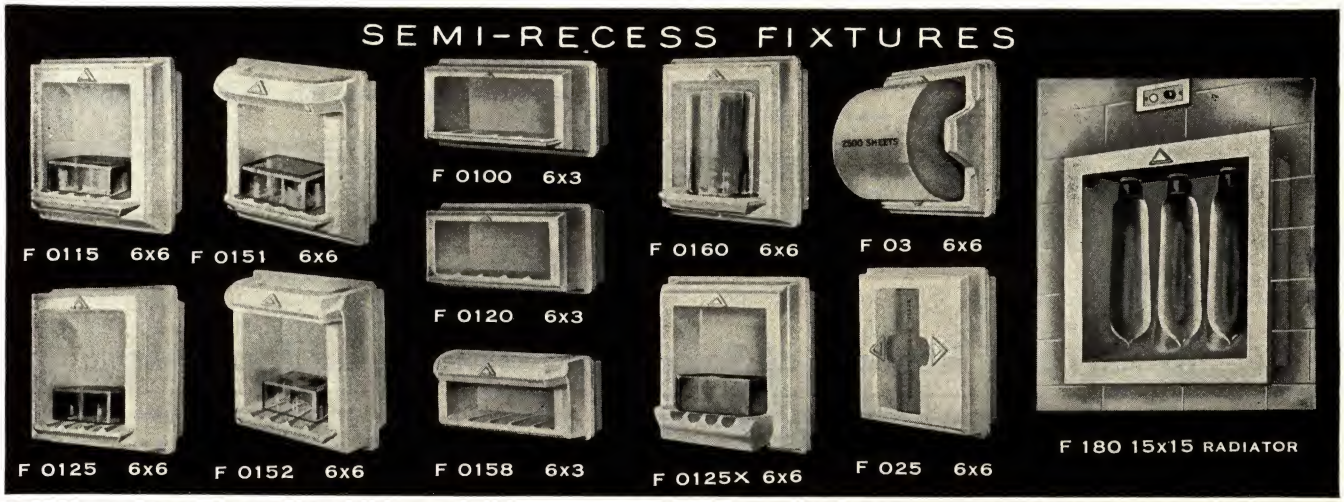


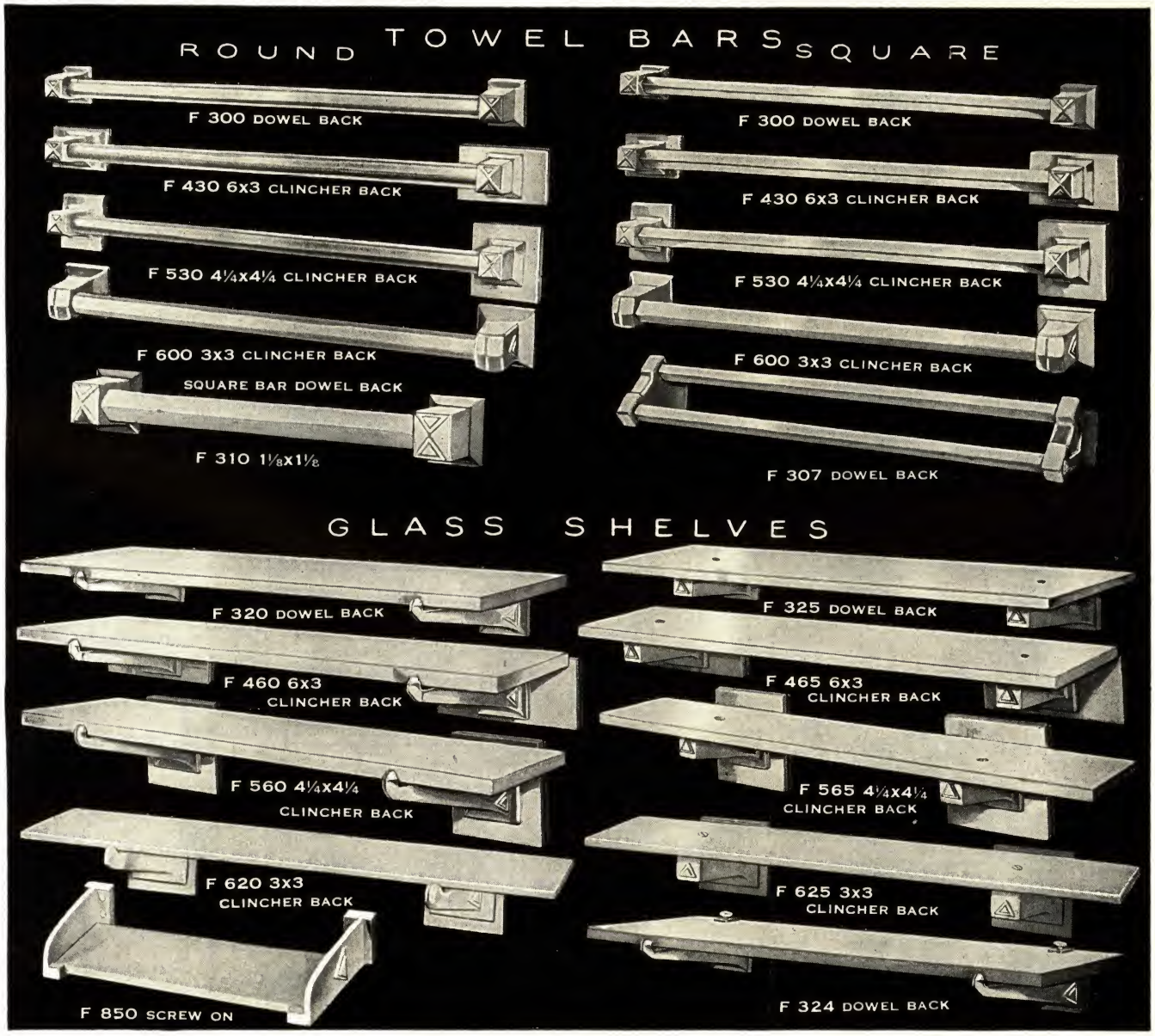
FAIRFACTS "F LINE"—REGULAR LINE, NEW DESIGNS

Fairfacts Toilet Paper Holders

F- 1—Has patented rewind roller, see section, keeps paper wound neatly. Is perhaps the best fixture of its type; shown in larger detail because of its unusual merit. Takes rolls of 1000 sheets pasteboard cores 1¼ in. diameter.
F- 30—Has plain roller.
F- 31—Same as F-30, except with rewind roller.
F- 2—Has plain roller, takes rolls of medium diameter.
F- 03—Takes rolls of large diameter, semi-recess, see page 9.
F- 25, F-26, F-27, F-28, F-025—All take patented folded paper. F-27 also has spring to keep tension on paper.
F- 60—Heavy cast metal, baked finish white, black or colors, takes largest sheet paper. Fixture shown in large detail because of its unusual merit.
F-025—Semi-recess, otherwise like F-25, see page 9.

Look for the *Double Triangle*





FAIRFACTS "F LINE"—REGULAR LINE, NEW DESIGNS

See page 10 for sizes of towel bars and shelves
See page 8 for other toilet paper holders

Look for the *Double Triangle*

Fairfacts Towel Bars with China Posts—See Page 9

Bars are of several kinds, i. e.—⅞ in. square set edge up, called "non-slip" because towels do not slip off.

Made in pyralin finish, white, black and colors and in glass white, black and crystal.

1-in. round bars are also furnished in pyralin and glass, otherwise as above mentioned.

Regular lengths center to center of posts are: 18, 24, 30, 36, 42 and 48 in., the last two having also a center post. Other lengths to order.

See illustrations page 9, all of substantially same design but with different wall attachments and having designating numbers. Specifications should include quantity, plate number and type, length and color, thus: 24—F-300 non-slip pyralin bars, 18 in. long white, or 12—F-600 round glass bars 30 in. long crystal.

No. F-300—Dowel back type.
No. F-430—Clincher back type, 6x3 back.
No. F-530—Clincher back type, 4¼x4¼ back.
No. F-600—Clincher back type, 3x3 back.
No. F-307—Dowel back type has two ⅝-in. square bars, pyralin finish only, and in the same regular lengths up to 36 in.

Fairfacts Glass Shelves with China Brackets—See Page 9

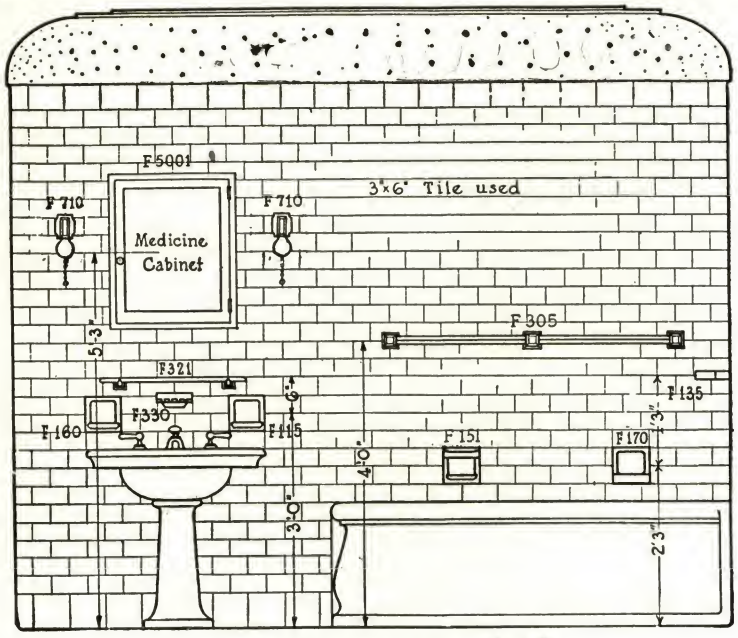
Glass can be furnished in white, black and crystal.

Shelves are 5 in. wide. Those with serial number ending in 0 rest on the brackets. Those with serial number ending in 5 are bolted to brackets.

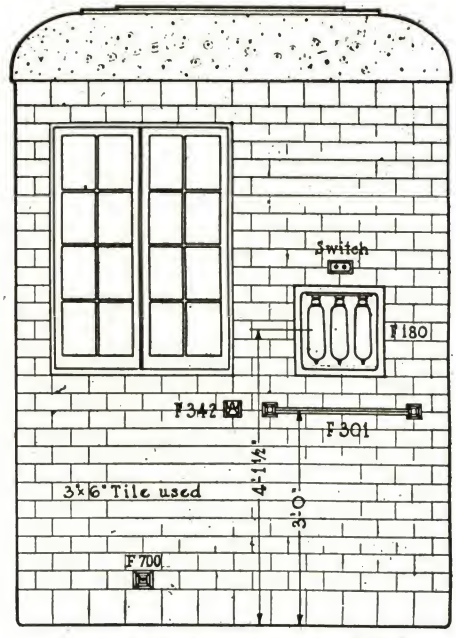
Length, in.	Dowel back type	Clincher back type		
	F-320	6x3	4¼x4¼	3x3
18, 24, 30, 36	F-324	F-460	F-560	F-620
20, 24, 30, 36	F-325	F-465	F-565	F-625

Note: F-324 is like F-320, except that shelf is held in place by metal clamps and set screws at back of shelf.

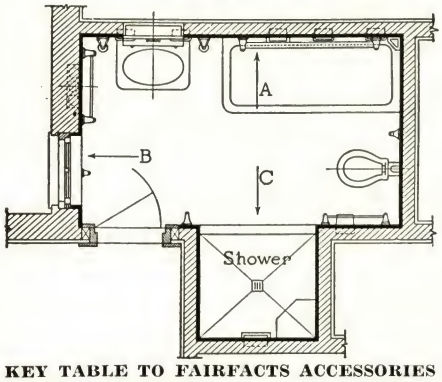
"Royal Line" Fixtures of Same Type Take Same Locations



ELEVATION "A"

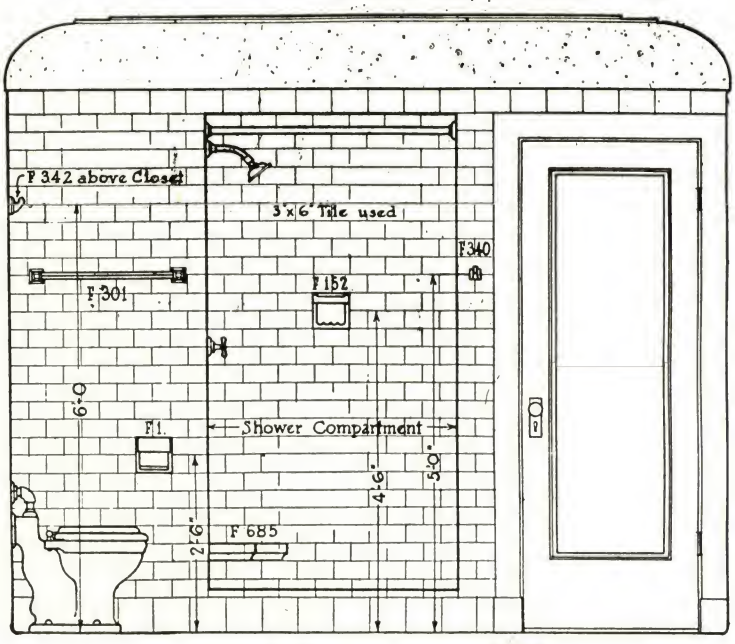


ELEVATION "B"



KEY TABLE TO FAIRFACTS ACCESSORIES

Cat. No.	Article
F-1	Biltin China Roll Paper Holder
F-115	Biltin China Soap Holder
F-135	China Soap, Sponge or Brush Holder
F-151	Biltin China Combination Soap Holder and Wall Grip
F-152	Biltin China Combination Soap Holder and Wall Grip
F-160	Biltin China Tumbler Holder
F-170	Biltin China Sponge Holder
F-180	Biltin China Electric Bathroom Radiator
F-301	Nonslip Towel Bar with China Posts (24 in. long)
F-305	Nonslip Towel Bar with China Posts (48 in. long)
F-321	White Glass Shelf with China Brackets (24 in. long)
F-330	China Tooth Brush Holder
F-340	China Hook for Robes, etc. (4½ in. long)
F-342	China Hook for Strop, Douche, etc. (2 in. long)
F-685	China Bathroom Seat
F-700	China Stop
F-710	China Light Fixture
F-5001	Medicine Cabinet

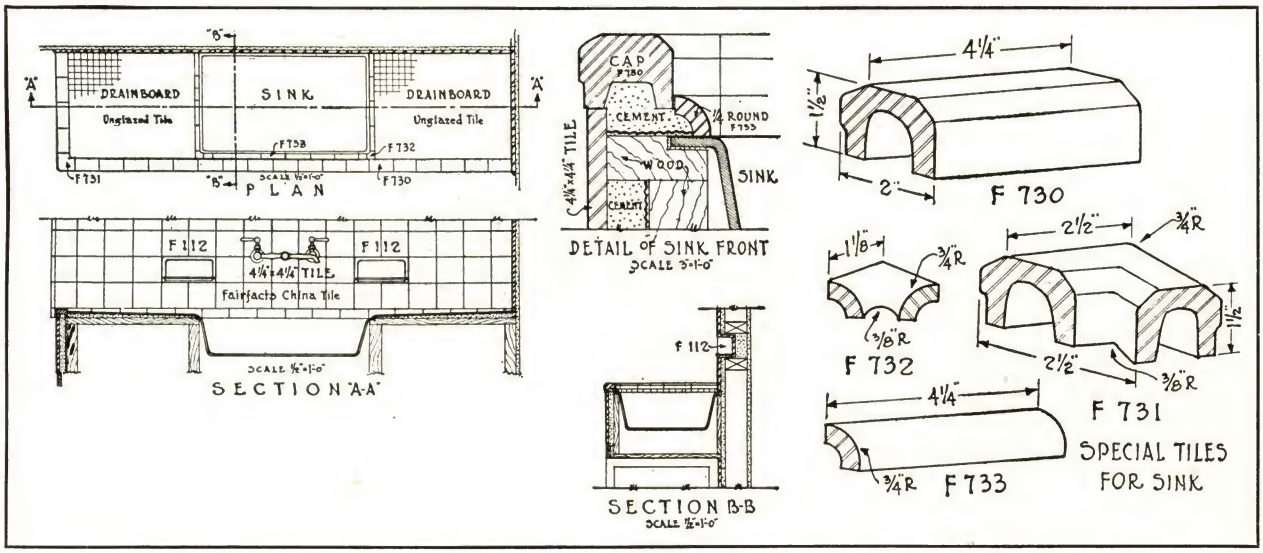


ELEVATION "C"

TYPICAL BATHROOM SHOWING FAIRFACTS ACCESSORIES

Look for the *Double Triangle*

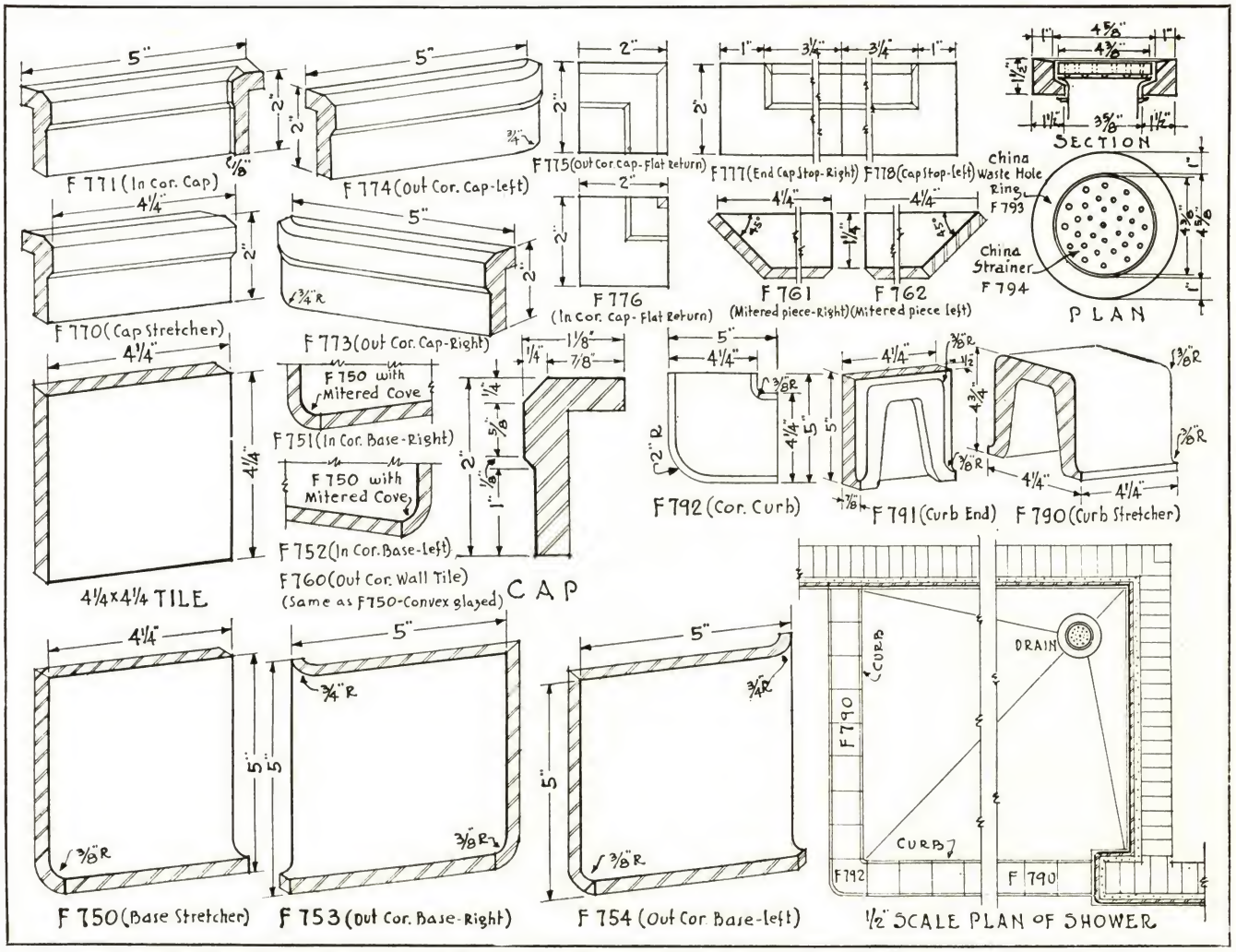
Fairfacts China Kitchen Sink and Shower Stall Trim



Genuine Vitreous China Tile and Trim for Sink and Drainboard and for Surrounding Walls

Wonderfully attractive and serviceable kitchen sink equipment is obtained by using Fairfacts Vitreous China Tile and Trim. The accompanying sketches show the various pieces that may be used in constructing an equipment of this kind, with identifying code numbers. The usual flat rim enameled iron sink of the required size forms the base of this modern idea. Very attractive color schemes may be obtained by referring to the inside front cover of this catalogue

Fairfacts Vitreous China Shower Stall Trim



Attractive Shower Inclosures and Receptors Made of Fairfacts Genuine Vitreous China Tile and Trim

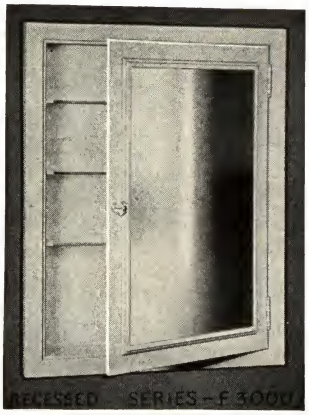
Sketches show the various pieces that may be used for the walls of the stall and of the receptor, the front sill and entrance; all with identifying code numbers.

Note the unglazed china countersunk waste hole ring for floor of receptor, used around the waste pipe to receive waste fitting. China strainer rests on top of the waste fitting. Waste hole ring makes an ideal contact between floor tile and waste fitting. An all-china shower stall is thus obtained.

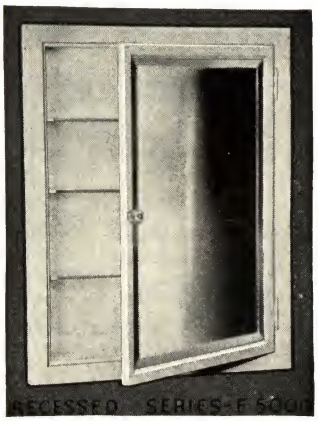
Attractive color schemes may be obtained by referring to the inside front cover of this catalogue

Regular Fairfacts Medicine Cabinets and Mirrors

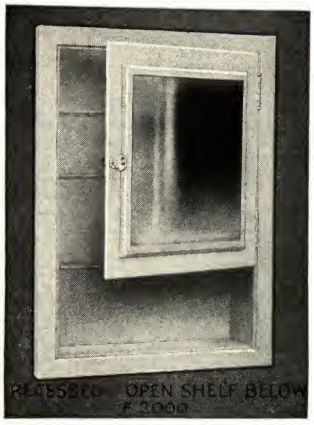
Code No.	Over all, in.	Wall opening, in.	Plain mirror, in.	Glass shelves
F-1000	16x20	13½x17½	10x14	2
F-1001	18x22	15½x19½	12x16	2



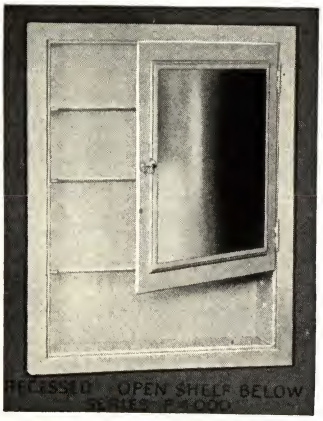
Code No.	Over all, in.	Wall opening, in.	Plain mirror, in.	Glass shelves, adj.
F-3000	18x22	15½x19½	12x16	2
F-3001	20x24	17½x21½	14x18	2
F-3002	20x26	17½x23½	14x20	3



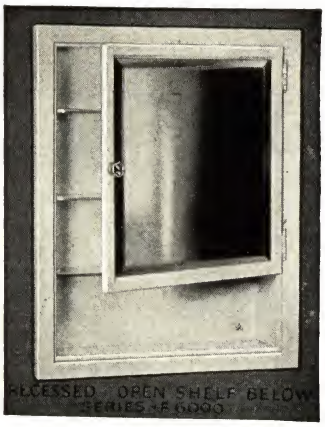
Code No.	Over all, in.	Wall opening, in.	Bev. mirror, in.	Glass shelves, adj.
F-5000	18x24	15¼x21¼	14x20	2
F-5001	20x26	17¼x23¼	16x22	3
F-5002	22x28	19¼x25¼	18x24	3
F-5003	24x30	21¼x27¼	20x26	3



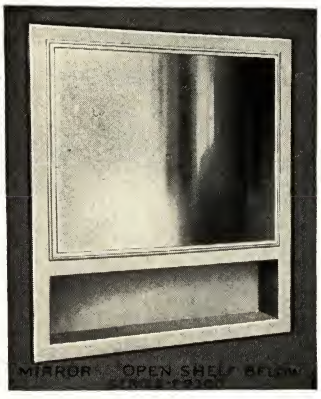
Code No.	Over all, in.	Wall opening, in.	Plain mirror, in.	Glass shelves
F-2000	18x24	15½x21½	12x12	2



Code No.	Over all, in.	Wall opening, in.	Plain mirror, in.	Glass shelves, adj.
F-4000	18x24	15½x21½	12x12	2
F-4001	18x28	15½x25½	12x16	3
F-4002	20x26	17½x23½	14x14	3



Code No.	Over all, in.	Wall opening, in.	Bev. mirror, in.	Glass shelves adj
F-6000	18x24	15¼x21¼	14x14	2
F-6001	20x26	17¼x23¼	16x16	3
F-6002	22x28	19¼x25¼	18x18	3
F-6003	24x30	21¼x27¼	20x20	3



Code No.	Over all, in.	Mirror, in.	Depth in wall, in.
F-9300	15⅜x26¾	12x16	3⅜
F-9301	19⅜x22¾	16x12	3⅜
F-9302	17⅜x28¾	14x18	3⅜
F-9303	21⅜x24¾	18x14	3⅜
F-9304	19⅜x20¾	16x20	3⅜
F-9305	23⅜x26¾	20x16	3⅜

Code No.	Over all, in.	Mirror, in.	Glass shelves, adj.
F-8000	17½x21½	12x16 Bev.	2
F-8001	19½x23½	14x18 Bev.	3

WHITE ENAMELED STEEL FRAMED BEVELLED MIRRORS

Code No.	Over all, in.	Mirror, in.	Hangers
F-9000	15¼x21¼	14x20 Bev.	Concealed
F-9001	17¼x23¼	16x22 Bev.	Concealed
F-9002	19¼x25¼	18x24 Bev.	Concealed
F-9003	21¼x27¼	20x26 Bev.	Concealed

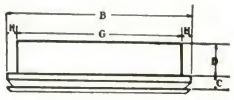
"Arcadian" Recess Medicine Cabinets

Frameless Mirror Doors—No Door Knobs—Metal Backs

"Arcadian"

Mirrors Are Waterproofed by Copper Process

"Arcadian"



F-5800-V Series Etched Mirror Doors Angle Top

F-5810-V Series Modern Etched Mirror Doors Angle Top

Cat. No.	Mirror size, in., etched	Sizes and dimensions as shown in diagrams, in.							Wall opening, in.	Glass shelves, adj.	Cat. No.
		A	B	C	D	E	G	H			
F-5800-V	14x22 etch	20	14	1¼	3	18⅛	12⅛	15/16	12¼x18¼x3¼	2	**F-5810-V**
F-5801-V	16x24 etch	22	16	1¼	3	20⅛	14⅛	15/16	14¼x20¼x3¼	2	**F-5811-V**
F-5802-V	18x26 etch	24	18	1¼	3	22⅛	16⅛	15/16	16¼x22¼x3¼	3	**F-5812-V**
F-5803-V	18x28 etch	26	18	1¼	3	24⅛	16⅛	15/16	16¼x24¼x3¼	3	**F-5813-V**
F-5804-V	20x30 etch	28	20	1¼	3	26⅛	18⅛	15/16	18¼x26¼x3¼	3	**F-5814-V**

Angle designs of mirror and cabinet follow the present-day flair.

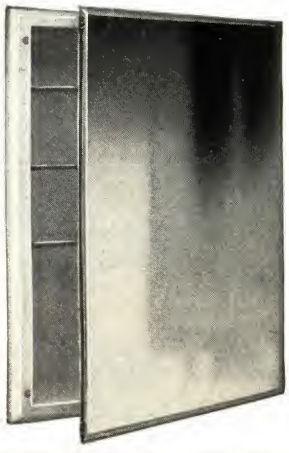
The *French Gray Bevel* adds a delicate suggestion of frame to the mirror and eliminates double imaging in the bevel.

Mirror Surface in this new design gives the greatest possible reflecting area in proportion to the cabinet box.

The *Angle Moulding Flange* on the cabinet box adds symmetrical beauty when the door is opened. The *Vertical* surface is ideal to butt the tile against and the *Retreating Angle* surface affords opportunity for a finger hold for opening door. Eliminates knobs. Preserves mirror effect.

The "Arcadian" Cabinet is a harmonious unit in design, construction and ornamentation.

"Arcadian" Recess Medicine Cabinets, Square Top



F-5880-V Series with Plain Mirror Doors

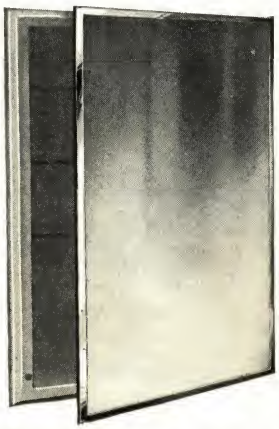
Code No.	Size box over all, in.	Wall opening, in.	Mirror bevel, in.
			Plain
F-5880-V	14x20x4¼	12¼x18¼x3¼	14x20
F-5881-V	16x22x4¼	14¼x20¼x3¼	16x22
F-5882-V	18x24x4¼	16¼x22¼x3¼	18x24
F-5883-V	18x26x4¼	16¼x24¼x3¼	18x26
F-5884-V	20x28x4¼	18¼x26¼x3¼	20x28

F-5850-V Series Etched Mirror Doors, Chromium Frame

F-5850-V
F-5851-V
F-5852-V
F-5853-V
F-5854-V

Note: F-5850-V has etched mirror door, otherwise is like F-5890-V. See F-5890-V series for sizes, etc.

Mirror doors with chromium frame have no bevel.



F-5890-V Series with Plain Mirror Doors, Chromium Frame

Code No.	Size box over all, in.	Wall opening, in.	Mirror bevel, in.
			Plain
F-5890-V	14x20x4¼	12¼x18¼x3¼	14x20
F-5891-V	16x22x4¼	14¼x20¼x3¼	16x22
F-5892-V	18x24x4¼	16¼x22¼x3¼	18x24
F-5893-V	18x26x4¼	16¼x24¼x3¼	18x26
F-5894-V	20x28x4¼	18¼x26¼x3¼	20x28

Look for the *Double Triangle*

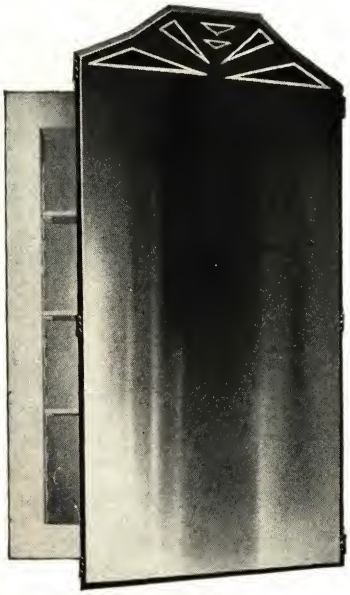
"Venetia" Recess Medicine Cabinets

Frameless Mirror Doors—No Door Knobs—Metal Backs

Mirrors Are Waterproofed by Copper Process

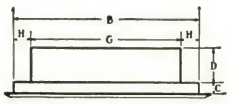
"Venetia" Cabinets with Etched Beveled Mirror Doors

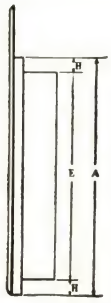
"Venetia"
Modern Design



F-5610-V Series

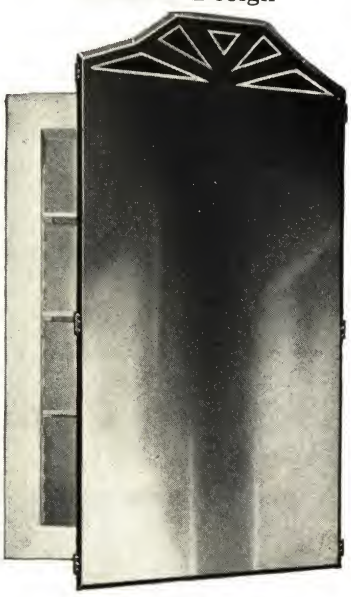
F-5610-V
F-5611-V
F-5612-V
F-5613-V
F-5614-V





Note: F-5610-V and F-5630-V are same size as F-5600-V. See F-5600-V Series for sizes, etc.

"Venetia"
Modern Design



F-5630-V Series

F-5630-V
F-5631-V
F-5632-V
F-5633-V
F-5634-V

"Venetia"

F-5600-V Series

The "Venetia" cabinets have beveled plate glass mirrors with and without designs *cut in the back of the mirror,* heavily silvered and copper waterproofed. A full size metal plate protects the back of the mirror and a sheet of insulating material is placed between the metal back and the mirror. The mirror door is protected from injury with a chain stop.

"Mirrors Mounted Like a Diamond." No exposed frame.

"Venetia"
Cabinets with Adjustable Side Wing Mirrors

F-5700-V Series "Venetia" Wing Cabinets with Curved Top, Etched Beveled Mirror Doors and Wings

Catalog No.	Mirror size, in., plain or etched	Sizes and dimensions as shown in diagrams, in.							Wall opening, in.	Glass shelves, adj.
		A	B	C	D	E	G	H		
F-5600-V	14x20 etch	17	13½	1	3¼	14⅛	10⅝	17/16	10¾x14¼x3⅜	2
F-5601-V	16x24 etch	21	15½	1	3¼	18⅛	12⅝	17/16	12¾x18¼x3⅜	2
F-5602-V	18x26 etch	23	17½	1	3¼	20⅛	14⅝	17/16	14¾x20¼x3⅜	2
F-5603-V	18x32 etch	29	17½	1	3¼	26⅛	14⅝	17/16	14¾x26¼x3⅜	3
F-5604-V	20x34 etch	31	19½	1	3¼	28⅛	16⅝	17/16	16¾x28¼x3⅜	3
F-5620-V	14x20 plain	17	13½	1	3¼	14⅛	10⅝	17/16	10¾x14¼x3⅜	2
F-5621-V	16x24 plain	21	15½	1	3¼	18⅛	12⅝	17/16	12¾x18¼x3⅜	2
F-5622-V	18x26 plain	23	17½	1	3¼	20⅛	14⅝	17/16	14¾x20¼x3⅜	2
F-5623-V	18x32 plain	29	17½	1	3¼	26⅛	14⅝	17/16	14¾x26¼x3⅜	3
F-5624-V	20x34 plain	31	19½	1	3¼	28⅛	16⅝	17/16	16¾x28¼x3⅜	3

Code No.	Width over all, in.	Wall opening, in.	Door mirror, in.	Wing mirrors, in.	Glass shelves, adj.
			Etched		
F-5700-V	27¼	10⅝x14⅛x3¼	14x20	6x17	2
F-5701-V	29¼	12⅝x18⅛x3¼	16x24	6x21	2
F-5702-V	31¼	14⅝x20⅛x3¼	18x26	6x23	2
F-5703-V	31¼	14⅝x26⅛x3¼	18x32	6x29	3
F-5704-V	33¼	16⅝x28⅛x3¼	20x34	6x31	3

Look for the *Double Triangle*

Mirrors with Wall Hangers—Metal Backs

Waterproofed by Copper Process

"Arcadian"
Angle Top—Modern Etching

F-9810-VB Series

Code No.	Size, in.
F-9810-VB	14x22
F-9811-VB	16x24
F-9812-VB	18x26
F-9813-VB	18x28

"Arcadian"
Square Top
Plain Interior Chromium Frame

F-9870-VC Series

Code No.	Size, in.
F-9870-VC	14x20
F-9871-VC	16x22
F-9872-VC	18x24
F-9873-VC	18x26

"Arcadian"
Square Top
Modern Etching Chromium Frame

F-9890-VC Series

Code No.	Size, in.
F-9890-VC	14x20
F-9891-VC	16x22
F-9892-VC	18x24
F-9893-VC	18x26

"Venetia"
Modern Etching

F-9610-VB Series

Code No.	Size, in.
F-9610-VB	14x20
F-9611-VB	16x24
F-9612-VB	18x26
F-9613-VB	18x32

"Venetia"
Regular Etching

F-9600-VB Series

Code No.	Size, in.
F-9600-VB	14x20
F-9601-VB	16x24
F-9602-VB	18x26
F-9603-VB	18x32

"Venetia"
Modern Etching

F-9630-VB Series

Code No.	Size, in.
F-9630-VB	14x20
F-9631-VB	16x24
F-9632-VB	18x26
F-9633-VB	18x32

Fairfacts Plate Glass Mirrors shown on this page are waterproofed by the copper process, one of the latest and best methods.

A sheet of insulating material is interposed between the waterproofing and the heavy metal back plate. This plate has the concealed hangers.

Some of the mirrors are mounted like a diamond with no exposed frame.

All these mirrors can be furnished without etching. Where etchings are in black, any color can be matched from your sample, all being applied beneath the glass.

Note: See Page 12 for F-9000 Series Mirror.

Look for the *Double Triangle*

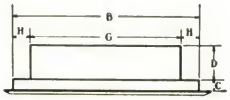
"Parisienne" Recess Medicine Cabinets

Frameless Mirror Doors—No Door Knobs—Waterproofed—Metal Backs

Mirror Doors Are Waterproofed by Copper Process

The *"Parisienne"* is a cabinet with French mirrors of a superlative design exquisitely etched. The mirror is made with an enameled border 1 in. wide in either soft or brilliant color tones or in lustrous black. Black borders only are carried in stock. Colored borders will be made on special orders.

Beautiful results are obtained by putting the black or color on the back of the glass. *A frame effect, 1 in. wide, without a frame.*



Cat. No.	Mirror, curved top, in.	Sizes and dimensions as shown in diagrams, in.							Wall opening, in.
		A	B	C	D	E	G	H	
F-5692-V	18x28 curv.	23	17½	1	3¼	20⅛	14⅝	1⁷⁄₁₆	14¾x20¼x3⅜
F-5693-V	18x34 curv.	29	17½	1	3¼	26⅛	14⅝	1⁷⁄₁₆	14¾x26¼x3⅜
F-5694-V	20x36 curv.	31	19½	1	3¼	28⅛	16⅝	1⁷⁄₁₆	16¾x28¼x3⅜

See next page for illustration.

"Parisienne" Cabinets with Adjustable Side Wings

The *"Parisienne"* is a cabinet with French mirrors of a superlative design exquisitely etched. The adjustable side wings are 8 in. in width. Both the mirror and wings are made with an enameled border 1 in. wide in either soft or brilliant color tones or in lustrous black.

Code No.	Box over all, in.	Wall opening, in.	Center mirror, in.	Wings, in.	Glass shelves, adj.
F-5792-V	21x23x4¼	14⅝x20⅛x3¼	Etched, 18x28	8x23	2
F-5793-V	21x29x4¼	14⅝x26⅛x3¼	18x34	8x29	3
F-5794-V	23x31x4¼	16⅝x28⅛x3¼	20x36	8x31	3

See next page for illustration.

"Parisienne" Mirrors

"Parisienne" Mirrors only (without medicine cabinet box) are designated and described in the table below.

"PARISIENNE" MIRRORS (Like F-5692-V)

Code No.	Mirror size, in.
F-9692-VB	Etched 18x28
F-9693-VB	18x34
F-9694-VB	20x36

"Parisienne" Mirror only, with side wings (without medicine cabinet box) are designated and described in the table below.

"PARISIENNE" MIRRORS WITH ADJUSTABLE SIDE WINGS

Code No.	Center mirror, in.	Wings, in.
F-9792-VB	Etched 18x28	8x23
F-9793-VB	18x34	8x29
F-9794-VB	20x36	8x31

Look for the *Double Triangle*

"PARISIENNE"

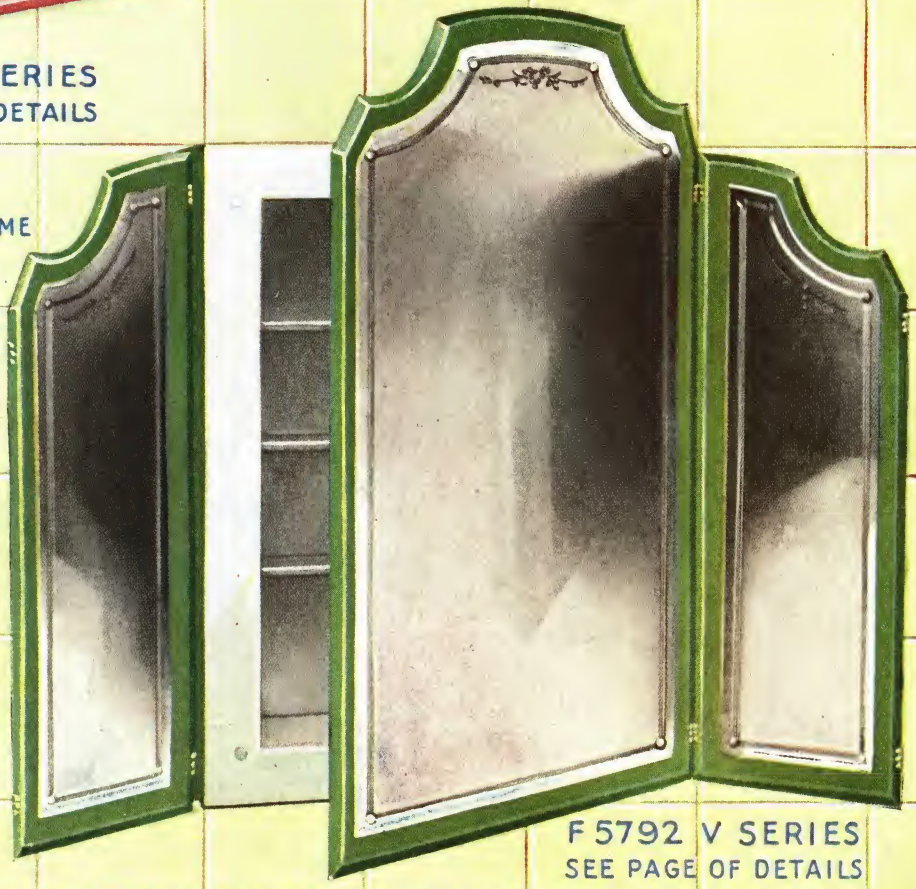
F 5692 V SERIES
SEE PAGE OF DETAILS

COLOR IS APPLIED
BENEATH THE GLASS
THERE IS NO METAL FRAME

"ARCADIAN"

F 5890 V SERIES
CHROMIUM FRAME
SEE PAGE OF DETAILS

"PARISIENNE"



FAIRFACTS SYMBOL
OF QUALITY

F 5792 V SERIES
SEE PAGE OF DETAILS

COLOR IS APPLIED BENEATH THE GLASS, THERE IS NO METAL FRAME

BATHROOM ACCESSORIES

MEDICINE CABINETS · · · MIRRORS

F 152

OUR
NEW 1932 DESIGNS
REPLACE THOSE OF
1930 1931

SUPERLATIVE
FINISH

WHITE
BLACK
COLORS

SPECIAL FINISHES

F 400

F 300

FAIRFACTS SYMBOL OF QUALITY

The Fairfacts Company
INCORPORATED
234-236 WEST FOURTEENTH ST.
NEW YORK, U.S.A.

CABLE ADDRESS
FAIRFACTS
CODE: ABC 6TH EDITION
AND BENTLEY'S

CATALOGUE 32

THE CHARLES PARKER COMPANY

ESTABLISHED 1832

MERIDEN, CONN

NEW YORK SALESROOM: 101 Park Avenue

Parker Products and the Company Behind Them

One of the greatest recommendations a product can have is the reputation and responsibility of the company back of it. THE CHARLES PARKER COMPANY, also manufacturers of the famous Parker Gun, completes a century of business in the year 1932.

The Parker bathroom line is complete and includes mirrors, medicine cabinets, etc., to fulfill any requirement of the architect. He can be assured in specifying Parker products that (1) all fixtures required will be available, (2) that they will be of the highest grade, (3) that the finish of every article will be perfect and lasting, and (4) that the date of delivery will be met regardless of the size of the order.

Designs and Finishes—Both design and finish, as well as perfect construction, play an important part in the appearance and lasting qualities of both fixtures and accessories. Only the most modern methods are employed in producing the lasting Parker finishes. These are supplied regularly in four finishes: chromium plate, nickel plate, solid nickel silver and white enamel.

Apartment House, 740 Park Avenue, New York, N. Y.

Typical of many such buildings equipped with Parker Bathroom Accessories

Parker Bathroom Accessories

Each article has been carefully designed to have perfect proportion and grace of line yet with the proper strength where needed. Only the best of materials and workmanship are utilized in their production and the greatest care is given to the proper finishing of each article.

All castings are produced in our own foundry according to special formulas. In this way, we are able to control the finished product in a manner which would otherwise be impossible.

This control extends not only to the article itself but to the final completion date as well. It enables us to meet delivery dates with a certainty which is frequently of great importance on large contracts where the completion of a large building may be involved.

PARKER CONCEALED SCREW DEVICE

This device, developed by THE CHARLES PARKER COMPANY for mounting their bathroom accessories, adds the final touch to the appearance of fine fixtures.

It consists of a brass disc in the center of which is riveted a post ⅜ in. in diameter and ⅞ in. long with a hole drilled and tapped ½ in. from the disc. The mounting fixtures are of two sizes; one with 1⅜-in. disc for the usual fixtures and one with a larger disc for extra large or heavy fixtures. Beside the post is a small stud which fits into a recess in the fixture and insures that the screw hole in the fixture lines up accurately with tapped hole in the mounting device.

Advantage of the Concealed Screw Device

(1) It eliminates unsightly screw heads which frequently spoil the appearance of otherwise beautiful fixtures.

(2) When used in public buildings it prevents removal or theft of the fixture which cannot be removed without the special key, which is supplied when specified.

(3) The mounting device may be installed before the final finish is put on the walls and the fixtures installed later. In this way there is no danger of marring the wall finish during installation or of injuring finish of fixture while final decorating is being done.

(4) The mounting devices may be shipped to the job in advance of the fixtures which, therefore, do not have to be stored, eliminating danger of theft.

(5) White enamel fixtures can be installed without danger of chipping the enamel.

(6) There are no screw heads in which dust and dirt can collect or on which towels, etc., can catch.

(7) The detaining screw goes entirely through the mounting post. This feature insures the stability of the fixtures, for whether the screw is absolutely tight or a trifle loose, the fixture will not turn or loosen from the wall until the screw is entirely removed.

Method of Installation

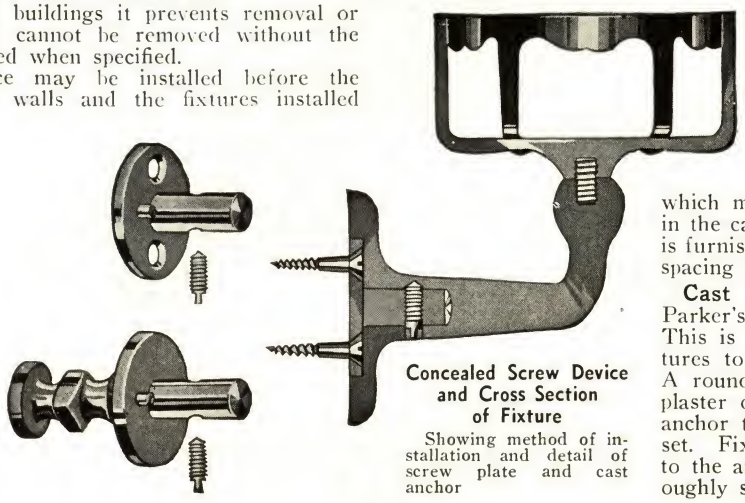
The mounting device is first fastened to the wall with ordinary flat head screws. If the device and fixture are shipped together they must first be separated.

The fixture is then placed against the flange and turned into the recess in the fixture. The special screw is next placed in the hole in the fixture and tightened until it is fast.

A special key for tightening the screw is furnished with each order.

When there are a number of similar articles to be installed, especially items with two brackets which must be spaced accurately as in the case of towel bars, a template is furnished which insures the correct spacing and facilitates installation.

Cast Anchor—An illustration of Parker's cast anchor plate is shown. This is used in connection with fixtures to be applied to tile surfaces. A round hole is drilled in the tile, plaster of paris slushed in and the anchor then inserted and allowed to set. Fixtures should not be applied to the anchor until plaster has thoroughly set.



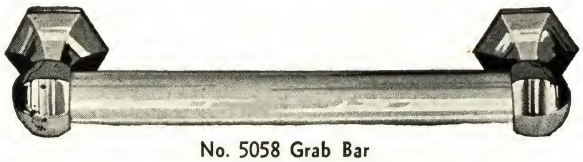
Concealed Screw Device and Cross Section of Fixture

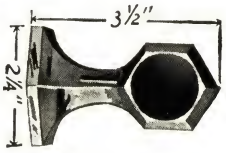
Showing method of installation and detail of screw plate and cast anchor

HEXAGON PATTERN

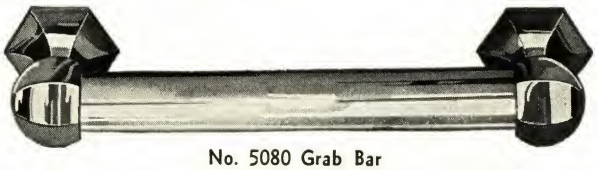
GRAB BARS, TOWEL BARS AND SHELVES

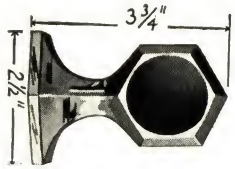
Metal parts are finished in chromium plate, nickel plate, nickel silver or white enamel
Bars are furnished in crystal, opal or black glass or enameled wood
Shelves are furnished in crystal, opal or black glass



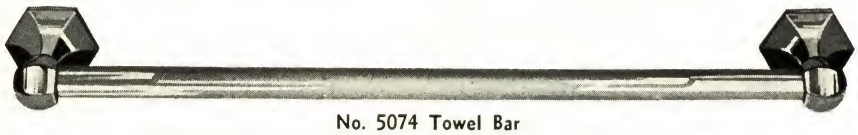


No. 5058 Grab Bar
Lengths center to center: 12, 15, 18, 24, 30 ins. Bar 1¼-in. diam.

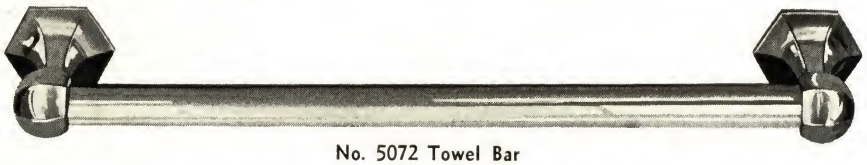


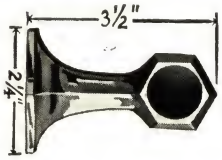


No. 5080 Grab Bar
Lengths center to center: 12, 15, 18, 24, 30 ins. Bar 1½-in. diam.

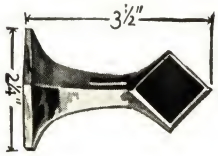


No. 5074 Towel Bar
Lengths center to center: 18, 24, 30, 36 ins. Bar, ¾-in. diam.

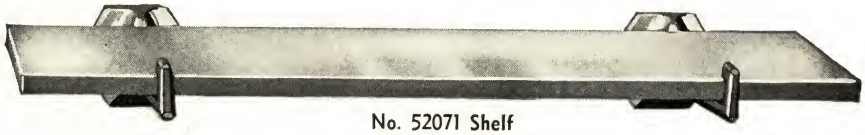


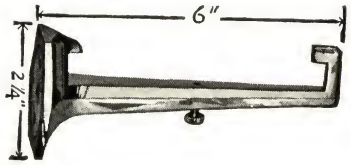


No. 5072 Towel Bar
Lengths center to center: 18, 24, 30, 36 ins. Bar 1-in. diam.

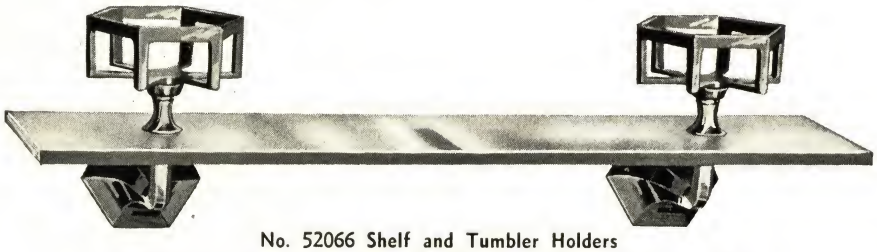


No. 5093 Towel Bar
Lengths center to center: 18, 24, 30, 36 ins. Bar ⅞-in. square





No. 52071 Shelf
Lengths over all: 18, 24, 30 ins. Widths 5 and 6 ins. Thickness $\frac{5}{16}$ and ½ in.



No. 52066 Shelf and Tumbler Holders
Lengths over all: 18, 24, 30 ins. Width 5 ins. Thickness $\frac{5}{16}$ and ½ in.

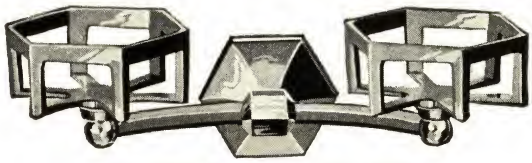
A Century PARKER of Business

HEXAGON PATTERN

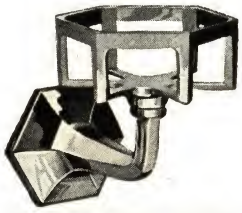
TUMBLER AND TOOTH BRUSH HOLDERS

Finished in chromium plate, nickel plate, nickel silver or white enamel

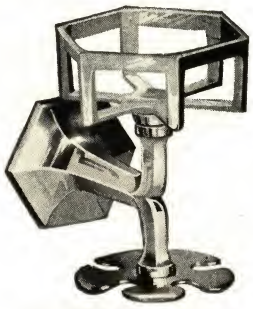
No. 5966 Tumbler and Toothbrush Holder



No. 5988 Double Tumbler Holder
Spread 9¼ ins.



No. 5476 Single Tumbler Holder

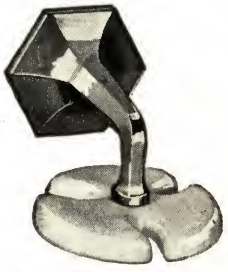


No. 5972 Tumbler and Toothbrush Holder

MISCELLANEOUS PIECES

Finished in chromium plate, nickel plate, nickel silver or white enamel

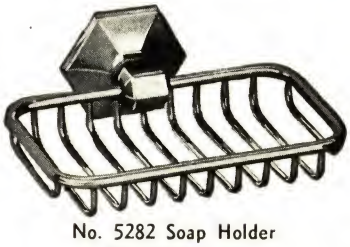
No. 5059 Single Hook
Height 2 ins.



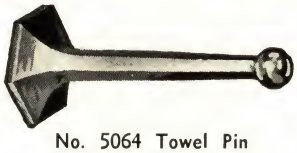
No. 5950 Toothbrush Holder

No. 5976 Toothbrush Holder

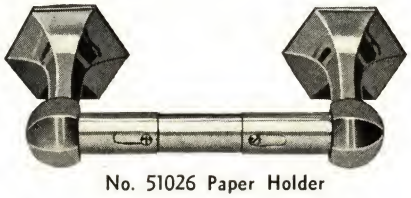
No. 5046 Double Hook
Height 1½ ins.



No. 5282 Soap Holder
Size 6x3½x1 in.

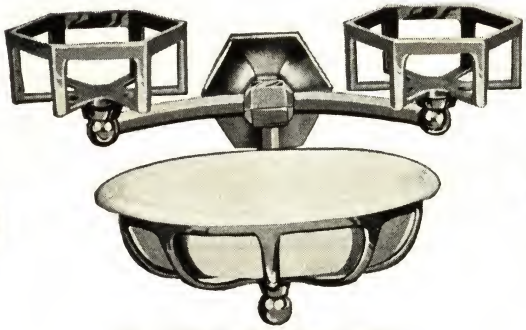


No. 5064 Towel Pin
Projection 6½ ins.
Cast in one piece

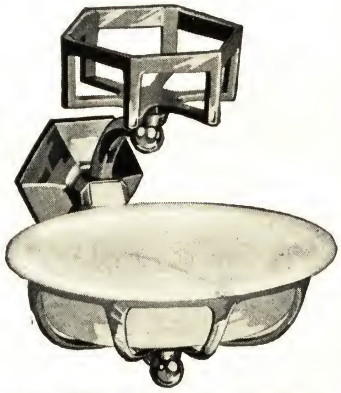


No. 51026 Paper Holder

No. 5576 Soap Holder
Takes No. 209 liner
Projection 5½ ins.



No. 5986 Combination Double Tumbler and Soap Holder
Takes No. 201 liner. Spread 9¼ ins.

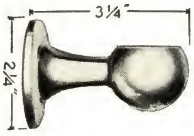


No. 5475 Combination Tumbler and Soap Holder
Takes No. 201 liner

A Century PARKER of Business

GRAB BARS AND TOWEL BARS

Metal parts finished in chromium plate, nickel plate, nickel silver or white enamel
Bars are furnished in crystal, opal or black glass or enameled wood



At Left:

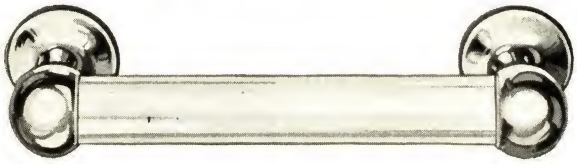
No. 58 Grab Bar

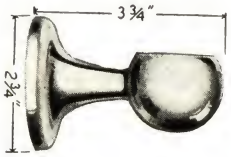
Lengths, center to center: 12, 15, 18, 24, 30 ins. Bar 1¼-in. diam.

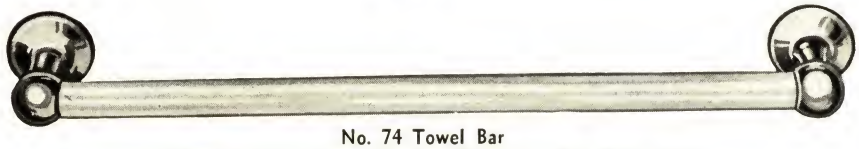
At Right:

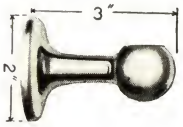
No. 80 Grab Bar

Lengths, center to center: 12, 15, 18, 24, 30 ins. Bar 1½-in. diam.



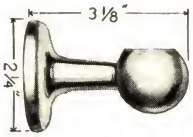






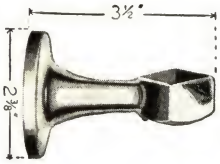
No. 74 Towel Bar

Lengths, center to center: 18, 24, 30, 36 ins. Bar ¾-in. diam.
No. 75 Towel Bar same as No. 74, except bar is all metal



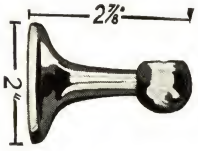
No. 72 Towel Bar

Lengths, center to center: 18, 24, 30, 36 ins. Bar 1-in. diam.
No. 77 Towel Bar same as No. 72, except bar is all metal



No. 93 Towel Bar

Lengths, center to center: 18, 24, 30, 36 ins. Bar ⅞-in. square



No. 55 All-metal Towel Bar

Lengths, center to center: 18, 24, 30, 36 ins. Bar ½ or ⅝-in. diam.

At Left:

No. 94 All-metal Towel Bar

Lengths, center to center: 18, 24, 30, 36 ins. Bar ⅜x¾ in.

At Right:

No. 010—Towel Bar

Lengths, center to center: 18, 24, 30, 36 ins. Diam., ⅝ or ½ in. Heavy stamped flanges

At Left:

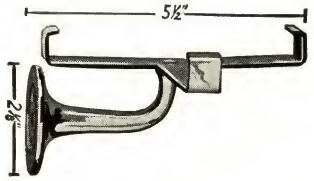
No. 10 Towel Bar

Lengths, center to center: 18, 24, 30, 36 ins. Diam., ½ or ⅝ in. Heavy cast flanges

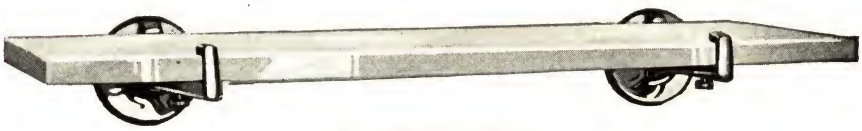
A Century PARKER of Business

GLASS SHELVES

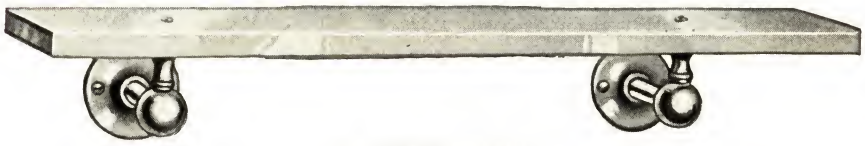
Metal parts finished in chromium plate, nickel plate, nickel silver or white enamel
Shelves are furnished in crystal, opal or black glass

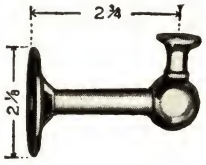


No. 2072 Glass Shelf
Lengths over all: 18, 24, 30 ins. Widths 5 and 6 ins. Thickness $\frac{5}{16}$ and ½ in.



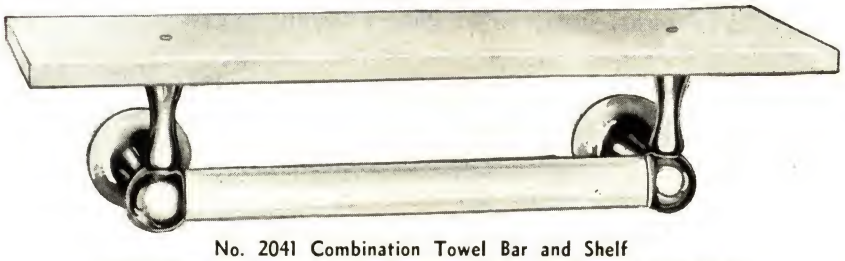
No. 2071 Glass Shelf
Lengths over all: 18, 24, 30 ins. Widths 5 and 6 ins. Thickness $\frac{5}{16}$ and ½ in.

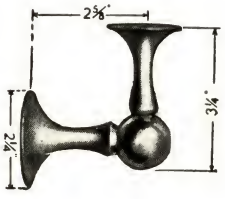




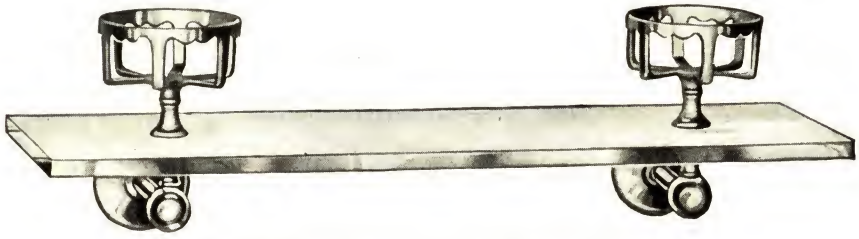
No. 2037 Glass Shelf
Lengths over all: 18, 24, 30 ins. Widths 5 and 6 ins. Thickness $\frac{5}{16}$ and ½ in.

No. 2051 Glass Shelf
Lengths over all: 18, 24, 30 ins. Widths 5 and 6 ins. Thickness $\frac{5}{16}$ and ½ in.





No. 2041 Combination Towel Bar and Shelf
Lengths over all: 24 and 30 ins. Width 5 ins. Thickness $\frac{5}{16}$ and ½ in.
Crystal or opal bar, 1-in. diam.



No. 2066 Combination Shelf and Tumbler Holder
Lengths over all: 18, 24, 30 ins. Widths 5 and 6 ins. Thickness $\frac{5}{16}$ and ½ in.

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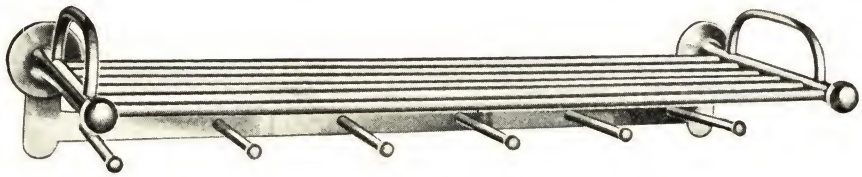
TOWEL SHELVES

Finished in chromium plate, nickel plate, nickel silver or white enamel



At Left:

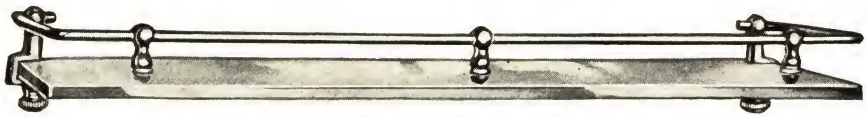
No. 606 Towel Shelf
Length 25 ins. Width 8⅜ ins.

At Right:

No. 505 Towel Shelf
Length 25 ins. Width 8⅜ ins.

GUARD RAILS FOR GLASS SHELVES

Finished in chromium plate, nickel plate, nickel silver or white enamel



At Left:

No. 2034 Guard Rail
Lengths: 18, 24, 30 ins. For $\frac{5}{16}$ and ½ in. glass
Rubber tipped posts, 1 in. high. Cast clamps with adjustable screws to fasten to shelf. Can be raised to facilitate cleaning glass

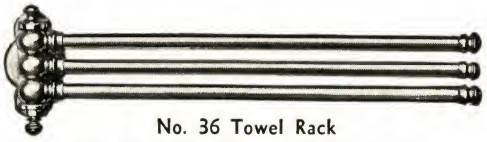
At Right:

No. 2010 Guard Rail
Lengths: 18, 24, 30 ins.
Rubber tipped posts, 1 in. high. Rail can be raised to facilitate cleaning glass

TOWEL RACKS AND CORKSCREWS

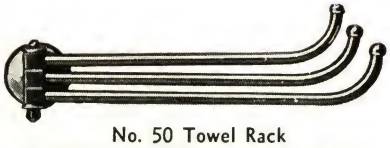
Finished in chromium plate, nickel plate, nickel silver or white enamel

No. 38 Towel Rack
Length 15 ins. Diam. each bar ⅜ in.



No. 36 Towel Rack
Length 16 ins. Diam each bar ½ in.

No. 101 Corkscrew and Decapper
Furnished only in chromium and nickel plate



No. 50 Towel Rack
Length 11 ins. Diam. each bar ⅜ in.

No. 102 Corkscrew and Decapper

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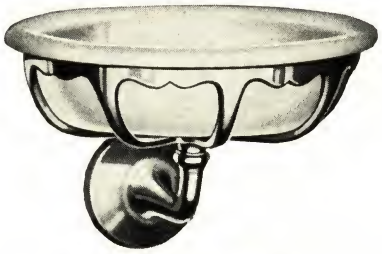
SOAP HOLDERS, TUMBLER HOLDERS AND COMBINATIONS

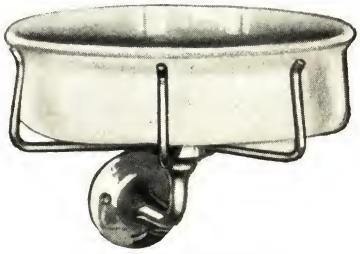
Finished in chromium plate, nickel silver, nickel plate or white enamel

No. 562 Soap Holder
Size: 5x4½ ins.

No. 578 Liquid Soap Holder
Height 7 ins. Projects from wall 6¼ ins.

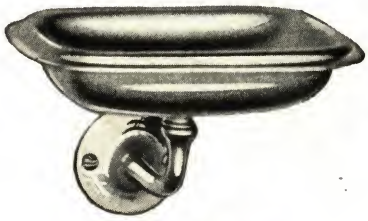


No. 259 Soap Holder
Size: 5x4½ ins.

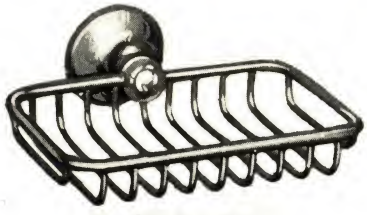


No. 540 Soap Holder
Size: 5¼x3½x1¼ ins.

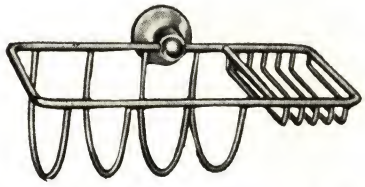
No. 576 Soap Holder
Projection 5½ ins.



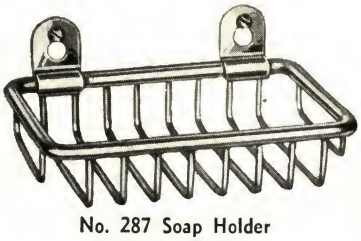
No. 271 Soap Holder
Size: 4¾x3¾ ins.
Removable drainer



No. 282 Soap Holder
Size: 6x3½x1 in.

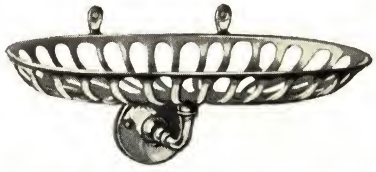


No. 921 Combination Sponge and Soap Holder
Extreme length 10¼ ins.



No. 287 Soap Holder
Size 4½x3¾x1 in.

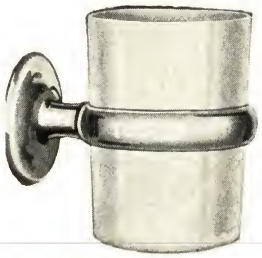
No. 966 Combination Tumbler and Tooth Brush Holder



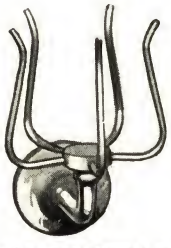
No. 1240 Soap Holder or Comb and Brush Tray
Size: 10½x4¾x1¼ ins.

No. 972 Combination Tumbler and Tooth Brush Holder

No. 476 Tumbler Holder



No. 855 Tumbler Holder



No. 803 Tumbler Holder

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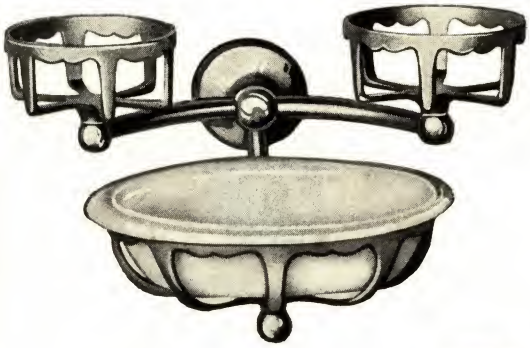
COMBINATIONS AND TOOTH BRUSH HOLDERS

Finished in chromium plate, nickel silver, nickel plate or white enamel



At Left:

No. 986 Combination Double Tumbler and Soap Holder
Spread 9¼ ins.

At Right:

No. 475 Combination Tumbler and Soap Holder

No. 976 Tooth Brush Holder

No. 950 Tooth Brush Holder

No. 988 Double Tumbler Holder
Spread 9¼ ins.

HOOKS

Finished in chromium plate, nickel silver, nickel plate or white enamel

No. 64 Towel Pin
Projects from wall 6½ ins.
Cast in one piece

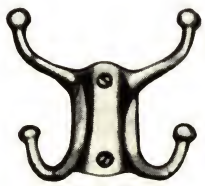
No. 57 Towel Pin and Hook
Projects from wall 6½ ins.
Cast in one piece

No. 24 Towel Pin
Projects from wall 6½ ins.

No. 4 Hook
Height 1¼ ins.

No. 70 Hook
Height 3¾ ins.

No. 46 Hook
Height 1½ ins.



No. 47 Hook
Height 3⅛ ins.

No. 30 Hook
Height ⅝ in.

No. 52 Razor Strop Hook

No. 59 Hook
Height 2 ins.

No. 66 Hook
Height 3½ ins.

No. 65 Hook
Height 2⅞ ins.

No. 67 Hook
Height 5¾ ins.

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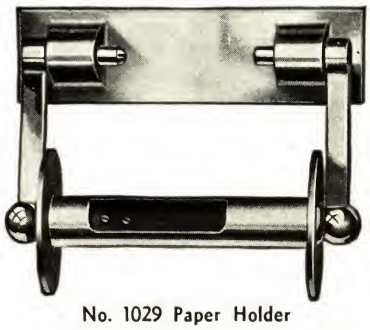
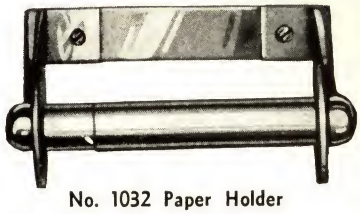
PAPER HOLDERS AND TOWEL BASKETS

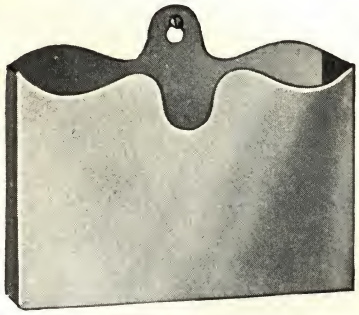
Finished in chromium plate, nickel plate, nickel silver or white enamel



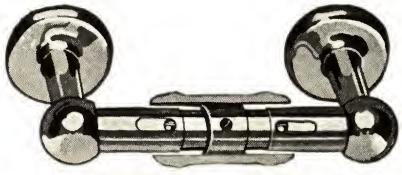
No. 1029 Paper Holder



No. 1032 Paper Holder

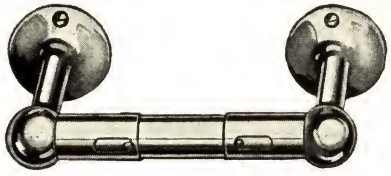


No. 1020 Paper Holder

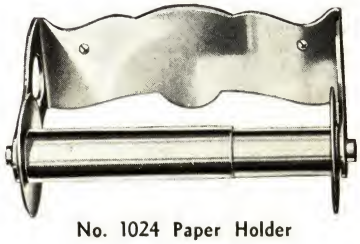


No. 1038 Paper Holder

No. 1023 Paper Holder

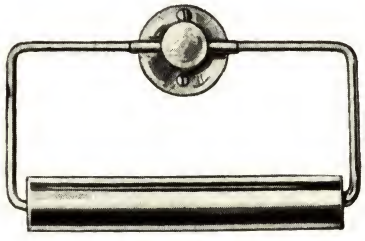


No. 1026 Paper Holder



No. 1024 Paper Holder

No. 502½ Towel Basket
Height 15 ins. Width 12 ins.
Depth 5 ins.



No. 1019 Paper Holder

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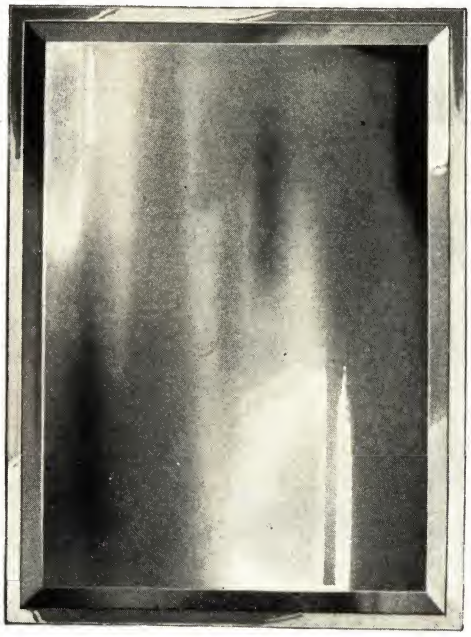
PLATE GLASS MIRRORS

Frames finished in chromium plate, nickel plate, nickel silver, or white enamel except as noted

No. 4006 Mirror

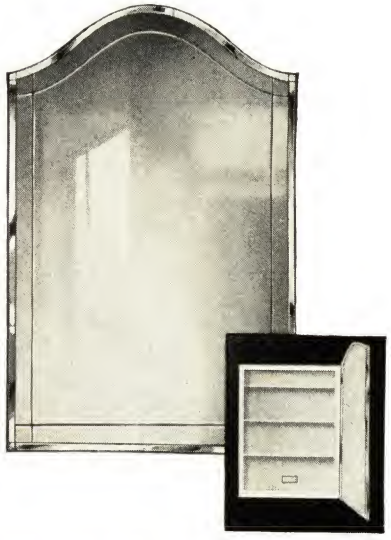
Frame is steel with corners welded. Furnished in white enamel only
Sizes: 12x18, 16x20, 18x24, and 18x30 ins.



No. 3020 Mirror

Frame is brass with corners mitered and brazed
Sizes: 12x18, 16x20, 18x24 and 18x30 ins.
Special sizes if desired

Cabinet Models 1100-V, 1150-V and 1175-V
Mirror Models 110-V, 115-V and 117-V



Cabinet Models 1000-V, 1050-V and 1075-V
Mirror Models 100-V, 105-V and 107-V

DIMENSIONS, INCHES

Model	1100-V	1150-V	1175-V	110-V	115-V	117-V	1000-V	1050-V	1075-V	100-V	105-V	107-V
Mirror	16 x22	18 x24	20 x28	16x22	18x24	20x28	16 x26	18 x28	20 x32	16x26	18x28	20x32
Wall opening	13¾ x19¾	15¾ x21¾	17¾ x25¾	.....	.....	.....	13¾ x19¾	15¾ x21¾	17¾ x25¾	.....	.....	.....

A Century PARKER of Business

MEDICINE CABINETS.

The Parker line of bathroom cabinets is complete and contains a model for every purpose. Only a few of the more popular styles are shown here but we shall be pleased to forward a complete catalogue upon receipt of your request. We are prepared also to quote prices on special cabinets in quantities.

The Countess—Model 780-VABS
The Dutchess—Model 770-VABS
The Princess —Model 760-VABS

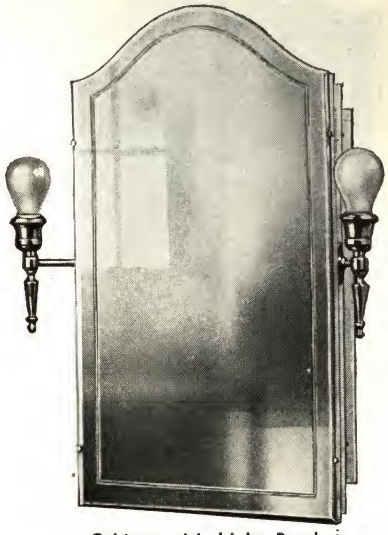
Venetian Type Cabinets

The Parker Venetian Models are furnished in a variety of styles and mirror designs. The cabinet shown above is fitted with adjustable side mirrors and the "ABS" mirror consisting of a black border enameled in the glass with polished gold cut work showing through.

Parker Venetians resemble unusually handsome mirrors hung flush on the wall as there is no knob, hardware or portion of the body visible to indicate that a spacious cabinet is hidden behind the door.

Regular equipment for the cabinet shown above includes adjustable bulb edge glass shelves and razor blade drop.

Models 100 and 150



Cabinet with Light Brackets

Light Brackets for Cabinets

Chromium plated light brackets of distinctive design can be attached to any model in the Parker line, except the wing types. These brackets of either the keyless or pull chain type add a very distinctive and practical touch to the cabinet. They concentrate the light at the point it is needed most and there is enough light reflected by the mirror to illuminate the entire bathroom.

The wiring system is a model of simplicity and has been approved by the Underwriters' Laboratories, Inc.

Models 750-VM and 710-VM

Flush-Door Recessed Models

Model 100 is equipped with locked compartment for poisonous medicines. Also furnished with beveled plate mirror, adjustable bulb edge glass shelves and a slot for used razor blades.

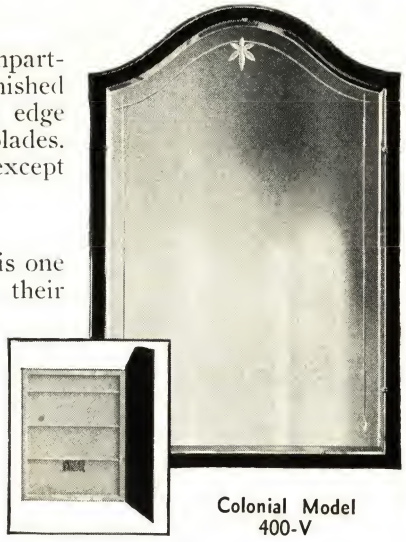
Model 150 identical with Model 100, except without locked compartment.

Colonial Model Cabinet

The Colonial cabinet shown at the right is one of several "panel door" models, noted for their attractive design and rugged construction. Other cabinets of this type are illustrated in our complete new catalogue.

Mitered Line Design Cabinet

At the left is shown the "M" or mitered line design on all glass Venetian models. This particular design is offered in two sizes.



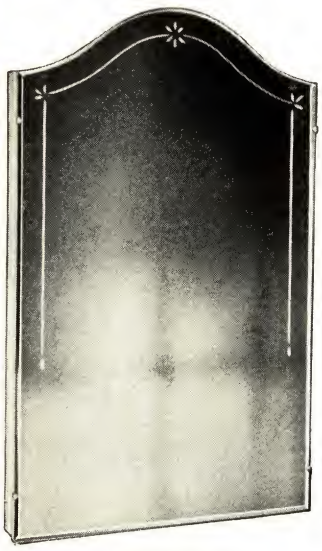
Colonial Model
400-V

DIMENSIONS, INCHES

Model	780VABS	770VABS	760VABS	750VM	710VM	400V	100	150
Mirror	18 x28 6 x24	16 x26 6 x22	14 x22 6 x19	18 x28	16 x26	14 x22	16 x22	16 x22 .....
Over all	30½x28	28½x26	26½x22	18 x28	16 x26	15¾x23¾	20¾x26¾	20¾x26¾
Inside	15 x21	13 x19	11 x15	15 x21	13 x19	12¾x16¾	16¾x22¾	16¾x22¾
Wall opening	15¾x21¾	13¾x19¾	11¾x15¾	15¾x21¾	13¾x19¾	13½x17½	17½x23½	17½x23½

A Century PARKER of Business

MEDICINE CABINETS



Model 750-VH
Model 710-VH
Model 700-VH

The all-glass Venetian model shown at the left fitted with the "H" mirror design is furnished in three sizes. Other mirrors which may be had if desired include the handsome "AB" design or for those who prefer the ultimate in simplicity the "P" or plain mirror without etching.

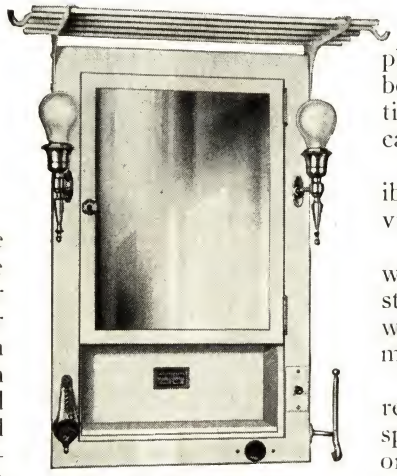
The mirrors on Parker Venetian Models are suspended on heavy built-up door panels by clips of special design which eliminate breakage. The doors are of such solid construction that they may be slammed without injury to the mirror.

The cabinet at the right is furnished in one size only and is recommended as a distinctive fixture for the inexpensive bathroom.

Model 690-VH

Special Hotel Cabinet

The special hotel cabinet at the right can be made up by attaching the fixtures shown to any flush door model in the Parker line. Regular equipment includes: either chromium plated or enameled towel tray with water bag hooks, chromium plated light brackets (either keyless or pull chain), switch (where keyless brackets are used), combination hook, hot plug, combination corkscrew and bottle opener, vitrolite shelf, junction box for connecting house and cabinet wires, and razor blade drop.

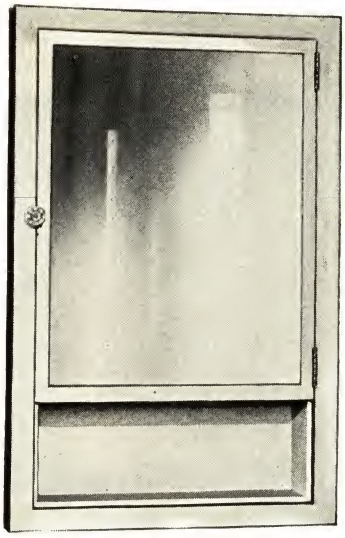


Special Hotel Cabinet

The regular equipment is very flexible and can be altered to meet individual requirements.

The cabinets are shipped completely wired, assembled and ready for installation, except for the towel tray which can be attached in a very few minutes time on the job.

These cabinets are not carried in regular stock but are made up on special order and therefore small orders cannot always be handled promptly.

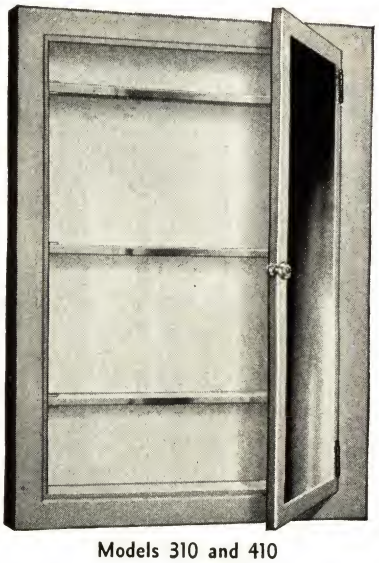


Models 300 and 400

Standard Type Cabinets

Models 300, 400, 310 and 410 are especially recommended for the modest bathroom where price is to be considered. These cabinets are very practical in design, rugged in construction and of a uniformly high quality.

Regular specifications include glass knobs, plain plate mirrors and three adjustable bulb edge glass shelves. Beveled mirrors may be substituted at a slightly higher price.



Models 310 and 410

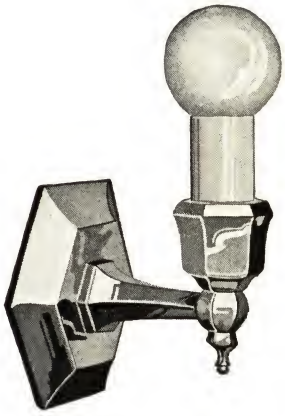
DIMENSIONS, INCHES

Model	750VH	710VH	700VH	690VH	310	410	300	400
Mirror	18x28	16x26	14x22	14x18	14 x18	12 x16	14 x18	12 x16
Over all.....	18x28	16x26	14x22	14x18	19 x23	17 x21	19 x29	17 x27
Inside	15x21	13x19	11x15	11x15	15 x19	13 x17	15 x25	13 x23
Wall opening...	16x22	14x20	12x16	12x16	15½x19½	13½x17½	15½x25½	13½x23½

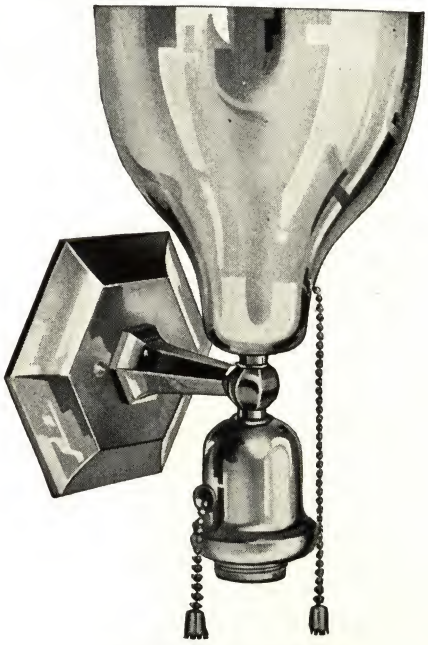
A Century PARKER of Business

LIGHTING FIXTURES

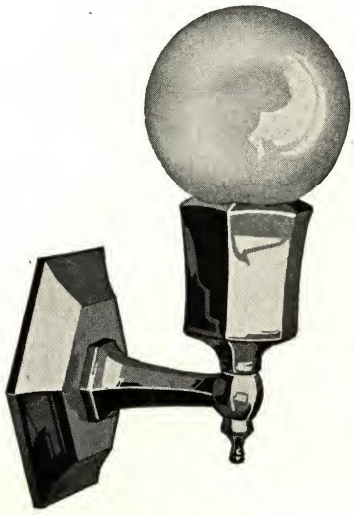
Finished in chromium plate, nickel plate, nickel silver or white enamel



No. 5002 Lighting Fixture
Projection from wall 4 ins.
Height 4½ ins.

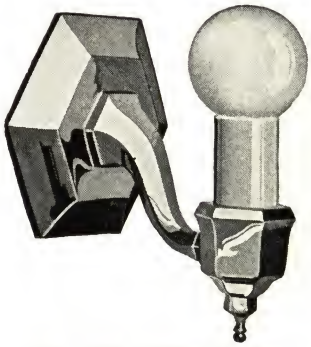


No. 5003 Lighting Fixture with Indirect Light
Projection from wall 6 ins.
Height 9½ ins.

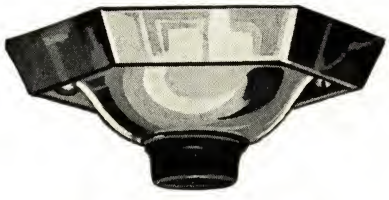


No. 5000 Lighting Fixture
Projection from wall 4½ ins.
Height 5½ ins.

No. 5004 Ceiling Fixture
Drop 5 ins.



No. 5001 Lighting Fixture
Projection from wall 4½ ins.
Height 6¼ ins.



No. 5005 Ceiling Fixture
Drop 2¼ ins.

A Century **PARKER** of Business

HOEGGER, INC.

Manufacturers of Solid Brass Bathroom Accessories

TELEPHONE
Palisade 6-8100

MAIN OFFICE AND FACTORY
532 Gregory Avenue, WEEHAWKEN, N. J.

NEW YORK, N. Y., Architects Samples Corporation, 101 Park Avenue

For Hoegger Garment Carriers, see Manufacturers' Index

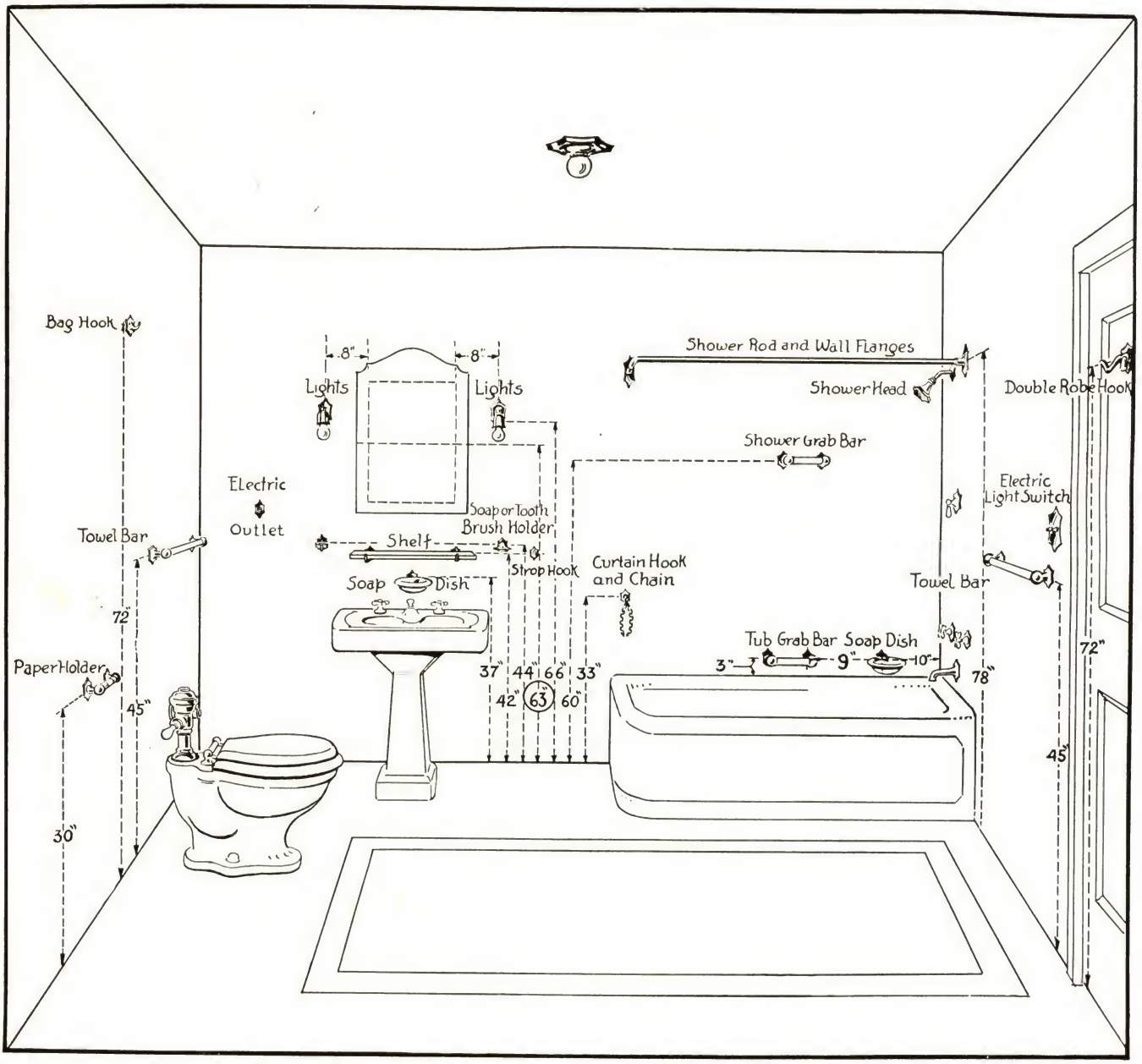
Hoegger Products and Experience

An assurance of quality. Backed by an organization of master craftsmen and a quarter century's experience, Hoegger products have become the standard of excellence among many architects and owners.

In addition to an extensive selection of stock products made in several complete lines of matched design, HOEGGER, INC., manufacture special products to individual designs and specifications.

Mounting Heights for Hoegger Accessories

The mounting heights shown on this page are offered for the convenience of the architect. Due to slight variations of bathroom fixtures and local conditions, these heights are necessarily an average—they have been found to apply to the majority of installations. From experience, it has been found that only a very slight deviation from "63 in." to the center of the medicine cabinet is satisfactory. Mounting heights for electric lighting fixtures will be found under each fixture.



Hoegger Suggests the Above Mounting Heights for Your Convenience

Mounting Heights

MOUNTING FEATURES OF HOEGGER ACCESSORIES

(Patent No. 1636364)

HOEGGER surface applied accessories consist essentially of two parts, the fixture proper and the solid brass concealed back plate. The back plates are made in several types to facilitate mounting on the various kinds of wall construction. The fixture is rigidly secured to the back plate by a single concealed set screw which is regularly furnished slotted for screw driver, but where fixtures are used in public places, a special theft-proof set screw will be furnished when specified.

Advantages of HOEGGER Concealed Plate type mounting are:

(1) They are easily and quickly installed in any type of wall construction.

(2) The back plates may be shipped to the job and installed in advance, as the fixtures are not attached until the rooms are completely decorated, thus eliminating any possible loss from theft or injury.

(3) Fixtures may be easily removed whenever it is necessary to re-decorate the room.

(4) Due to the construction of the patented back plate post the fixture is forced tightly against the wall surface when set screw is tightened, thus assuring a neat, tight-fitting assembly that will not work loose.

HOEGGER Concealed Back Plates are made in several types to meet the various conditions in wall construction:

"S" Type—(Supplied with fixtures.) Can be mounted on any type of wall. This is our regular plate and is shipped with all fixtures unless otherwise specified.

"SA" Type—(Supplied with fixtures.) "Anker-in" plate set in wall with plaster of paris. Anchors made in two lengths —1¼ in. long for tile or marble walls and 2¼ in. long for cement or plaster walls.

"SH" Type—May be used with any fixture where an additional hook is desired. Hook extends ⅞ in. below flange. *Important*—As the flange of this fixture must be machined at the factory, this type plate must be specified when fixtures are ordered.

"SB" Type—(Supplied with fixtures.) Adjustable wall anchor bar—made for new work only where tile or glass walls are erected. The adjustable back plates are mounted on a ⅛x1 in. galvanized bar which is placed in the wall during its erection.

All fixtures except 513 and 518 are interchangeable on all HOEGGER back plates.

Anker-in (SA) Type Plate

Installing Directions for Hoegger Concealed Plates (Patent No. 1636364)

All HOEGGER Concealed Plates are mounted so that lug is on top (Fig. 1). This lug fits in a recess and keeps the fixture from turning on the concealed plates.

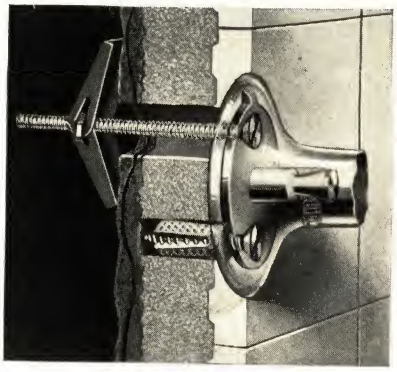
Where fixtures require two concealed plates, as towel and grab bars, carefully measure center to center distance of plates from assembled fixture.

Note: Where conditions warrant, a templet will be furnished for all double plate fixtures.

Fig. 1

Important When Ordering

If Anker-in type wall fastening is wanted add (SA) to catalogue numbers; if concealed screw type is wanted, add (S) only.



Concealed Screw (S) Type Plate

Installing Directions for Anker-in (SA) Type Plates

Cut hole in wall 1⅝ in. wide, ⅝ in. high, 1½ in. deep for short anchor plates used on tile walls, and 2½ in. deep for long anchor plates used on cement, plaster or marble walls. Fill hole with plaster of paris, placing some on anchor, and insert with lug at top (Fig. 1). Hold until set—about one minute.

Important—Fixtures should not be put on plates for at least one hour or preferably after room is decorated and ready for occupancy.

Installing Directions for Concealed Screw (S) Type Plates

On Wood—Use inclosed wood screws.

On Tile—Use inclosed wood screws and lead shields.

On Plaster—Use inclosed wood screws and rawl plugs or toggle bolts.

Note: Plate may be fastened by top screw only, fixture put on and adjusted as required, then fixture carefully removed and hole drilled for bottom screw.

Chromium Plated Tapped Buttons (C-10-24)

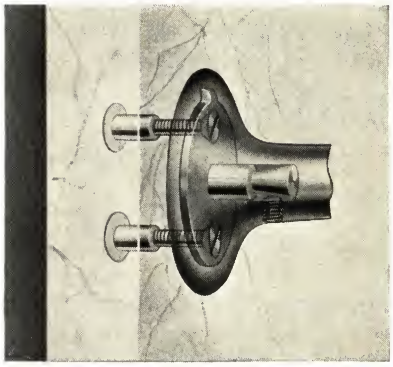
Tapped Brass Sleeves (10-24)

Brass Machine Screws (10-24)

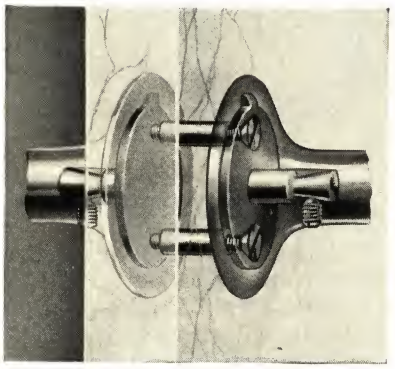
"SH" Back Plate

(Patent applied for) Hook extends ⅞ in. below flange

"SH"-Concealed Screw Back Plate (illustrated) finished to match fixtures with which they are ordered, **$0.50** each.



"S" Type Plate Mounted on Marble with Chromium Plated Buttons and Screw



"S" Type Plates Mounted Back to Back on Marble with Sleeves and Screws

Important: Drill holes vertically 1⅛ in. center to center

GENERAL INFORMATION

HOEGGER Bathroom Accessories are made in two stock designs. "Parfait" (design patent No. 70560) and "Standard," which permit a wide selection from two complete lines of matched designs.

Finishes of Hoegger Accessories

Medicine Cabinets—The cases are made of 1/8-in. steel electrically welded. They are furnished in polished stainless steel or baked white enamel. (Colored enamel cases to order.)

Mirrors—HOEGGER Mirrors are made in many designs and sizes and are equipped with a patented concealed hanger, described on page 12. Mirrors with brass frames furnished in any of the finishes given below under Accessories. Prices are listed under each mirror.

Accessories—All accessories are made of solid forged brass, and are mounted on the wall with a patented concealed plate, described on preceding page. They are supplied in the following finishes which are designated by placing a letter before the catalogue number.

Price	*Prefix*	*Finish*
As listed	"C"	"Crodon"* (chromium plate), a permanent non-tarnishable finish; no abrasive necessary to clean
"Crodon" price	"OS"	"Old Sheffield"—Satin finished "Crodon" (chromium plate).
As listed	"W"	HOEGGER's "Wyco"—a soft white velvety finish that is guaranteed not to blister, crack or change color.
See table	Name of Color	Colored accessories—Similar to "Wyco"—furnished any color desired on order.
"Wyco" price less 10%	"N"	Nickel plate. Every modern improvement in nickel plating is used in the HOEGGER shops.
"Crodon" price	"NS"	Solid (18%) nickel silver. The finish is the highly polished surface of the nickel silver.
On application	"RG"	Roman gold (20-year coin gold plate)—A beautiful dull rich finish.
On application	"SG"	Satin gold (20-year coin gold plate)—A most distinctive finish similar to "Old Sheffield."
On application	"PG"	Polished gold (20-year coin gold plate)—A highly polished finish.
On application	"S"	Silver plate—A heavy plate of silver, fully guaranteed by HOEGGER.

*Crodon is the trade name of The Chromium Corp. of America and HOEGGER, INC., is licensed to use their process.

PRICES OF COLORED ACCESSORIES AND LIGHTING FIXTURES

Any Color

1 to 25 Articles, Same Color, ADD 25% to Crodon Prices
26 Articles and over, Same Color, same as Crodon Prices

Prices and Deliveries

Trade Discounts—On application, subject to change without notice.

Export Packing—An extra charge of 3% is made for all export packing.

Handling Charges—A handling charge of 25¢ is made for all orders under $10.00 net.

Returned Material—A 10% handling charge will be made on all material returned for credit with our permission, if in resalable condition.

Notice: The carriers are responsible for all goods lost, damaged or delayed in transit, and in such cases the consignee must immediately notify the carrier agent at destination in writing in order to substantiate the formal claim when it is presented.

No claims allowed unless made within TEN days of receipt of goods.

Orders covering special goods are not subject to cancellation, except upon agreement to make payment for special work which has been performed.

BATHROOM ACCESSORIES

1. This contractor shall furnish and install, where indicated or directed, all of the bathroom accessories required throughout the building in accordance with the following specifications and with the schedule of bathroom accessories given below.

2. All bathroom accessories shall be those manufactured by HOEGGER, INC., Weehawken, N. J. No other brand of accessories shall be used without the written consent of the architect and/or owner.

3. *Medicine Cabinets* shall be constructed of .083" steel. The entire cabinet, excepting only such parts as are to be plated, shall receive a priming coat of white paint and the interior shall have, in addition, three coats of baked-on enamel.

4. Medicine cabinets shall be set flush with the wall, the door only being exposed. Doors shall be flush to flange and shall be provided with double stops. All door stops and hinges shall be concealed.

5. All medicine cabinets shall be equipped with plate glass shelves with polished edges, supported on Crodon plated adjustable shelf and rest strips.

6. All medicine cabinets shall have mirror doors with the best quality polished American plate glass mirrors.

7. The cabinet recess shall be so constructed as to allow the complete finishing of the wall up to the inside of the recess and permit the setting of the cabinet after all other work has been completed. This contractor shall furnish to the sub-contractor suitable data to enable him to provide the proper recess for the cabinets.

8. *Wall Mirrors* shall be of the same material and construction as the mirror doors of the medicine cabinets and shall be secured to the wall with concealed hangers

9. All accessories such as towel bars, soap holders, tumbler holders and other surface type fittings shall be secured to the wall in such manner that all supporting plates are concealed and that the fittings shall be drawn toward the wall when they are secured to the supporting plates.

10. All accessory parts shall be made of solid brass forgings.

Note: HOEGGER accessories may be had in any of the following finishes: (a) Crodon (chromium plate); (b) Wyco, enameled finish in white or color; (c) Gold plate; (d) Silver plate. Paragraphs 11a, 11b, 11c and 11d respectively, refer to these four finishes. In specifying the finish the architect should select the paragraph which specifies the desired finish and, if necessary, add a paragraph calling for certain of the accessories to be of other finish.

11a. *Finish.* All exposed metal parts of all accessories, unless otherwise noted, shall be finished by a process such as treats the base metal electrically with nickel for thirty minutes and with Crodon (chromium) for fifteen minutes to produce a plate of adequate thickness and durability.

11b. *Finish.* All exposed metal parts of all accessories, unless otherwise noted, shall be finished in Wyco....(White or colored)....enamel with one priming coat and two finishing coats of enamel sprayed on.

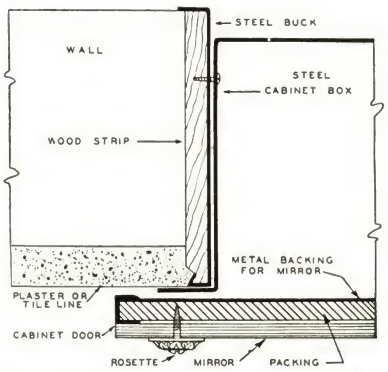
11c. *Finish.* All exposed metal parts of all accessories, unless otherwise noted, shall be finished in Gold plate. The plating shall be accomplished by four separate heavy platings of twenty-four carat gold, providing a smooth, uniform finish. The plating shall be guaranteed against defects of all kinds for a period of twenty years.

11d. *Finish.* All exposed metal parts of all accessories, unless otherwise noted, shall be finished in Silver plate. The plating shall consist of a heavy two hour plate, providing a smooth uniform finish. The plating shall be guaranteed against defects of all kinds for a period of twenty years.

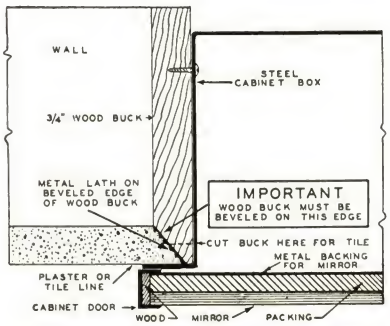
12. List of Accessories Required: The following accessories are to be furnished, the numbers referring to the catalog of HOEGGER, INC.

Note: The various bathrooms, lavatories, etc., should be listed here with the list of accessories that are to be furnished for each room.

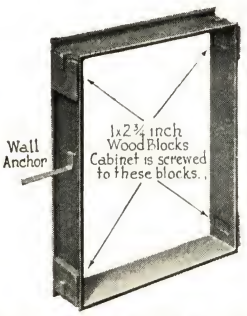
TYPICAL INSTALLATION OF RECESS MEDICINE CABINETS SHOWING HOEGGER STEEL BUCK AND *WOOD BUCK



Horizontal Section Through "Parfait" Cabinet Showing Hoegger Steel Buck



Horizontal Section Through "Impériale" Cabinet Showing Wood Buck



Hoegger Steel Buck for Recess Medicine Cabinets
(Patent 1715032)
List price, all sizes...**$12.00**

Important: Tile or plaster must be kept flush and to an even plane around wall opening so that cabinet flange will fit tightly against the wall.

Hoegger Steel Buck for Recess Cabinets

A pressed steel buck, 4½-in. deep, which is built into place in a definite location at the time the terra cotta partition is laid up. Eliminates necessity of cutting the required opening in the partition after the walls have been laid and finished. Saves much time and labor and gives a much better appearance to the finished job. Buck acts as a ground for plaster, giving a straight, flush finished plaster job—cabinet therefore fits absolutely flush against the wall in all cases.

*To be built on job.

"PARFAIT" RECESS MEDICINE CABINETS

Electrically Welded Steel Cabinets

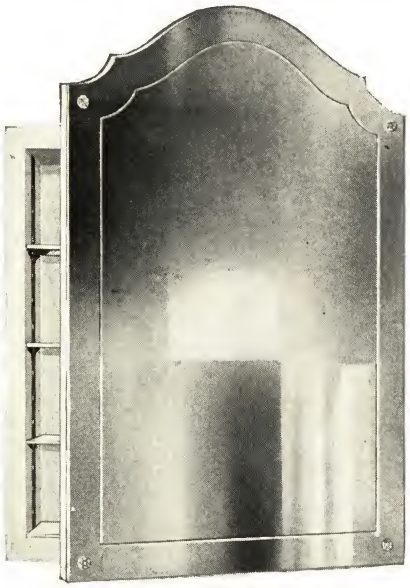
Genuine French Plate Mirror Entirely Conceals the Medicine Cabinet

These cabinets are for use in high class residences, club or hotel rooms where a cabinet of exceptional beauty and design is desired.

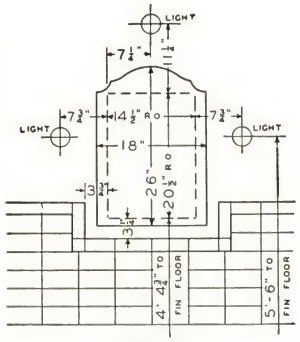
The design of the front of the cabinets (the mirror entirely covers the cabinet) gives them the appearance of a beautiful mirror and conceals the fact that a medicine cabinet is housed behind the mirror.

Construction Features—Door consists of a chromium plated $\frac{7}{16}$ in. brass channel frame with an enameled steel back on which is mounted a polished edge mirror, tightly packed so that there is no tinning sound when door is closed. Hinges are completely concealed in door frame and both are equipped with door stops, an exclusive HOEGGER patented feature; has no knob, door is opened by placing fingers at bottom edge of frame.

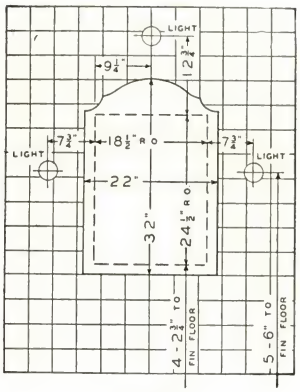
Mirrors supplied without mitre lines if desired.



"Parfait" Recess Medicine Cabinet
(Patents, Reissue 17510, 1707013, 1738705)



C-50-P



C-51-P

Typical Installations of "Parfait" Recess Medicine Cabinets

"PARFAIT" RECESS MEDICINE CABINETS

Catalogue No.	Mirror, in.	Glass shelves, in.	Rough opening, in.	List price
C-50-P	18x27	3–13½x4¼x5/16	14½x20½x4½	**$100.00**
C-51-P	22x32	4–17½x4¼x5/16	18½x24½x4½	**120.00**

STRAIGHT TOP "PARFAIT" RECESS CABINETS

ST-50	18x23	3–13½x4¼x5/16	14½x20½x4½	**$ 90.00**
ST-51	22x27⅝	4–17½x4¼x5/16	18½x24½x4½	**110.00**

(For Cabinet details see page 4)

Colored mirror frames at prices shown.
For colored cabinet and door frame, add $20.00.

SPECIAL DEPTH CABINETS

These cabinets are regularly furnished 3½ and 4½ in. deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep.....add $10.00
8 in. deep.....add 15.00
10 in. deep.....add 20.00
12 in. deep.....add 25.00

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 4 should be used.

"PARFAIT" MIRROR ONLY (No Cabinet)

Catalogue No.	Mirror, in.	List price
C-950-SP	18x27	**$60.00**
C-951-SP	22x32	**80.00**

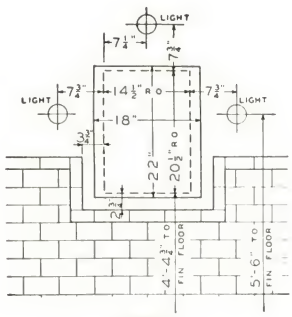
STRAIGHT TOP "PARFAIT" MIRROR ONLY (No Cabinet)

ST-950	18x23	**$50.00**
ST-951	22x27⅝	**70.00**

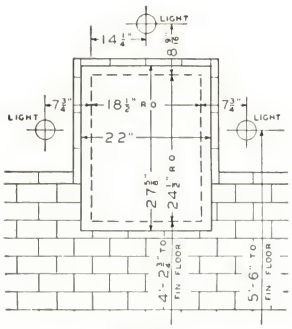
These mirrors are equipped with HOEGGER's Patented Concealed Hanger as described on page 12.

Note: Add $20.00 to list prices for gold back mirror in place of regular silver mirror.

Colored mirror frames at prices shown.



ST-50



ST-51

Typical Installations of Straight Top "Parfait" Recess Medicine Cabinets

HOEGGER *Cabinets and Mirrors can be furnished to your design and specifications on order*

"PARFAIT" RECESS CABINETS WITH SIDE MIRRORS

This cabinet is identically the same as the "Parfait" (described on preceding page) with the exception that side mirrors have been added.

Mirrors supplied without mitre lines if desired.

"PARFAIT" RECESS CABINET WITH SIDE MIRRORS

Catalogue No.	Mirrors, in.		Glass shelves, in.	Rough opening, in.	List price
	Center	Side			
C-75-P	18x26	8x22	3–13½x4¼x5/16	14½x20½x4½	**$150.00**
C-76-P	22x32	10x27½	4–17½x4¼x5/16	18½x24½x4½	**175.00**

***STRAIGHT TOP "PARFAIT" RECESS CABINETS WITH SIDE MIRRORS**

ST-75	18x22	8x22	3–13½x4¼x5/16	14½x20½x4½	**$140.00**
ST-76	22x27⅝	10x27⅝	4–17½x4¼x5/16	18½x24½x4½	**165.00**

*Cabinets same as illustrated at the right except that mirrors have straight tops.

Colored door frames at prices shown.

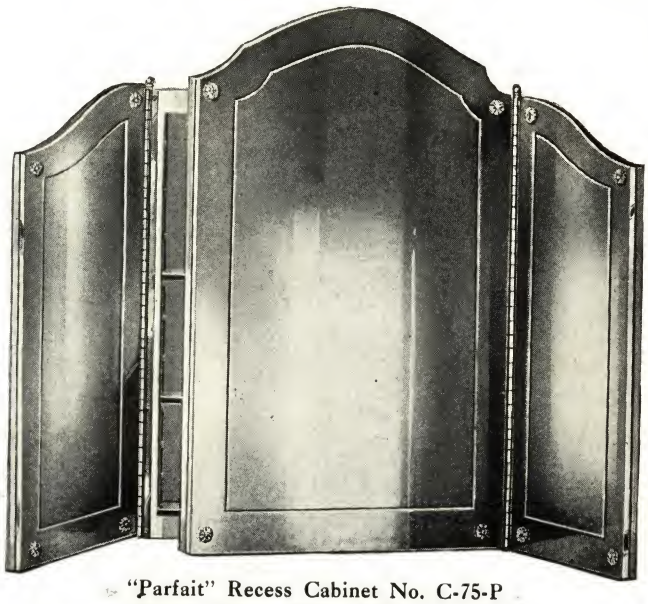
For colored cabinet and door frames, add $25.00.

SPECIAL DEPTH CABINETS

These cabinets are regularly furnished 3½ and 4½ inches deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep.....add $10.00
8 in. deep.....add 15.00
10 in. deep.....add 20.00
12 in. deep.....add 25.00

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 4 should be used.



"Parfait" Recess Cabinet No. C-75-P
(Patents, Reissue 17510, 1707013, 1738705)

Mirrors Only (No Cabinet)

Mirrors listed at the right are equipped with HOEGGER'S Patented Concealed Hanger as described on page 12.

"PARFAIT" TRIPLICATE

Catalogue No.	Mirrors, in.		List price
	Center	Side	
C-975-SP	18x26	8x22	**$100.00**
C-976-SP	22x32	10x27½	**125.00**

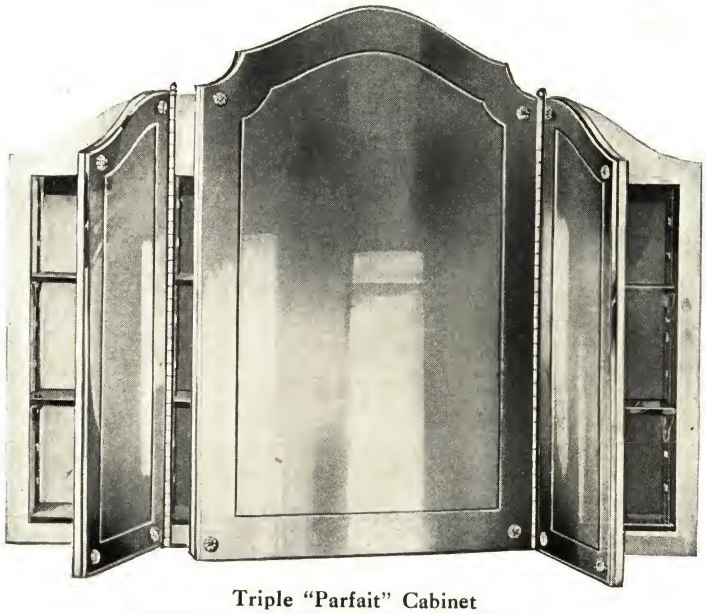
STRAIGHT TOP "PARFAIT" TRIPLICATE

Catalogue No.	Mirrors, in.		List price
	Center	Side	
ST-975	18x22	8x22	**$ 90.00**
ST-976	22x27⅝	10x27⅝	**115.00**

Note: Add $40.00 to list prices shown at the left for gold back mirror in place of regular silver mirror.

Colored mirror frames at prices shown.

This is the same construction as C-75-SP and C-76-SP cabinets shown and listed above, with the exception that it has three separate medicine cabinets —one under each door.



Triple "Parfait" Cabinet
(Patents, Reissue 17510, 1707013, 1738705)

Mirrors supplied without mitre lines if desired.

Note: For prices of mirrors only, see "Parfait" Triplicate mirrors in table above.

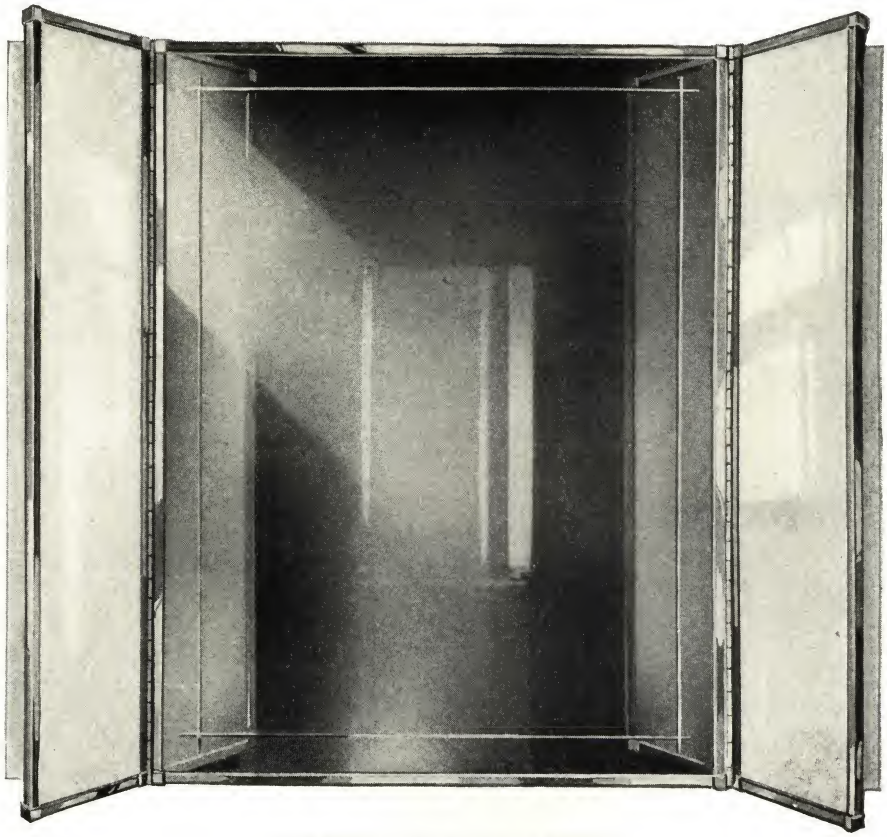
"TRIPLE-PARFAIT" RECESS MEDICINE CABINETS

Cat. No.	Mirrors, in.		Cabinets, in.		Glass shelves, in.		Rough opening, in.	List price
	Ctr.	Side	Ctr.	Side	Center	Side		
C-77-TP	18x26	8x22	18x17	7x17	3-17¾x4¼x5/16	6-6⅞x4¼x5/16	33x17¾x4½	**$200.00**
C-78-TP	22x32	10x27½	22x22	9x22	4-21¾x4¼x5/16	8-8⅞x4¼x5/16	41x23¼x4½	**250.00**

"HOEGGERLITE" RECESS CABINET

(Patents, Reissue 17510, 1707013, 1738705)

Electrically Welded Steel Cabinet

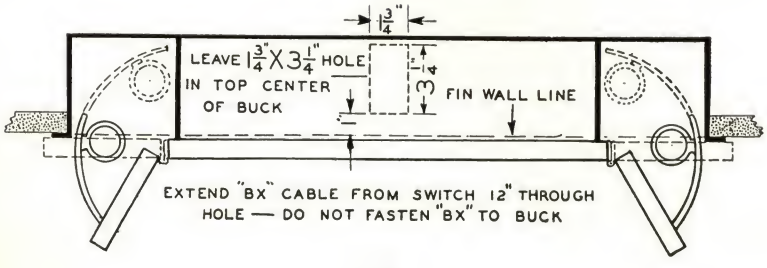


C-60 "Hoeggerlite" Recess Cabinet
Illuminated, adjustable side wing panels
List Price $175.00

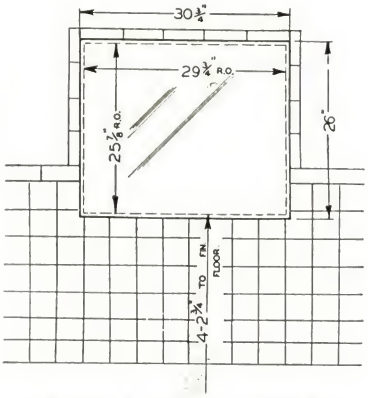
Shadowless light in front mirror takes standard bulbs up to 40 watt.

Wings adjustable to any position. Center mirror 20x26 in., wings 5x26 in. $\frac{7}{16}$-in. "Crodon" (chromium plated) frames.

Leave rough opening, 29¾x25⅞x4½ in.



C-60

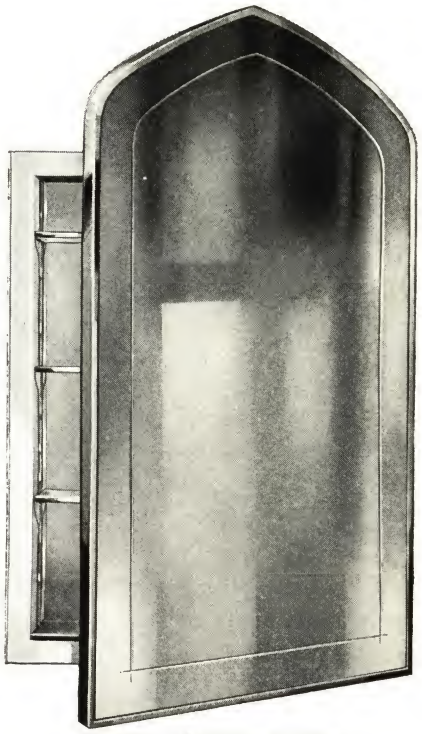


Typical Installation of C-60 Cabinet

"COLONIAL" AND "GOTHIC" RECESS MEDICINE CABINETS

Electrically Welded Steel Cabinets

Genuine French Plate Mirror Entirely Conceals the Medicine Cabinet



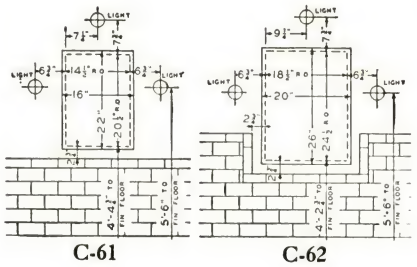
"Gothic" Medicine Cabinet

Patents, Reissue 17510, 1707013, 1738705

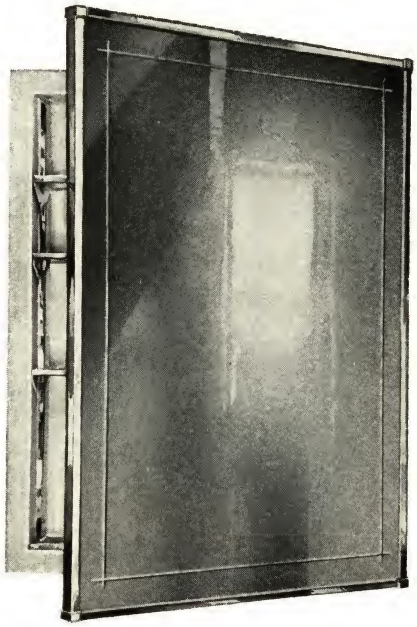
Two of Hoegger's most popular cabinets. Narrow crodon (chromium plate) frame makes them distinctly individual and attractive.

Mirrors supplied without mitre lines if desired.

For gold back mirrors in place of silver mirrors, add $20.00 to prices shown.



C-61 C-62



"Imperiale" Medicine Cabinet

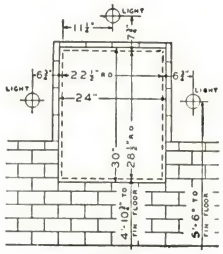
Cat. No.	Mirror, in.	Glass shelves, in.	Rough opening, in.	List Price
C-46	16x27	3—13½x4¼x5/16	14½x20½x4½	$ 75.00
C-47	20x32	4—17½x4¼x5/16	18½x24½x4½	100.00

Colored door frames at prices shown.
For colored cabinet and door frame add $15.00.

"GOTHIC" MIRRORS ONLY

C-946-S	16x27	$50.00
C-947-S	20x32	70.00

These mirrors are equipped with Hoegger's Patented Concealed Hanger, described on page 12.



C-63

Typical Installations of Impériale Medicine Cabinets

"IMPERIALE" RECESS CABINETS

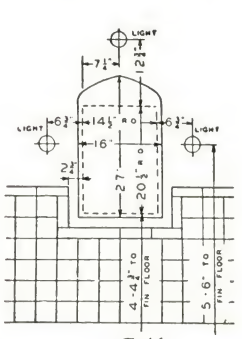
Cat. No.	Mirror, in.	Glass shelves, in.	Rough opening, in.	List price
C-61	16x22	3–13½x4¼x5/16	14½x20½x4½	$ 50.00
C-62	20x26	4–17½x4¼x5/16	18½x24½x4½	75.00
C-63	24x30	4–21½x4¼x5/16	22½x28½x4½	100.00

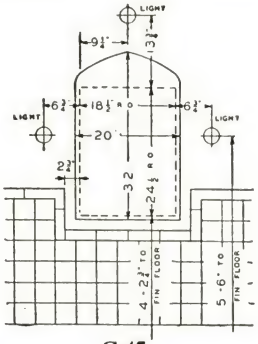
Colored door frames at prices shown.
For colored cabinet and door frame add $15.00.

"IMPERIALE" MIRRORS ONLY

Catalogue No.	Mirror, in.	List price
C-961-S	16x22	$35.00
C-962-S	20x26	50.00
C-963-S	24x30	65.00

These mirrors are equipped with Hoegger's Patented, Concealed Hanger, described on page 12.





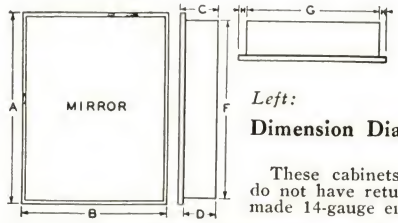
C-46 C-47

Typical Installations of "Gothic" Medicine Cabinets

SPECIAL DEPTH CABINETS

Cabinets are regularly furnished 3½ and 4½ inches deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep.....add $10.00 10 in. deep.....add $20.00
8 in. deep.....add 15.00 12 in. deep.....add 25.00



Left:

Dimension Diagram of Recess Medicine Cabinets

These cabinets fit flush with the wall and do not have return flanges. Cabinet cases are made 14-gauge enameled steel

Catalogue Nos.											Dimensions in in.						
Parfait	Straight top Parfait	Parfait with side mirrors	Straight top Parfait with side mirrors	Impériale	Impériale Parfait	Impériale Parfait with side mirrors	Gothic	Standard	Standard 2/3 doors	A	B	C	D	F	G	H
C-50-P	ST-50	C-75-P	ST-75	C-61	C-43-P	C-42-P	C-46	213	233	22	16	5¼	4½	20	14	1
C-51-P	ST-51	C-76-P	ST-76	C-62	C-40-P	C-41-P	C-47	214	234	26	20	5¼	4½	24	18	1
.....	.....	.....	.....	C-63	.....	.....	....	215	235	30	24	5¼	4½	28	22	1

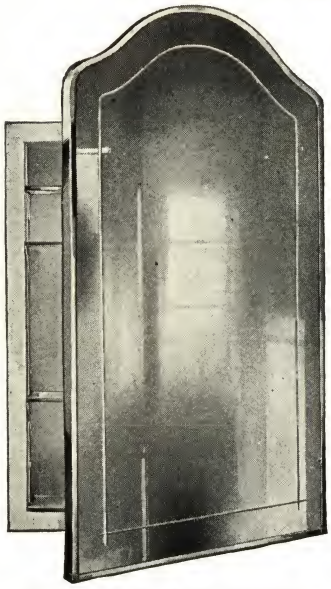
"Impériale" Cabinets and Mirrors

"IMPÉRIALE-PARFAIT" RECESS CABINETS

(Patents, Reissue 17510, 1707013, 1738705)

Electrically Welded Steel Construction

Genuine French Plate Mirror Entirely Conceals the Medicine Cabinet



"Impériale-Parfait" Medicine Cabinet

"Studied simplicity" is the keynote of true art, and in this popular design HOEGGER craftsmen have produced a medicine cabinet which has appealed to all who have seen it.

The narrow 7/16 in. frame, finished in Crodon, Wyco (white) or color (on order) is correctly proportioned and makes a neat clean frame for the genuine French plate mirror.

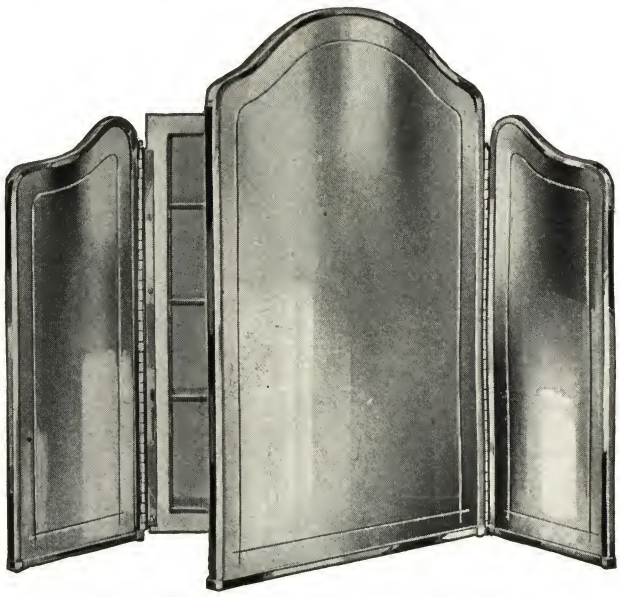
Doors open to left on order.

Mirrors supplied without mitre lines if desired.

With Side Mirrors—In combining side mirrors of matched design with the "Impériale-Parfait" cabinet, HOEGGER offers a striking example of art and simplicity.

The 7/16 in. frame is regularly furnished in the non-tarnishable Crodon or Wyco (white) but can be furnished in any color on order.

Mirrors supplied without mitre lines if desired.



"Impériale-Parfait" Cabinet with Side Mirrors

"IMPÉRIALE-PARFAIT" RECESS CABINETS

Catalogue No.	Mirror, in.	Glass shelves, in.	Rough opening, in.	List price
C-43-P	16x27	3–13½x4¼x5/16	14½x20½x4½	**$ 85.00**
C-40-P	20x32	4–17½x4¼x5/16	18½x24½x4½	**110.00**

"IMPÉRIALE-PARFAIT" CABINETS WITH SIDE MIRRORS

Catalogue No.	Mirror, in. Center	Mirror, in. Side	Glass shelves, in.	Rough opening, in.	List price
C-42-P	16x27	8x22	3–13½x4¼x5/16	14½x20½x4½	**$150.00**
C-41-P	20x32	10x26	4–17½x4¼x5/16	18½x24½x4½	**185.00**

(For Cabinet details see page 8)

Colored door frames at prices shown

For colored cabinet and door frame, add $15.00

SPECIAL DEPTH CABINETS

These cabinets are regularly furnished 3½ and 4½ in. deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep.....add $10.00
8 in. deep.....add 15.00
10 in. deep.....add 20.00
12 in. deep.....add 25.00

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 5 should be used.

MIRRORS ONLY (No Cabinets)

"Impériale-Parfait"

Catalogue No.	Mirror, in.	List price
C-943-SP	16x27	**$60.00**
C-940-SP	20x32	**80.00**

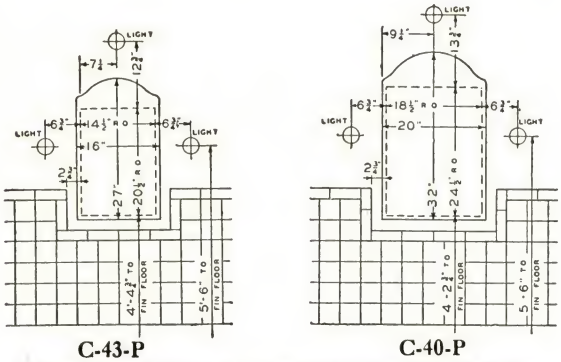
"Impériale-Parfait" Triplicate

Catalogue No.	Center mirror, in.	Side mirrors, in.	List price
C-942-SP	16x27	8x22	**$110.00**
C-941-SP	20x32	10x26	**135.00**

These mirrors are equipped with HOEGGER'S Patented Concealed Hanger, described on page 12.

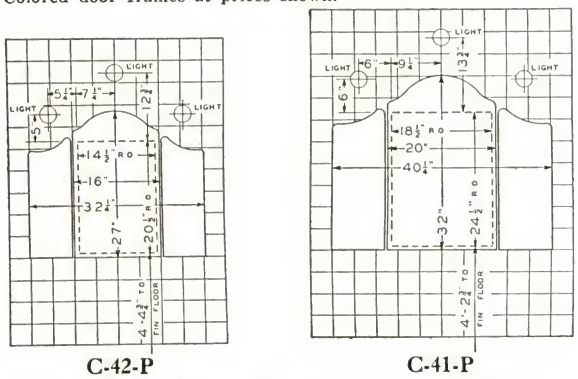
Note: Add $20.00 to list price for gold back mirror in place of regular silver mirror for G-943SP and C-940SP. Add $40.00 for C-942SP and C-941SP.

Colored door frames at prices shown.



C-43-P C-40-P

Typical Installation of "Impériale-Parfait" Medicine Cabinets



C-42-P C-41-P

Typical Installations of "Impériale-Parfait" Cabinets with Side Mirrors

HOEGGER Cabinets and Mirrors can be furnished to your design and specifications on order

"IMPÉRIALE" RECESS SUPPLY CABINET AND DRESSING MIRROR

(Patents, Reissue 17510, 1707013, 1738705)

This new product by HOEGGER provides ample room for storage of the necessary bathroom supplies in the bathroom, and at the same time provides a beautiful dressing mirror.

The mirror frame is $\frac{7}{16}$ in. solid brass, regularly finished in Crodon (chromium plate) or Wyco (white) but can be furnished in colors if desired. Colored mirror frames furnished at prices shown.

Price of colored cabinet and mirror frame on application.

Cabinet is equipped with 4 plate glass shelves, adjustable every 2 in., and 1 stationary shelf at bottom.

Bottom of cabinet should be 12 in. above finished floor line.

C-65 "Impériale" Recess Supply Cabinet and Dressing Mirror

The plate glass mirror entirely conceals the cabinet

MEDICAL INSTRUMENT CASES

Either C-65 or C-465 with clear glass door in place of mirror. Frame 1 in. wide at prices shown.

RECESS SUPPLY CABINET AND DRESSING MIRROR

Cat. No.	Mirror size, in.	Cabinet depth, in.	Rough opening, in.	List price
C-65	20x60	4½	18½x58½x4½	**$200.00**

CORNER TYPE SUPPLY CABINET AND DRESSING MIRROR (Not Recessed)

Cat. No.	Mirror size, in.	Shelves, in.	List price
C-465	20x60	13¾x13¾x19⅝x$\frac{5}{16}$	**$255.00**

Note: Cabinet extended 14 in. each way from corner.

RECESS SUPPLY CABINET WITH TRIPLE DRESSING MIRRORS

Cat. No.	Mirror size, in.		Cabinet depth, in.	List price
	Center	Side		
C-66	20x60	10x60	4½	**$350.00**

Leave rough opening 18½x58½x4½ in.

MIRRORS ONLY

Single Type			Triple Type			
Cat. No.	Size, in.	List price	Cat. No.	Mirror, size, in. Center	Side	List price
C-965-S	20x60	**$100.00**	**C-966-S**	20x60	10x60	**$250.00**

SPECIAL DEPTH CABINETS

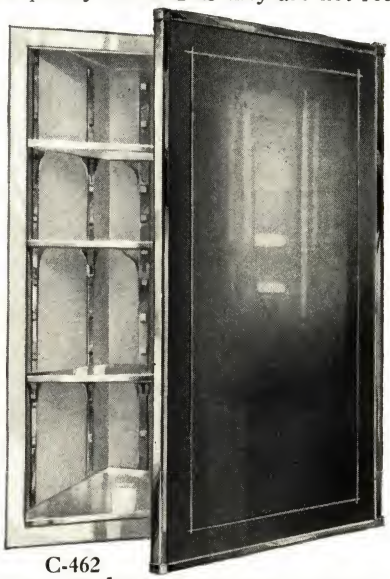
These cabinets are regularly furnished 4½-in. deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep....add $15.00
8 in. deep....add 30.00
10 in. deep....add 45.00
12 in. deep....add 60.00

CORNER MEDICINE CABINETS

(Patents, Reissue 17510, 1707013, 1738705)

Corner medicine cabinets are ideal for use where space is at a premium and as an added convenience in bathrooms equipped with regular wall cabinets. They are easily and quickly installed as they are not recessed.



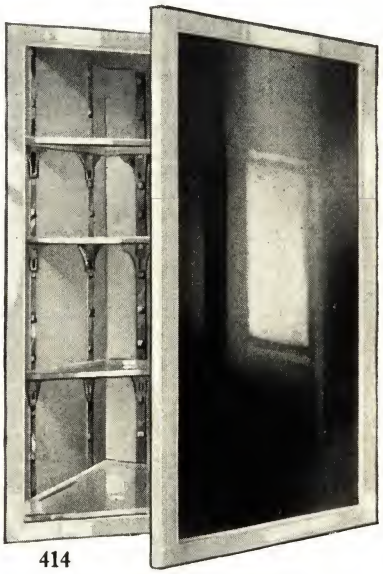
C-462

C-462 IMPÉRIALE CORNER CABINET

Cat. No.	Mirror size, in.	Glass shelves, in.	List price
C-462	20x26	(4)13¾x13¾x19⅝x$\frac{5}{16}$	**$85.00**

Cabinet extends 14 in. each way from corner.

Equipped with same door as C-62 cabinet (see page 8).



414

414 CORNER CABINET

Cat. No.	Mirror size, in.	Door size, in.	Glass shelves, in.	List price
414	18x24	20x26	(3)13¾x13¾x19⅝x$\frac{5}{16}$	**$60.00**

Cabinet extends 14 in. each way from corner.

Equipped with same door as 214 cabinet (see page 11).

"STANDARD" RECESS AND SURFACE MEDICINE CABINETS

Electrically Welded Steel Cabinets

(Patents, Reissue 17510, 1707013, 1738705)

Recess Medicine Cabinets, Nos. 213, 214 and 215

The highest type of "Standard" medicine cabinet. Doors have concealed hinges and stops. No knob, door is opened by placing fingers in recess at bottom edge of frame.

Two-thirds Door Recess Medicine Cabinets, Nos. 233, 234 and 235

This cabinet is exactly the same construction as the 213, 214 and 215 with the exception of the two-thirds door in place of the full door, which leaves an exposed shelf, so desirable in hotels and apartments.

Standard Recess Medicine Cabinet

General Notes on Both Types

Baked white enamel finish. Colors on order only.

Equipped with lock and key when specified. Add $10.00 to list price.

Door opening to the left may be had on Nos. 213, 214 and 215 at the same price; for door opening to the left on Nos. 233, 234 and 235, add $5.00 to prices shown.

For colored cabinets and door frames, add 20% to prices shown.

(For Cabinet details see page 8.)

SPECIAL DEPTH CABINETS

Cabinets are regularly furnished 3½ and 4½ inches deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep	add $10.00
8 in. deep	add 15.00
10 in. deep	add 20.00
12 in. deep	add 25.00

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 4 should be used.

Standard Two-third Door Medicine Cabinet

"STANDARD" RECESS MEDICINE CABINETS

Catalogue No.		Mirror size, in.	Glass shelves, in.	Rough opening, in.	List price	
Plain mirror	Beveled mirror				Plain mirror	Beveled mirror
213	**2213**	14x20	3–13½x4¼x5/16	14½x20½x4½	**$30.00**	**$32.00**
214	**2214**	18x24	4–17½x4¼x5/16	18½x24½x4½	**50.00**	**52.00**
215	**2215**	22x28	4–21½x4¼x5/16	22½x28½x4½	**62.00**	**66.00**

"STANDARD" SURFACE TYPE WALL CABINETS

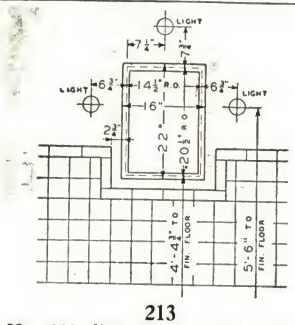
Catalogue No.		Mirror size, in.	Outside size, in.	List price	
Plain mirror	Beveled mirror			Plain mirror	Beveled mirror
323	**2323**	14x20	16x22x5	**$36.00**	**$38.00**
324	**2324**	18x24	20x26x5	**57.00**	**59.00**
325	**2325**	22x28	24x30x5	**70.00**	**74.00**

"STANDARD" TWO-THIRDS DOOR RECESS MEDICINE CABINETS

Cat. No.		Mirror size, in.	Glass shelves, in.	Rough opening, in.	Height of exposed shelf, in.	List price	
Plain mirror	Beveled mirror					Plain mirror	Beveled mirror
233	**2233**	14x13	3-13½x4¼x5/16	14½x20½x4½	6	**$28.00**	**$29.00**
234	**2234**	18x16	4-17½x4¼x5/16	18½x24½x4½	7	**44.00**	**46.00**
235	**2235**	22x19	4-21½x4¼x5/16	22½x28½x4½	8	**50.00**	**54.00**

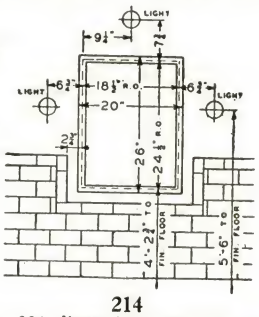
"STANDARD" TWO-THIRDS SURFACE TYPE—EXPOSED SHELF

Catalogue No.		Mirror size, in.	Outside size, in.	Height exposed shelf, in.	List price	
Plain mirror	Beveled mirror				Plain mirror	Beveled mirror
333	**2333**	14x13	16x22x5	6	**$34.00**	**$35.00**
334	**2334**	18x16	20x26x5	7	**51.00**	**53.00**
335	**2335**	22x19	24x30x5	8	**58.00**	**62.00**



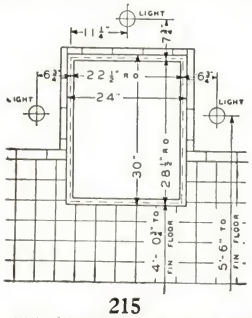
213

No. 233 dimensions are the same, except 4 ft. 1⅜ in. from bottom of rough opening to finished floor



214

No. 234 dimensions are the same, except 3 ft. 10⅞ in. from bottom of rough opening to finished floor



215

No. 235 dimensions are the same, except 3 ft. 8⅜ in. from bottom of rough opening to finished floor

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 4 should be used.

HOEGGER *Cabinets and Mirrors can be furnished to your design and specifications on order*

HOEGGER *"Standard" Recess and Surface* MEDICINE CABINETS HOEGGER

BATHROOM MIRRORS—CONCEALED HANGERS

These mirrors are of the same construction as those used on the "Impériale" Medicine Cabinets, and are available in any size or shape. Stock sizes only are listed on this page. They are hung flat against the wall with our Patented Concealed Hanger, no screws or fastening of any kind exposed.

Left:

906 Mirror

The frames of these mirrors are made of white enameled steel, filled with well-seasoned wood as shown in the cross section, and make a very serviceable low priced mirror

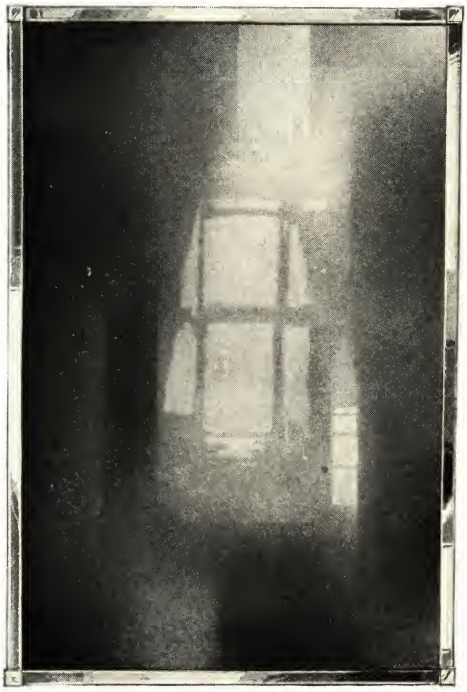
Right:

C-909-S Mirror

$\frac{7}{16}$-in. Brass Frame
Wyco or Crodon Finish
Frames made of solid brass, finished in Crodon (chromium plate), Wyco (white), or colors on order

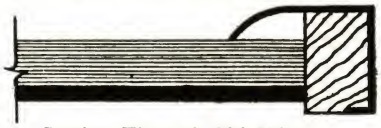
For colored mirror frames use "Crodon" prices. Frames furnished in 18% solid polished nickel silver same price as Crodon.

All dimensions are outside sizes.

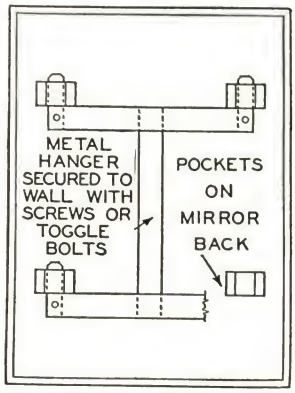


NO. 906 MIRRORS
¾-in. White Enameled Steel Frame

Size, In.	No. 906 Plain Mirror	No. 2906 Beveled Mirror
12x18	$11.00	$12.00
14x20	12.00	14.00
18x24	16.00	19.00
24x30	31.00	35.00
24x36	35.00	40.00
24x48	45.00	53.00
24x60	55.00	65.00



Section Through 906 Mirrors



Hoegger Patented Concealed Hanger

Information Required When Ordering

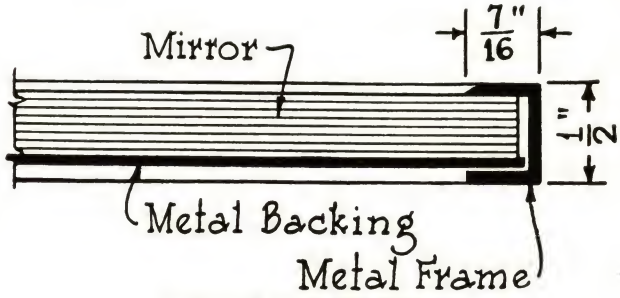
When ordering mirrors give first the width and then the height, or state definitely which way the mirror will be hung so that the hangers may be properly placed.

NO. 909 MIRRORS

Wyco Frame			Crodon Frame		
Mirror, in.	W-909-S Plain	W-2909-S Beveled	Mirror, in.	C-909-S Plain	C-2909-S Beveled
12x18	$17.90	$18.90	12x18	$18.20	$19.20
14x20	20.80	22.80	14x20	21.30	23.30
18x24	27.00	29.00	18x24	28.00	30.00
24x30	37.50	40.50	24x30	39.50	42.50
24x36	42.50	47.50	24x36	44.00	49.00
24x48	51.00	59.00	24x48	53.00	61.00
24x60	58.00	68.00	24x60	61.00	71.00

NO. C-900-S OVAL MIRROR
$\frac{7}{16}$-in. Frame
Wyco or Crodon Finish

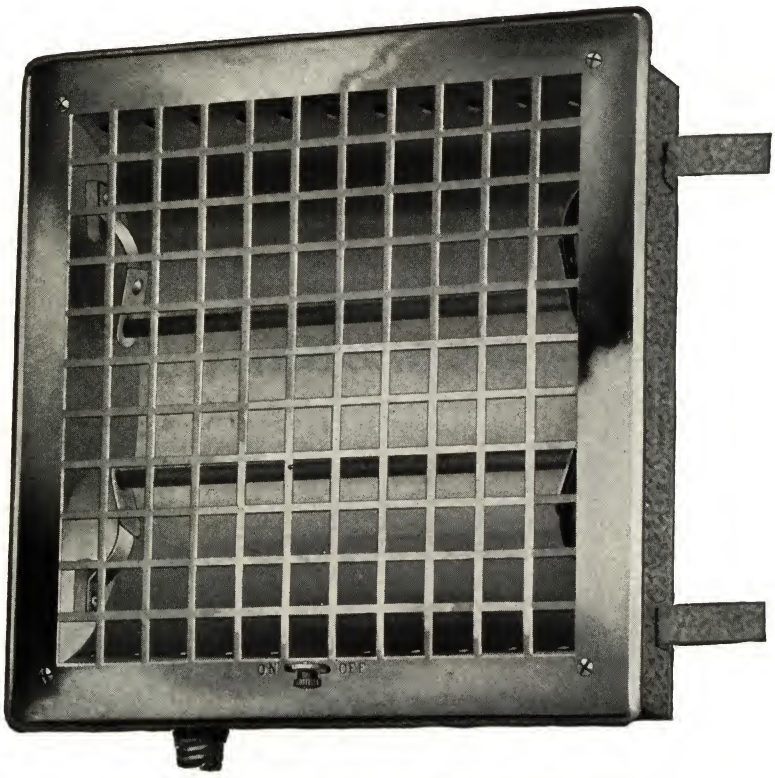
Wyco Frame			Crodon Frame		
Mirror, in.	W-900-S Plain	W-2900-S Beveled	Mirror, in.	C-900-S Plain	C-2900-S Beveled
12x18	$16.40	$17.40	12x18	$17.10	$18.10
14x20	19.00	21.00	14x20	19.90	21.90
18x24	25.00	27.00	18x24	27.00	29.00



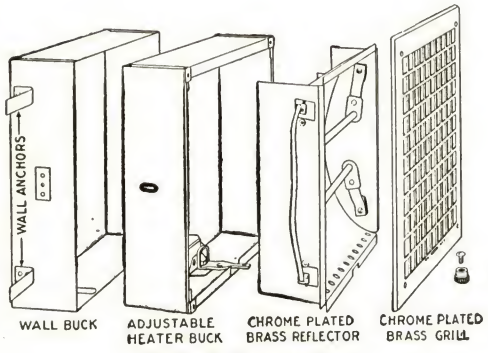
Section Through 909 Mirrors

HOEGGER *Cabinets and Mirrors can be furnished to your design and specifications on order*

RECESS ELECTRIC HEATERS
Chromium Plated



Recess Chromium Plated Adjustable Electric Heater



Method of Assembly

The galvanized wall back is installed when wall is erected. Heater back is adjustable in wall back to allow grill to fit tightly against wall surface.

Heating units are quickly and easily snapped in place in the spring terminals.

Holes at extreme top and bottom of heat reflector allow a circulation of air to keep backs cool.

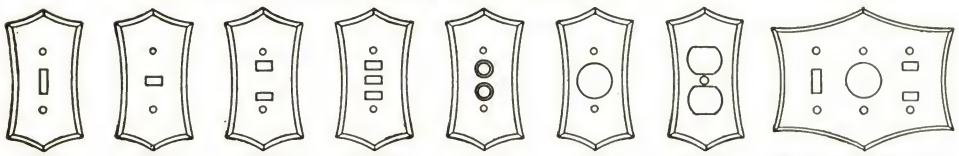
Packed in individual cartons complete with built-in switch and Bx clamp.

RECESS CHROMIUM PLATED ADJUSTABLE ELECTRIC HEATERS

Catalogue No.	Watts	Size of grill, in.	Size of wall back, in.	List price
C-190	450	9¼x 9¼	8¾x 8¾x3¾	**$50.00**
C-191	1000	13¼x13¼	12¾x12¾x3¾	**60.00**

CRODON PARFAIT SWITCH PLATES

Hoegger Switch Plates are made of solid brass ⅛-in. thick. Will not bend or dent. Are regularly finished in Crodon (Chromium plate). Can also be furnished in any other plated finish or any color desired.



"T" Toggle — **"JT" Junior Toggle** — **"2JT" Double Junior Toggle** — **"3JT" Triple Junior Toggle** — **"P" Push** — **"S" Service** — **"2S" Duplex Service** — **"3 Gang T-S-2JT" Method of ordering Multiple Gang Plates**

Switch Plates other than shown above made to order when sufficient details for manufacture are supplied

LIST PRICES

Type	Width, in.	Height, in.	List price
Single	3¼	5½	**$2.50**
*2-gang	5⅜	5½	**4.00**
*3-gang	7⅛	6	**6.00**
*4-gang	9	6	**8.00**

*Gang combination plates on order only.

C-28-P

Price $15.00

Projection from wall (including bulb), 5⅛ in. Height, 8 in.

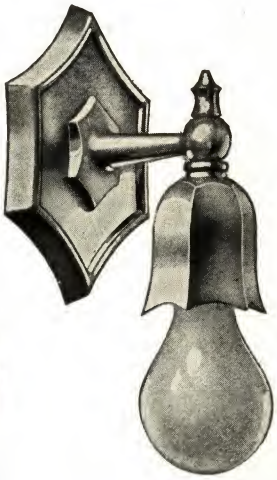
Set outlet box 65 in. from floor line. Switch on wall flange add $1.00

C-38-P

Price $30.00

Dimensions shown on diagram below.

Chain pull switch, add $2.00



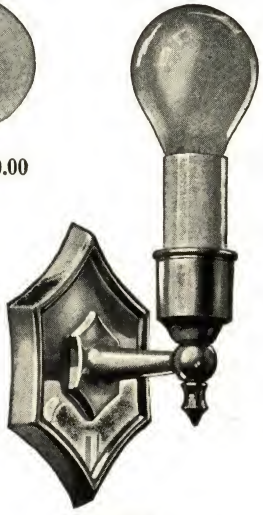
C-33-P

Price $14.00

Projection from wall (including bulb), 4½ in. Height (including bulb), 5½ in.

Set outlet box 69 in. from floor line. If mounted with bulb up, set outlet box 63 in. from floor line.

Switch on wall flange, add $1.00



C-26-P

Price $12.00

Projection from wall (including bulb), 4½ in. Height (including bulb), 9½ in.

Set outlet box 63 in. from floor line.

Regularly furnished with chain pull switch

Left:

C-29-SP

Price . . $30.00

Projection from wall (including bulb), 5 in. Height, 10⅞ in.

Set outlet box 66 in. from floor line

C-27-P

Price $12.00

Dimensions shown on diagram below.

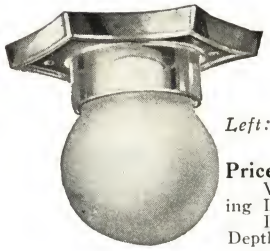
Chain pull switch, add $2.00

C-34-SP

Price $25.00

Projection from wall (including bulb), 5 in. Height, 6 in.

Set outlet box 66 in. from floor line



Left:

C-35-P

Price . . $24.00

Vapor Proof Ceiling Light.

Diameter 6¾ in. Depth 6 in.

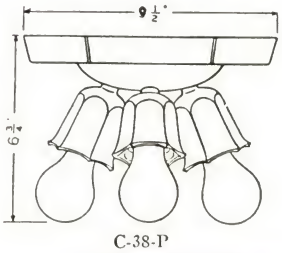
C-32-P

List Price $30.00

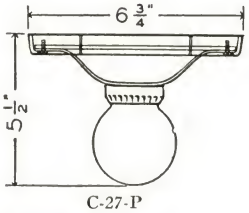
Projection from wall (including bulb), 5¾ in. Spread (including bulb), 13½ in. Height (including bulb), 8½ in.

Set outlet box 7 in. above top of cabinet mirror.

Switch on wall flange, add $1.00



C-38-P



C-27-P

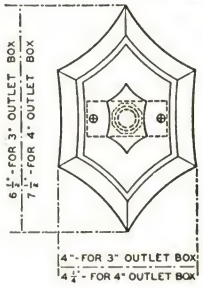
Dimension Diagrams of Ceiling Lights

Right:

Wall Fixture Flange

Fixtures cover 3 in. outlet boxes.

4¼ x 7½ in. flange for 4 in. boxes (except C-29-SP and C-34-SP) $3.00 each



Colored Accessories Any Color

Prices

1 to 25 articles (same color) add 25% to above prices

25 articles and over (same color) same as above prices

These accessories are made of solid forged brass, finished in Crodon (chromium plate), Wyco (white) or colors (on order).

For Old Sheffield finish, add 10% to Crodon prices. Crystal or Opal Glass at prices shown. For Black Glass, add 10% of Crodon prices. Twenty year coin gold plate or silver plate furnished on order only.

Mounting—Flanges fit tightly against wall; all supporting screws are concealed. They are easily removed while walls are being redecorated.

Specify whether type "S" (concealed screw) or "SA" (anker-in) back plates are wanted. Example—C-507-S (concealed screw) or C-507-SA (anker-in).

Colored Accessories on Pages 17 and 18 (Any Color)—*1 to 25 Articles (Same Color)*—Add 25% to prices shown. *25 Articles and Over (Same Color)*—Same prices as shown.

⅞" Square Polished Cut Glass Towel Bar
Wall flange, 2¼"; Projection, 3½"
W-506-S or SA (Wyco) 18" **$8.40,** 24" **$9.60,** 30" **$10.80,** 36" **$12.00**
C-506-S or SA (Crodon) 18" **$9.40,** 24" **$10.60,** 30" **$11.80,** 36" **$13.00**
For Wood Sheet Wyco Bars, deduct 25 per cent. from above prices

1" Round Towel Bar
Wall flange, 2¼"; Projection, 3¼"
W-507-S or SA (Wyco) 18" **$5.60,** 24" **$6.20,** 30" **$6.80,** 36" **$7.40**
C-507-S or SA (Crodon) 18" **$6.40,** 24" **$7.00,** 30" **$7.60,** 36" **$8.20**

1" Round Towel Bar
Wall flange, 2¼"; Projection, 3¼"
W-509-S or SA (Wyco) 18" **$5.80,** 24" **$6.40,** 30" **$7.00,** 36" **$7.60**
C-509-S or SA (Crodon) 18" **$6.80,** 24" **$7.40,** 30" **$8.00,** 36" **$8.60**

⅜x¾" Rectangular All Metal Towel Bar
Wall flange, 2¼"; Projection, 3"
W-510-S or SA (Wyco) 20" **$3.70,** 24" **$3.95,** 30" **$4.30**
C-510-S or SA (Crodon) 20" **$4.45,** 24" **$4.75,** 30" **$5.20**

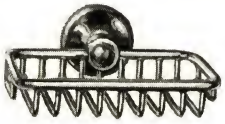
Left:
Tumbler and Toothbrush Holder
Wall flange, 2¼"
Width, 3¼"
Height, 5"
Projection, 4"
W-811-S or SA $4.80
C-811-S or SA $5.80

Strop or Bag Hook
Projection, 1¼"
Height, 1"
W-2-S (Wyco) **$.60**
C-2-S (Crodon) **.70**

1" Grab Bar
Wall flange, 2¼"; Projection, 2¾"
W-516-S or SA (Wyco) 6" **$5.60,** 9" **$5.90**
C-516-S or SA (Crodon) 6" **$6.60,** 9" **$6.90**

Strop or Bag Hook
Wall flange, 2¼"
Projection, 2¼"
W-4-S or SA $1.60
C-4-S or SA $1.90

1½" Grab Bar
Wall flange, 3"; Projection, 3½"
W-518-S or SA (Wyco) 9" **$9.90;** 12" **$11.20,** 18" **$13.80,** 24" **$16.30**
C-518-S or SA (Crodon) 9" **$11.10,** 12" **$12.40,** 18" **$15.00,** 24" **$17.50**



Soap Holder
Wall flange, 2¼"
Projection, 4¾"
Dish size, 6x3½x1"
W-711-S or SA (Wyco) **$4.00**
C-711-S or SA (Crodon) **$4.80**
Same as above, only to fit over rim of tub:
W-708 (Wyco) **$3.30**
C-708 (Crodon) **$4.00**

Soap Holder
Wall flange, 2¼"; Projection, 5¾"
Dish size—6¼x5x2"
W-704-S or SA (Wyco) **$3.80**
C-704-S or SA (Crodon) **$4.40**
For china dish—add **$1.50**
For drain hole—add **$0.50**

Tub Soap Holder
(as above)
Wall flange, 2¼"; Projection, 6½"
Dish size—7¼x5¾x2"
W-715-S or SA (Wyco) **$5.80**
C-715-S or SA (Crodon) **$6.50**
For china dish—add **$1.50**
For drain hole—add **$0.50**

Toothbrush Holder
Wall flange, 2¼"
Width, 3"
Projection, 2¼"
W-841-S or SA $2.70
C-841-S or SA $3.20

Coat and Hat Hook
Wall flange, 2¼"
Projection, 1"
Height, 3½"
W-13-S or SA $2.30
C-13-S or SA $2.80

Tumbler Holder
Wall flange, 2¼"
Width, 3¼"
Height, 3¾"
Projection, 4"
W-801-S or SA $3.60
C-801-S or SA $4.30

1½" Grab Bar
Wall flange, 3¼"; Projection, 4"
W-513-S or SA (Wyco) 9" **$10.40,** 12" **$11.70,** 18" **$14.30,** 24" **$16.80**
C-513-S or SA (Crodon) 9" **$11.70,** 12" **$13.00,** 18" **$15.60,** 24" **$18.10**

Soap and Sponge Holder
Wall Flange, 2¼"
Height, 4¼"
Projection, 6"
W-725-S or SA (Wyco) **$8.40**
C-725-S or SA (Crodon) **$10.00**
Same as above, only to fit over rim of tub:
W-712 (Wyco) **$6.50**
C-712 (Crodon) **$7.80**

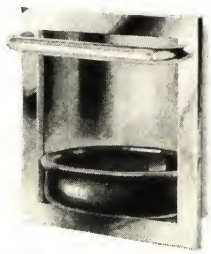
Toothbrush Holder
Wall flange, 2¼"
Height, 2¾"
Projection, 4"
W-813-S or SA $2.80
C-813-S or SA $3.40

Metal Soap Holder
Wall flange, 2¼"
Width, 4½"
Projection, 4"
Dish size, 4½x2¾x1¼"
W-717-S or SA $3.70
C-717-S or SA $4.50

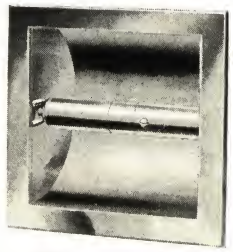
Double Robe Hook
Wall flange, 2¼"
Width, 3"
Projection, 2¾"
W-8-S or SA $2.00
C-8-S or SA $2.40

C-183-S.....$20.00
Recess Toilet Paper Box
Use 5x7" sheet paper
Width, 6½"
Height, 9"
Depth, 2½"
Exact Opening:
5⅞" Wide, 8⅜" High, 2½" Deep

C-184-S.....$10.00
Recess Soap or Tumbler Holder
Width, 7"
Height, 7"
Depth, 3½"
Exact Opening:
6⅛" Wide, 5⅞" High, 3⅜" Deep



C-185-S.....$12.00
Recess Soap Holder and Grab Bar
Width, 7"
Height, 7"
Depth, 3½"
Projection, 2¼"
Exact Opening:
6⅛" Wide, 5⅞" High, 3⅜" Deep
Black or crystal dish

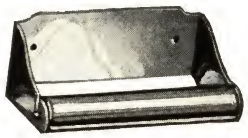


C-182-S.....$10.00
Recess Toilet Paper Holder
Takes standard 5" roll toilet paper
Width, 7"
Height, 7"
Depth, 3½"
Exact Opening:
5⅞" Wide, 6⅛" High, 3⅜" Deep

S-181-S....$8.50
Recess Toilet Paper Box
Takes folded paper
Width, 5"
Height, 6"
Depth, 2⅛"
Exact Opening:
4¼" Wide
5¼" High
1⅞" Deep

C-186-S..$10.00
Surface Toilet Paper Box
Takes folded paper
Width, 4¼"
Height, 6"
Depth, 2"

Swing Towel Bar
Wall flange, 2x3½"
Length, 12"; Dia. of bars, ⅜"
Flange hook, ⅞"
W-500-S or SA (Wyco) **$4.60**
C-500-S or SA (Crodon) **$5.50**

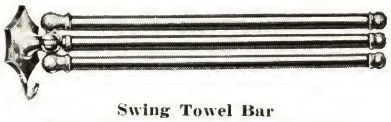


Exposed Screw Roll Paper Holder
Width, 5¼"
Exposed Screw only
W-853 (Wyco) **$2.50**
C-853 (Crodon) **$3.00**

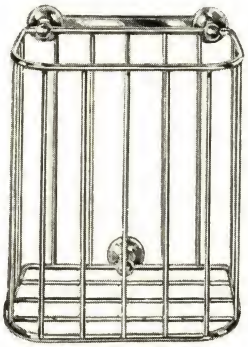
Roll Paper Holder
Wall flange, 2¼" Width, 8¼"
C-C of Posts, 6"
W-856-S or SA (Wyco) **$5.80**
C-856-S or SA (Crodon) **$7.00**

Roll Paper Holder
Wall flange, 2¼"; Width, 8½"
C-C of Posts, 6½"
W-850-S or SA (Wyco) **$5.60**
C-850-S or SA (Crodon) **$6.70**

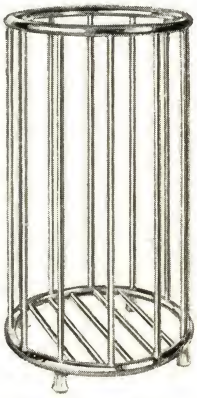
Solid Brass Paper Box
Exposed Screw only
Size, 7x6x1¾"
Use 5x7" paper
W-851 (Wyco on Brass) **$4.20**
C-851 (Crodon on Brass) **$5.00**



Swing Towel Bar
Wall flange, 2x3½"; Length, 16";
Bars, ⅜" diameter
Flange hook, ⅞"
W-504-S or SA (Wyco finish) **$8.00**
C-504-S or SA (Crodon finish) **$9.60**

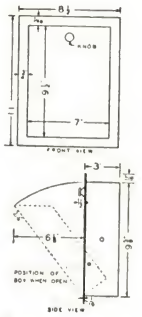


Soiled Towel Basket
Width, 12¾"; Height, 16";
Projection, 6¼"
W-553-S or SA (Wyco) **$20.00**
C-553-S or SA (Crodon) **$24.00**



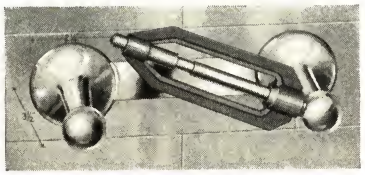
Soiled Towel Basket
Diameter, 10½";
Height, 19"
W-554 (Wyco) **$20.00**
C-554 (Crodon) **$24.00**

Recess Paper Box
W-854 (Wyco on Steel) **$12.00**



Solid Brass Paper Box
(Exposed Screw only)
Size 5½x8x1¾"
W-855 (Wyco) **$4.20**
C-855 (Crodon) **$5.00**
Use 5x7" paper

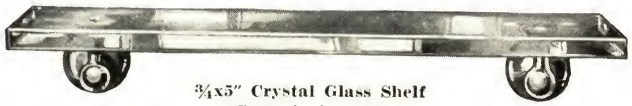
Towel Pin
Wall flange, 2¼"
Flange hook, ⅞"
Height, 4¼"
Projection, 3¾"
W-514-S or SA
(Wyco) **$2.50**
C-514-S or SA
(Crodon) **$3.00**



Tension Spring Roll Paper Holder
(Patent 1665739)
Holder shown in open position
Wall flange, 2¼"; Width, 8"
C-862-S or SA (Crodon only) **$7.00**

⅜x5" Crystal or Opal Glass Shelf
Spring Brackets
Patent 1779236
Wall flange, 2¼"; Projection, 5¾"
W-600-S or SA (Wyco) 18" **$8.60**, 24" **$9.80**, 30" **$11.00**, 36" **$12.20**
C-600-S or SA (Crodon) 18" **$9.60**, 24" **$10.80**, 30" **$12.00**, 36" **$13.20**

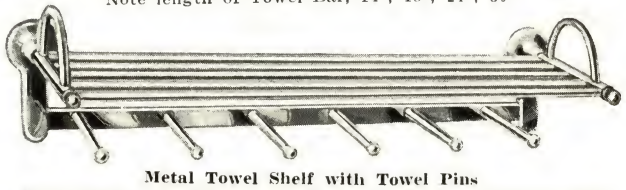
⅜x5" Crystal or Opal Glass Shelf with Tumbler Holders
Wall flange, 2¼"; Height overall, 5"; Projection, 5½"
W-601-S or SA (Wyco) 24" **$12.50**, 30" **$13.70**, 36" **$14.90**
C-601-S or SA (Crodon) 24" **$14.00**, 30" **$15.20**, 36" **$16.40**



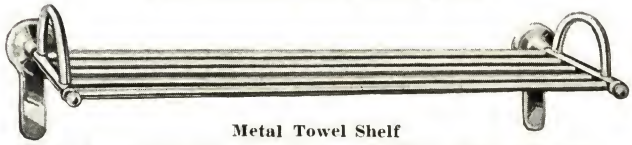
¾x5" Crystal Glass Shelf
(Crystal glass only)
Wall flange, 2¾"; Height overall, 3¾"; Projection, 5¼"
W-608-S (Wyco) 24" **$20.10**, 30" **$22.50**
C-608-S (Crodon) 24" **$22.10**, 30" **$24.50**

⅜x5" Crystal or Opal Glass Shelf and 1" Towel Bar
Wall flange, 2¼"; Projection, 5¼"; Height, 4¼"
W-614-S or SA (Wyco) 18" **$12.30**, 24" **$14.10**, 30" **$15.90**, 36" **$17.70**
C-614-S or SA (Crodon) 18" **$13.60**, 24" **$15.40**, 30" **$17.20**, 36" **$19.00**
Note length of Towel Bar, 14", 18", 24", 30"

Metal Towel Shelf
Wall flange, 1¼x5⅛"; Length overall, 25¼"; Projection, 8½"
W-621 (Exposed Screw only) **$9.00**
C-621 (Exposed Screw only) **$11.00**



Metal Towel Shelf with Towel Pins
Wall flange, 2¼x5¼"; Length overall, 26¼"; Projection, 8½"
W-619-S or SA (Wyco) **$18.00**
C-619-S or SA (Crodon) **$22.00**



Metal Towel Shelf
Wall flange, 2¼x5¼"; Length overall, 26¼"; Projection, 8½"
W-618-S or SA (Wyco finish) **$10.00**
C-618-S or SA (Crodon finish) **$12.00**

Solid Brass Guard Rail for 5" Glass Towel Shelves
W-612 (Wyco) 18" **$3.50**, 24" **$3.60**, 30" **$3.70**, 36" **$4.50**
C-612 (Crodon) 18" **$4.20**, 24" **$4.30**, 30" **$4.40**, 36" **$5.40**

A beautiful and distinctive design by HOEGGER which may be matched with cabinets and lighting fixtures, and which will add charm to the most luxurious bathroom.

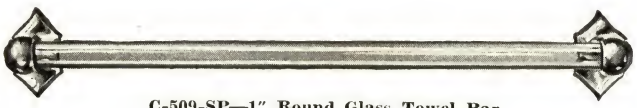
Glass can be furnished in clear crystal, white opal (vitrolite), or black at the prices shown.

Brackets of fixtures are furnished in either Crodon (chromium plate), as illustrated, or Wyco (white), at the prices shown. For Old Sheffield finish, add 10%. Prices of 20-year Coin Gold Plate and silver plate furnished on request.

Colored Accessories (Any Color) *Pages 15 and 16—1 to 25 Articles (Same Color)*—Add 25% to prices shown. *25 Articles and Over (Same Color)*—Same prices as shown.

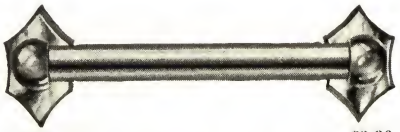
All Metal Towel Bars at prices shown

C-506-SP—⅞" Square Polished Cut Glass Towel Bar
Wall flange, 2x3½"; Projection, 3¾"
Prices—18" $11.30, 24" $12.50, 30" $13.70, 36" $14.90
Clear Crystal, White Opal or Black Glass at above prices



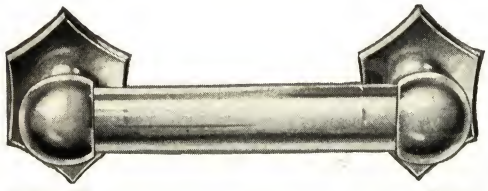
C-509-SP—1" Round Glass Towel Bar
Wall flange, 2x3½"; Projection, 3¾"
Prices—18" $8.60, 24" $9.20, 30" $9.80, 36" $10.40
Clear Crystal, White Opal or Black Glass at above prices

C-600-SP—¾x5" Glass Shelf Spring Brackets
(Patent 1779236)
Wall flange, 2x3½"; Projection, 5½"
Prices—18" $11.50, 24" $12.70, 30" $13.90, 36" $15.10
Clear Crystal, White Opal or Black Glass at above prices



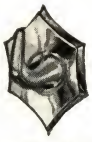
C-516-SP **$8.80**
1" All-Metal Grab Bar
Center to center of brackets, 9"; Wall flange, 2x3½"; Projection, 2½"
Width, 11"

C-8-SP, $3.30
Double Robe Hook
Wall flange, 2x3½"
Width, 3¼"
Projection, 3"



C-513-SP **$12.90**
1½" Glass Grab Bar
Center to center of brackets, 9"; Wall flange, 2⅞x4"; Projection, 3½"
Width, 12"

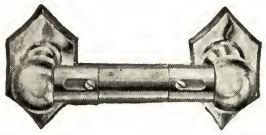
C-514-SP, $4.00
Towel Pin and Robe Hook
Wall flange, 2x3½"
Height, 4¼"
Projection, 3¾"



C-4-SP, $2.80
Strop or Bag Hook
Wall flange, 2x3½"
Projection, 2"

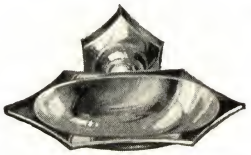
C-813-SP, $4.00
Toothbrush Holder
Wall flange, 2x3½"
Width, 2⅜"
Projection, 3⅞"

C-801-SP, $5.30
Tumbler Holder
Wall flange, 2x3½"
Width, 3"
Height, 4¼"
Projection, 4"



C-856-SP **$8.00**
Toilet Paper Holder
Takes standard 5" roll toilet paper
Center to center of brackets, 6"
Wall flange, 2x3½"
Width, 7½"

C-10-SP, $3.00
Strop or Bag Hook
Wall flange, 2x3½"
Projection, 2⅞"



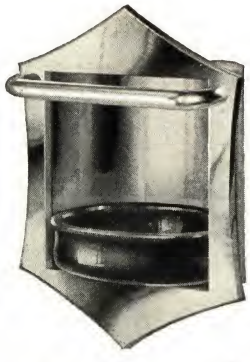
C-717-SP **$5.50**
All-Metal Soap Holder
Wall flange, 2x3½"
Width, 4½"
Projection, 3¾"
With drain holes—same price

C-704-SP—Small Soap Dish, $5.40
Wall flange, 2x3½"; Projection, 6"
Dish size, 6¼x5x2"
With drain hole, add $0.50
C-715-SP—Large Soap Dish, $7.50
Wall flange, 2x3½"; Projection, 6¾"
Dish size, 7¼x6x2"
With drain hole, add $0.50
Clear Crystal, White Opal or Black Glass Dishes at above prices

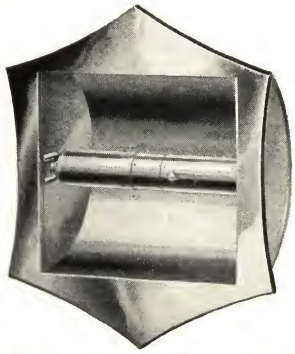
C-841-SP, $4.20
Toothbrush Holder
Wall flange, 2x3½"
Width, 2½"
Projection, 3⅜"

C-173-SP **$28.00**
"Parfait" Recess Toilet Paper Box
Use 5x7 sheet paper
Width, 7¼"; Height, 11⅝"; Depth, 2⅝"
Exact Opening:
5⅞" Wide, 8¼" High, 2½" Deep

C-174-SP **$18.00**
"Parfait" Recess Soap or Tumbler Holder
Width, 7⅞"; Height, 10⅛"; Depth, 3½"
Exact Opening:
6⅛" Wide, 5⅞" High, 3⅜" Deep
Black or Crystal Dish



C-175-SP **$20.00**
"Parfait" Recess Soap Holder and Grab Bar
Width, 7⅜"; Height, 10⅛"; Depth, 3½"
Projection, 2¼"
Exact Opening:
6⅛" Wide, 5⅞" High, 3⅜" Deep
Black or Crystal Dish



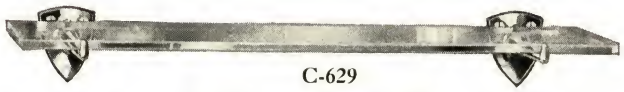
C-172-SP **$18.00**
"Parfait" Toilet Paper Holder
Takes Standard 5" Roll Toilet Paper
Width, 7⅞"; Height, 10⅛"; Depth, 3½"
Exact Opening:
5⅞" Wide, 6⅛" High, 3⅜" Deep

C-171-SP **$16.00**
"Parfait" Recess Toilet Paper Box
Takes Folded Paper
Width, 5¼"; Height, 8"; Depth, 1¾"
Exact Opening:
4¼" Wide, 5¼" High, 1⅞" Deep

"Parfait" Bathroom Accessories

"SHIELD" ACCESSORIES BY HOEGGER

This popular priced exposed screw line is made of solid forged brass finished in "Crodon" (chromium plate) and has the same careful workmanship and finish as all Hoegger products.



C-629

$\frac{5}{16}$x5" Crystal Glass Shelf
Wall Flange 2x2½", Projection 5½"
List Price
C-629—18"—**$4.90.** C-629—24"—**$5.20**

C-649

$\frac{5}{16}$x5" Black Glass Shelf
Wall Flange 2x2½", Projection 5½"
List Price
C-649—18"—**$7.60.** C-649—24"—**$8.80**

C-529

¾" Crystal Glass Towel Bar
Wall Flange 2x2½", Projection 3"
List Price
C-529—18"—**$3.50.** C-529—24"—**$3.80.** C-529—30"—**$4.10**

C-539

¾" All Metal Towel Bar
Wall Flange 2x2½", Projection 3"
List Price
C-539—18"—**$3.60.** C-539—24"—**$4.00.** C-539—30"—**$4.40**

C-809

Tumbler Holder
Wall Flange 2x2½", Width 3",
Height 4", Projection 4"
List Price—$2.00

C-549

¾" Black Glass Towel Bar
Wall Flange 2x2½", Projection 3"
List Price
C-549—18"—**$3.70.** C-549—24"—**$4.10.** C-549—30"—**$4.50**

C-849

Toothbrush Holder
Wall Flange 2x2½", Width 2½",
Height 2¾", Projection 3¾"
List Price—$1.50

C-559

All Metal Grab Bar, ¾x9"
Wall Flange 2x2½", Width 10¾",
Projection 2½"
List Price—$3.40

C-19

Hook
Wall Flange 2x2½",
Projection 2½"
List Price—$1.00

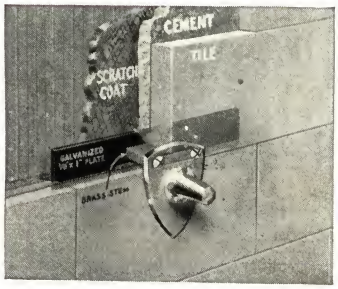
C-729

Metal Soap Dish
Wall Flange, 2x2½", Width
4½", Height, 3¼",
Projection 4"
List Price—$2.30

C-869

Paper Holder
Center to Center of Posts 6", Wall
Flange 2x2½", Width 7¾"
List Price—$3.50

Wall Anchor Bars



Used only on new work. The bars are installed on top of a course of tile nearest the proper height and location of fixture. The bars are installed in advance as the fixture should not be installed until the rooms are completely decorated.

Warning: Bars should be installed so that brass blocks are flush or slightly in back of tile surface but must not extend beyond tile surface.

To specify these wall anchor bars write a "B" after the catalogue number, for example C-629-B.

ACME METAL PRODUCTS CORPORATION

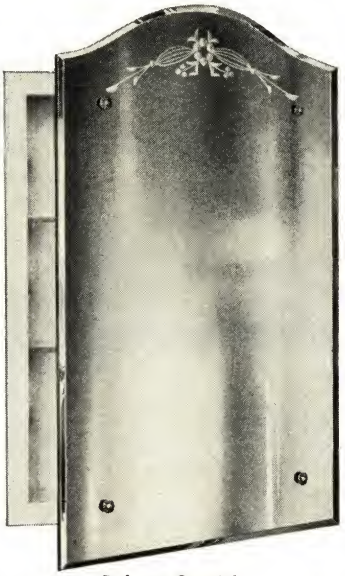
Manufacturers of Bathroom Cabinets and Access Panels

4217-23 Belle Plaine Avenue
CHICAGO, ILL.

For Majestic All-steel Kitchen Units, see Manufacturers' Index

The Majestic DeLuxe Special

A superior quality bathroom cabinet for installation in a limited space. The Majestic DeLuxe Special has been designed to fill this requirement. It has proved itself a leader in popularity and is now in wide demand the country over. The bevel-edge plate glass mirror will serve as a finishing touch to the equipment and appointments of the finest bathroom. The floral design is simple but effective in accentuating an atmosphere of conservative luxury. The Majestic DeLuxe Special is a cabinet in a class by itself. In quality of materials, design and workmanship, it cannot be surpassed at its surprisingly reasonable price. The cabinet follows the DeLuxe models in style and specifications. It is made throughout of 20 and 22-gauge patent leveled furniture steel. All joints and corners are acetylene-welded, ground and polished. Equipped with two adjustable glass shelves. The finish is a beautiful lustrous white enamel, baked-on. When installed, the cabinet is entirely concealed by the mirror. This is made of selective silvering quality plate glass. It is mounted on a polished, leveled steel plate which forms the back of the door. Rosettes of special design hold it in position. A $\frac{1}{16}$-in. pad between the mirror and mounting plate prevents strain on the glass.



DeLuxe Special

Mirror	Door swing	Outside measurements	Wall opening required	Approximate shipping weight
18″ x 26″	Right or left	17¼″ x 22¾″	16″ x 21¼″	50 lb.
16″ x 24″	Right or left	15¼″ x 20¾″	14″ x 19¼″	45 lb.
14″ x 22″	Right or left	13¼″ x 18¾″	12″ x 17¼″	40 lb.
14″ x 20″	Right or left	13¼″ x 16¾″	12″ x 15¼″	38 lb.

Majestic Popular Cabinets

With these models Majestic has brought the attractive durability of all steel cabinets within the easy reach of every apartment and home builder. The cost of these fine cabinets installed is actually less than wood construction

They are highly refined with special attention to every detail that makes for richness in appearance, durability and convenience for use and ease in cleaning.

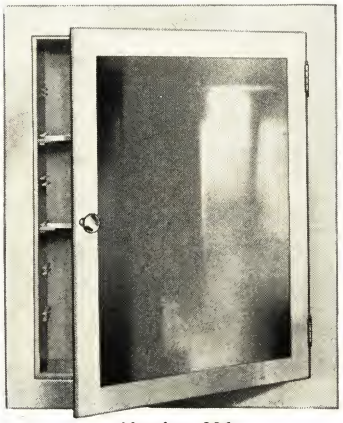
The door opening is rabbeted and the door, which is flush with front of the case, is of the box type, giving a smooth, substantial and pleasing appearance.

In closing, the door is cushioned by the air in the case, which eliminates the noise that is often found in other types. The automatic catch also acts as a door stop, so that the enamel on the door does not come in contact with the enamel on the body.

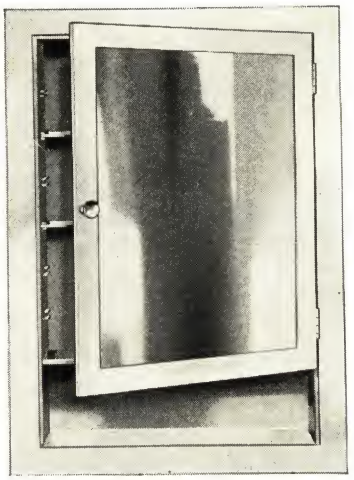
Majestic Popular Bathroom Cabinets are made of 20 and 22-gauge highest quality furniture steel. All joints and corners are electric spot-welded, ground and polished.

The mirrors are made of selective silvering quality plate and are mounted on a steel back which fits in the door and is fastened by screws.

Doors are fitted with semi-invisible plated hinges fastened to frame, finished in baked-on snow white enamel.



Number 800



Number 803

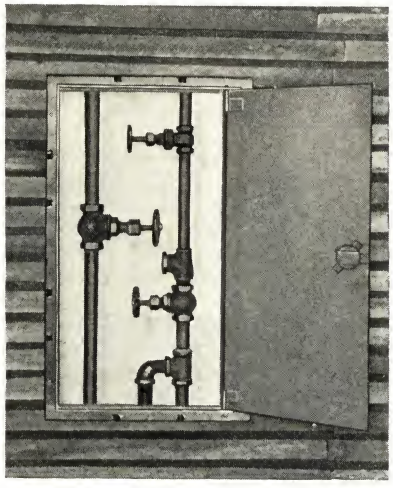
No.	Mirror	Door swing	Outside measurements	Wall opening required	Approximate shipping weight
800	12″ x 16″	Right or left	16″ x 20″	13″ x 17″	35 lb.
803	12″ x 16″	Right or left	16″ x 26″	13″ x 23″	40 lb.
805	14″ x 18″	Right or left	20⅜″ x 24¾″	16¾″ x 20¾″	47 lb.
807	14″ x 18″	Right or left	20⅜″ x 29⅜″	16¾″ x 25¾″	60 lb.
810	16″ x 20″	Right or left	22½″ x 26½″	18¼″ x 22¼″	56 lb.
812	16″ x 20″	Right or left	22½″ x 31½″	18¼″ x 27¼″	70 lb.

Majestic Access Panels

To obtain access to hidden plumbing, steam pipes, wiring, etc., these Majestic units are ideal. They permit ready access any time without the necessity for tearing out a plastered wall. And the universal type of construction used in Majestic units makes them adaptable for all types of installation.

The door of the Majestic is hinged to swing open. Note also the substantial locking device that holds the door flush with the frame when closed and can be locked or unlocked by inserting a screwdriver and giving it a half turn. The cracks between the door and the frame may be filled with putty and the whole unit may be painted or papered over if desired.

The frames are made of 12-gauge and the doors of ⅛-in. stretcher leveled steel. The corners are strongly reinforced and the door locks firmly in place. The edges of the frame and the door panel are installed flush with the plastering. The door fits against the angle sills when closed—a feature which makes the Majestic Access Unit dust-tight. Also note that the flanges have plated hooks.



Majestic Access Panels

Cat. No.	Panel size	Wall opening
MA-810	8″ x 10″	8½″ x 10½″
MA-1316	13⅛″ x 16″	13¾″ x 16½″
MA-1324	13⅛″ x 24″	13¾″ x 24½″
MA-1924	19⅛″ x 24″	19¾″ x 24½″
MA-1930	19¼″ x 30″	19¾″ x 30⅝″

Catalogue—A complete catalogue will be furnished upon request.

ESTABLISHED 1908

COLUMBIA METAL BOX CO.

TELEPHONE
MOtt Haven 9-4240

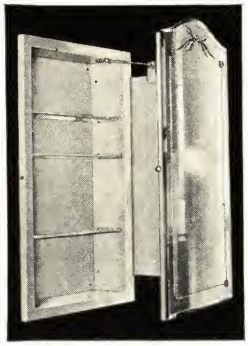
260 East 143rd Street
NEW YORK, N. Y.

Perfectlite, the Medicine Cabinet with the Adjustable Mirror

Door Open Hinge Folded
The Perfectlite hinge lays snugly against back of door, out of the way, but ready for instant use

Hinge Unfolded
A slight pull, the hinge unfolds, bringing mirror forward. Here mirror is swung at a sharp angle but can be pivoted in the opposite direction

The accompanying illustrations show the construction of the Perfectlite Medicine Cabinet and illustrate the advantages of an *adjustable* mirror. Proper reflection cannot be had unless the mirror is in the correct position to pick up the light rays—artificial or natural. This, Perfectlite, *the adjustable mirror cabinet,* does with ease. Swinging to practically any angle, catching the best light, it adjusts itself to the convenience of the user. The extended hinge arrangement on which the mirror swings is concealed from view when the door is closed, is sturdily built and cannot get out of alignment.

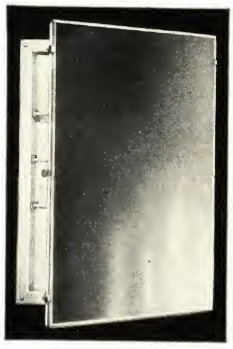


Mirror Extended
Here the mirror is extended straight out from the cabinet and is in position to be turned either right or left to catch the best light reflection

The Perfectlite Cabinet in Use
Convenient access to the contents of the cabinet is obtained with the mirror in use at the same time

Columbia No. 11 or 21

Venetian

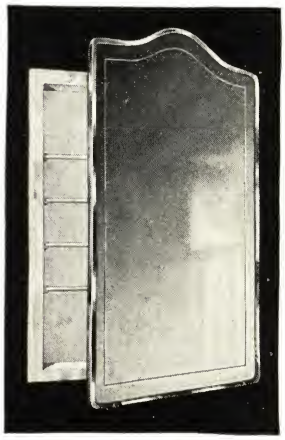


All-Mirror Front

Columbia No. 10, 20 or 30

Structural Features of Columbia-Quality Steel Cabinets

Made of heavy gauge furniture sheet steel, electrically spot-welded. Doors are hung on unusually strong hinges. When closed the door presents a solid front. No cracks or crevices in which dust can collect. Shelves are bulb edge clear glass; adjustable every ¾ in. Knobs are ornamental glass, except on the Venetian mirror and chromium frame cabinets; on these, small nickel knobs are used. Catch is of bullet type to close door securely. All exposed parts finished with a permanent smooth white enamel finish. Other standard colors furnished in quantity.



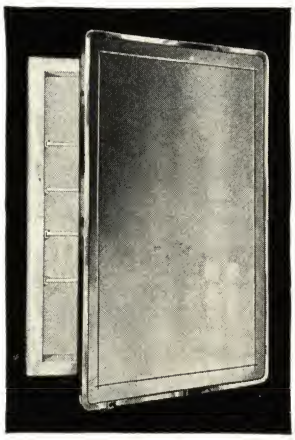
Chromium Frame Venetian

COLUMBIA-QUALITY STEEL CABINETS

Cat. No.	Over all size, in.	Wall opening, in.	Mirror size, in.	Cat. No.	Over all size, in.	Wall opening, in.	Mirror size, in.
11628V	16 x28	14 x24	16 x28	†10A	16⅝x20⅝	14½x18½	12 x16
21830V	18 x30	16 x26	18 x30	10B	16⅝x20⅝	14½x18½	12 x16
32032V	20 x32	18 x28	20 x32	*10P	16⅝x20⅝	14½x18½	12 x16
01624V	16 x24	14 x20	16 x24	†20A	18⅝x22⅝	16½x20½	12 x16
01628V	16 x28	14 x24	16 x28	20B	18⅝x22⅝	16½x20½	12 x16
11724CV	17 x24	14½x18½x3	17⅛x23¾	20C	18⅝x22⅝	16½x20½	14 x18
21926CV	19 x26	16½x20½x3	19⅛x25¾	30B	20⅝x26⅝	18½x24½	16 x22
31928CV	19 x28	16½x22½x3	19⅛x27¾	†11A	16⅝x26⅝	14½x24½	12 x16
42130CV	21⅜x30	19 x25 x3	21⅜x30	11B	16⅝x26⅝	14½x24½	12 x16
11722CS	17 x22	14½x18½x3	17⅛x21¾	21B	18⅝x28⅝	16½x26½	12 x16
21924CS	19 x24	16½x20½x3	19⅛x23¾	21C	18⅝x28⅝	16½x26½	14 x18
31926CS	19 x26	16½x22½x3	19⅛x25¾	†10AW	16 x20	Surface mounting	12 x16
42128CS	21⅜x28	19 x25 x3	21⅜x28	10BW	16 x20		12 x16
11724BV	17 x24	14½x18½x3	17⅛x23¾	†01216AW	14 x18		12 x16
21926BV	19 x26	16½x20½x3	19⅛x25¾	11216AW	16 x20		12 x16
31928BV	19 x28	16½x22½x3	19⅛x27¾	21924BS	19 x24	16½x20½x3	19⅛x23¾
42130BV	21⅜x30	19 x25 x3	21⅜x30	31926BS	19 x26	16½x22½x3	19⅛x25¾
11722BS	17 x22	14½x18½x3	17⅛x21¾	42128BS	21⅜x28	19 x25 x3	21⅜x28
01622AM	16 x22	14 x20	16 x22				

Key explanation: V—Venetian; BV—Black frame Venetian; CV—Chromium Venetian; CF—Chromium frame; AM—All-mirror front.

*Plain plate glass mirror.
†Plain mirrors: not plate glass.
Key explanation: A, plain mirror; B and C, beveled mirror; W, surface mounting.



Chromium Frame Imperial Venetian

Note: Add letter P to Catalogue No. if Perfectlite Adjustable Mirror is desired.

THE CORCORAN MANUFACTURING COMPANY

Manufacturers of Corcoran One-piece Steel Bathroom Cabinets

(Patented—U. S. Patents No. 1802552)

CINCINNATI, OHIO

BRANCH OFFICES AND WAREHOUSES

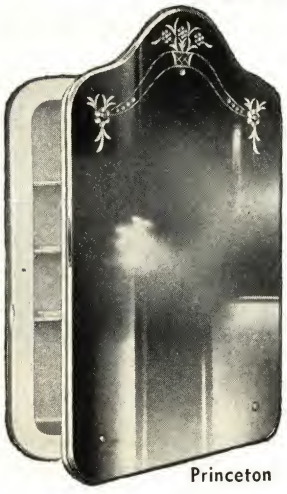
BALTIMORE, MD., 423 West Baltimore St.
CHICAGO, ILL., 1820 McCormick Building
DALLAS, TEX., 2405 McKinney Avenue
LOS ANGELES, CAL.
SAN FRANCISCO, CAL.,
NEW YORK, N. Y., 11 West 42nd Street
PHILADELPHIA, PA., 1228 Locust Street
CANADA: G. Mason Price, 832 St. James Street, MONTREAL, QUE.

Products

CORCORAN BATHROOM CABINETS.

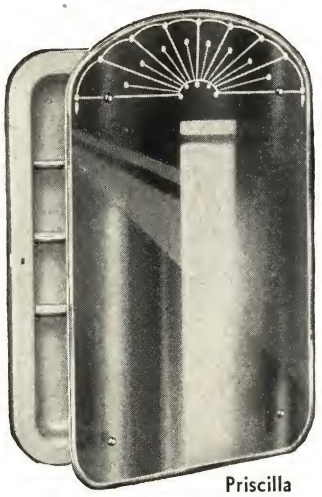
Also Corcoran Special Hotel Type Cabinets including all accessories, such as Towel Rack, Light Fixture, Hook for wet towel and razor strop, corkscrew, opener, etc.; Corcoran Vanity Cabinets with side wings; Nos. 1, 2 and 3 Corcoran Wall Cabinets; Nos. 7 and 8 Corcoran Spice and Extract Cabinets; Corcoran Framed Mirrors; Access Panels; Access and Stationary Bucks.

Corcoran One-piece Steel Bathroom Cabinets



Princeton

The bodies and flanges of Corcoran Cabinets are drawn from one piece of heavy gauge extra deep drawing steel—not two or more pieces of lighter gauge steel welded or seamed together. There are *no welded joints—no lap seams—no cracks—no raw edges—no sharp corners.* Corcoran Cabinets present features of design and construction entirely new and of outstanding superiority. Our catalogue describes in detail each individual cabinet—write for your copy today.



Priscilla

Distinctive Features

(1) Entire cabinet body and flange drawn from one continuous piece of steel.

(2) Round corners—inside and outside—easy to clean and keep clean.

(3) Continuous piano type door hinge of brass—heavily nickelplated. Will not sag or warp.

(4) Three heavy bulb edge glass shelves notched in ends to prevent slipping—easily removed.

(5) Shelf supports of nickeled brass held in place with special type screws and double locking washers.

(6) *New automatic door opener.* Press nickelplated bolt on return flange and door opens. Positive in action. Latest improvement—an exclusive Corcoran feature.

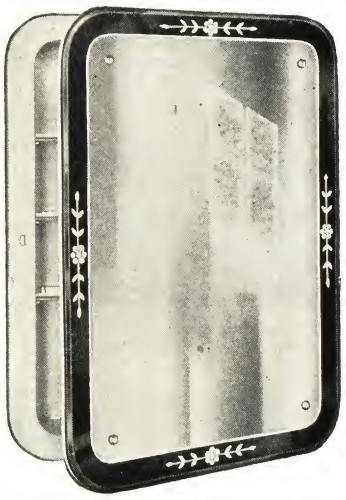
(7) *The brass spring plunger* acting in conjunction with door fastener also serves as cushion when closing door, thus preventing mirror breakage.

(8) Nickelplated combination chain with heavy spring door stop.

(9) Four nickelplated bolts and nuts for fastening mirrors to doors.

(10) Finished with pyroxylin lacquer. The prime coat is baked on at a temperature of 360°. No cheap enamels used.

(11) Mirrors are guaranteed against defective silvering for one year. Any defects will always show up long before this time.



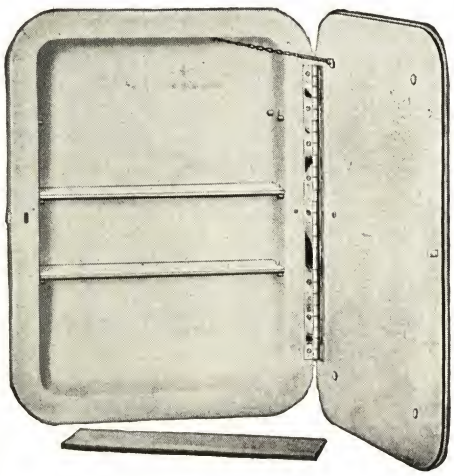
Little Aristocrat and Aristocrat and Autocrat

SIZES, WALL OPENINGS AND PRICES

Model	Mirror, size, in.	Wall opening, in.	List price, each
Venetian Mirror Type			
Avon	16x22	13¼x19¼x3¼	$18.00
Clifton	18x24	15¼x21¼x3¼	22.00
Melrose	21x27	18¼x24¼x3¼	27.00
Little Aristocrat	16x22	13¼x19¼x3¼	22.00
Aristocrat	18x24	15¼x21¼x3¼	26.50
Autocrat	21x27	18¼x24¼x3¼	30.00
Beechmont	16x24	13¼x19¼x3¼	20.00
Princeton	18x28	15¼x21¼x3¼	26.00
Tuxedo	21x30	18¼x24¼x3¼	32.00
Clovernook	16x24	13¼x19¼x3¼	21.00
Glendale	18x26	15¼x21¼x3¼	24.00
Priscilla	21x30	18¼x24¼x3¼	28.00
Cathedral	18x25	15¼x21¼x3¼	30.00
Alhambra Jr.	16x24	13¼x19¼x3¼	26.00
Alhambra	18x28	15¼x21¼x3¼	32.00
Moderne	18x26	15¼x21¼x3¼	34.00
Vogue	21x30	18¼x24¼x3¼	38.00
Peerless	21x30	18¼x24¼x3¼	28.00
Commander	18x26	15¼x21¼x3¼	36.00
Admiral	21x30	18¼x24¼x3¼	44.00
Corcoran Vanity Cabinets			
Ladye Faire	18x28	15¼x21¼x3¼	$60.00
Commander	21x30	18¼x24¼x3¼	80.00

Prices on all colored mirrors are based on furnishing standard colors. If other colors are desired, add $1.00 to list price.

All venetian mirror cabinets can be furnished with straight line etching only if so desired, at no additional cost. If furnished without etching, deduct $0.50 per cabinet.



SIZES, WALL OPENINGS AND PRICES

Model	Mirror, size, in.	Wall opening, in.	List price, each
Colonial Mirror Type			
20	13x19	13¼x19¼x3¼	$15.00
200	15x21	15¼x21¼x3¼	18.00
250	18x24	18¼x24¼x3¼	23.00
30	13x13	13¼x19¼x3¼	14.00
300	15x15	15¼x21¼x3¼	17.00
350	18x18	18¼x24¼x3¼	22.00
Regular Insert Type			
40	12x18	13¼x19¼x3¼	$11.00
400	14x20	15¼x21¼x3¼	14.00
450	16x22	18¼x24¼x3¼	19.00
50	12x12	13¼x19¼x3¼	10.00
500	14x14	15¼x21¼x3¼	12.50
550	16x16	18¼x24¼x3¼	18.00
60	10x16	13¼x19¼x3¼	9.50
600	12x18	15¼x21¼x3¼	12.00
650	14x20	18¼x24¼x3¼	17.00
70	10x10	13¼x19¼x3¼	9.00
700	12x12	15¼x21¼x3¼	11.00
750	14x14	18¼x24¼x3¼	16.00

HENKEL "EDGE-LITE" CORPORATION

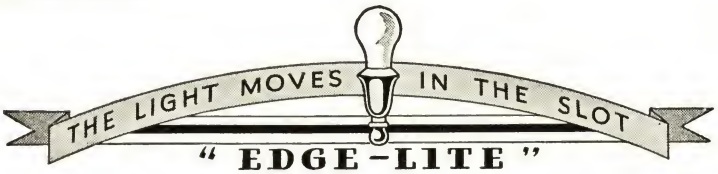
"Edge-Lite" Bathroom Cabinets, Mirrors and Vanities

SHOWROOMS
900 No. Franklin Street, CHICAGO, ILL. 19 W. 44th Street, NEW YORK, N. Y.
IN CANADA: Corporate Steel Products, Ltd., Architects Building, MONTREAL, QUE.

"THE LIGHT MOVES IN THE SLOT"

Moderne

Designed in keeping with the growing trend in decoration, the Moderne "Edge-Lite" is in great demand for the better-class homes, apartments, and hotels. All decorations harmonize with the modernistic design cut in the plate glass mirror. Three sizes: Catalog No. 222M, 16½x25½ in. overall; Catalog No. 232M, 21¼x29½ in. overall; Catalog No. 242M, 21x33½ in. overall. Three standard color combinations; orchid door, orchid box; green door, green box; black door, ivory box. Shipped ready to install.



" EDGE-LITE "

"Edge-Lite" Cabinets fall into that class of equipment that helps win apartment tenants and hotel guests because they are instantly seen and liked.

All "Edge-Lites" incorporate two light fixtures that slide in slots in the mirror frame. This exclusive betterment eliminates facial shadow, giving the same facial light effect as a movie-star's dressing and cosmetic mirror. Shaving is made pleasurable, cosmetic application more effective.

Moreover, these fixtures flood the bath with even light, eliminating ceiling and wall fixtures, outlets and wiring as demonstration proves—a valuable saving particularly in apartments, hotels and clubs.

"Edge-Lite" patented fixture brackets slide at finger touch, are tested for years of faultless service. Mirrors are flawless plate, held in aluminum slides; the rosette attachment is not used. Cabinet doors are one-piece die-cast white brass, cushioned. Cabinets are corrosion-proof steel. Each "Edge-Lite" is ready to install, completely wired by union labor. "Edge-Lites" come in an infinite range of sizes, styles and finishes for homes, apartments, clubs, hotels. Also made in bench, vanity and mirror sets for theatre and club public rooms, etc. Ask for filing catalog.

A Few "Edge-Lite" Installations

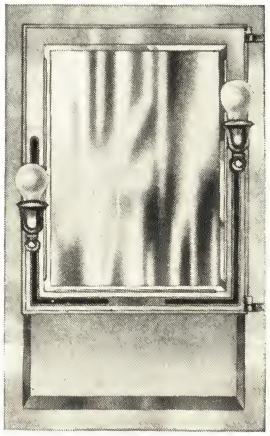
Town House, New York, N. Y.
Mayflower Hotel, Akron, Ohio
Schroeder Hotel, Milwaukee, Wis.
Nordic Hotel, Minneapolis, Minn.
Richmond-Leland, Richmond, Va.
Wallen Apartments, Chicago, Ill.
And many others.

University

A conservative model extremely popular for apartment and hotel use. Three shelves within the cabinet with a recessed shelf below. Standard finish: ivory door and green box. Prices for other color combinations on application. Overall dimensions of the University are 19x30x5 in. Ready wired at the factory.

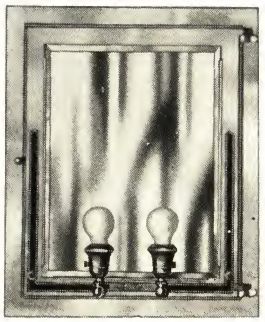
Villa Venice

At Left:
Decorated in the always-admired Venetian style throughout, the Villa Venice enjoys a steady and gaining demand for use in the finer homes, apartments, and hotels. Made in three sizes: Catalog No. 222V, 16½x27½ in. overall; Catalog No. 232V, 19¼x29½ in. overall; Catalog No. 242V, 21x33½ in. overall. Three standard color combinations: orchid door, orchid box; green door, green box; black door, ivory box. Wired at the factory.



Gramere

At Right:
A double-light mirror only, without cabinet, the Gramere is especially suitable for dressing rooms in theatres, hotels, and public buildings. Has 5x18-in. suspended shelf made of black vitrolite, and towel rod. Overall size 18¼x31 in. Mirror size 16½x20½ in. Colors: black or ivory. Wired ready for mounting with 4 screws which are hidden behind removable mirror.



Metropole

At Left:
Complete "Edge-Lite" advantages at minimum cost. Especially suitable for apartment hotels, clubs and public buildings. Box size, 19x23x5 in.; wall opening, 16½x20½x4½ in. Mirror size, 16½x20½ in. Two lights. Color combination: ivory door, green box. Wired at the factory.

J. P. EUSTIS MFG. CO.

12-16 Ames Street
CAMBRIDGE "A" (BOSTON), MASS.

The TRADE MARK *Brasscrafters*

SOLID BRASS BATHROOM ACCESSORIES

Both Stock and Built to Order

Specified by Architects for Over Thirty Years

Including mirrors, medicine cabinets, soap dishes, tumbler holders, towel bars, shelves and brackets.

Accessories with the trade-mark "The Brasscrafters" indented in the metal have been specified by architects for thirty years for residences, hotels, hospitals, institutions, schools and public buildings, and instances of special achievements make a long list of satisfied architects and owners alike.

Hand Book "O," A.I.A. File 29i, presenting a complete line of bathroom accessories will be mailed on request.

BRASSCRAFTERS' "EVALAST" MIRROR-DOOR MEDICINE CABINETS AND MIRRORS

These illustrations below, made from actual photographs (without retouching) of specimens of mirror plates which were submerged constantly in water for over eight months, except for occasional inspection, demonstrate graphically the action of silver under atmospheric moisture when applied by the usual process and by the "Evalast" Process.

Usual Process

Plate I—The deterioration, so apparent in the streaks, crazes, and dullness, is common in mirrors silvered by the usual process. Mirrors so affected may be found everywhere—in homes, on ships, institutions, and public building installations.

"Evalast" Process

Plate II—Shows, in comparison with Plate I, much better than word description can, the perfection and freedom from the usual deterioration which are guaranteed to you when you buy and install the Brasscrafters' "Evalast" Mirrors and Medicine Cabinets.

CONCEALED SCREW ATTACHMENT

(Patent Applied For)

A fixture mounting device used exclusively in connection with "The Brasscrafters" Bathroom and Lavatory concealed screw type accessories.

Secure, rigid, and immovable—assured by the expansion principle of holding.

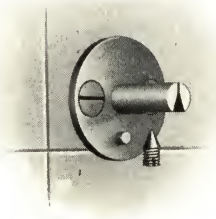


Figure I. Supporting Part and Set Screw

The beveled surface of setscrew enters the beveled surfaces of divisional stem, thereby acting as a wedge (when tightened) to expand the divisional stem apart into the enlarged section of hole in supported part of fixture. (See Figures II and III.)

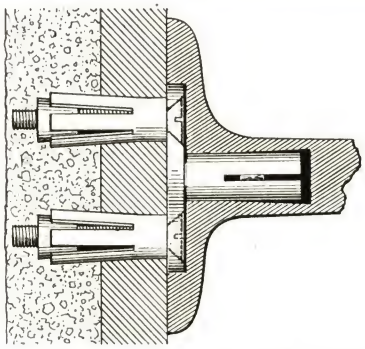


Figure II. Supporting Part and Supported Part or Fixture as Viewed from Top

Before expansion

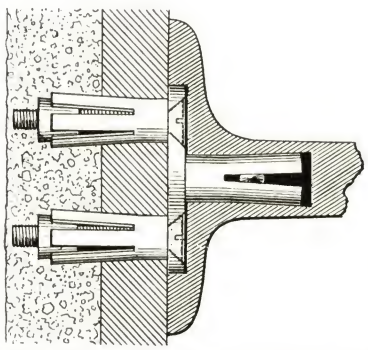


Figure III. Supporting Part and Supported Part or Fixture as Viewed from Top

After expansion

Outstanding Features

No strain on setscrew—it merely acts as a wedge.
Strain is evenly distributed on supported part or fixture and on supporting part.
No hole in stem of supporting part which positively fixes location of supported part or fixture.
Device made in three sizes—small, medium, large.
Fixtures in a given class interchangeable.
No loosening after setscrew is tightened.
Security—rigidity—immovability.
Assured by the expansion principle of holding.

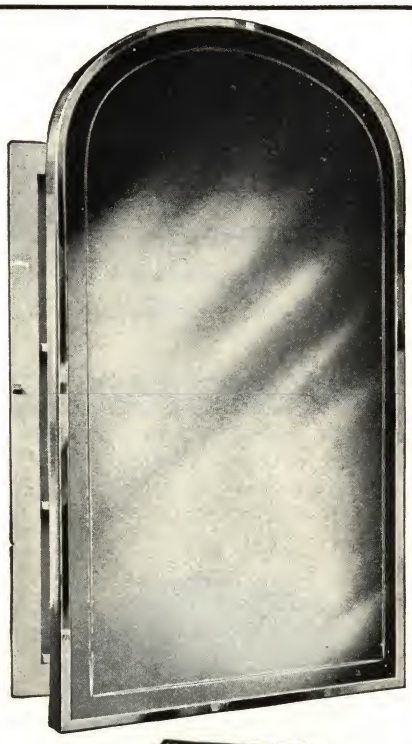
Brasscrafters' Medicine Cabinets Are All Equipped with "Evalast" French Mirror Plates

All Venetian-type Cabinets Can Be Furnished Either with or without ½-in. Metal Frame Around Mirrors

Left:	*Right:*
62019	62018
62029	62028
62059	62058

Left:
Square Top Venetian Type

Right:
Colonial Top Venetian Type



One-piece Steel Medicine Cabinets Secured Against Corrosion by a Special Process Which Seals the Edges as Well as the Surface After Body Has Been Completely Assembled—and Accounts for the Endurance of Brasscrafters' Finishes

Left:			*Right:*	
16010 16020 16025	Full mirror door	16015 16030 16035	Part mirror door open shelf	62016 62026 62056

Left:
Standard Type
Also furnished part mirror door and open shelf below

Right:
Semi-Hex Top Venetian Type

SPECIFICATIONS AND ROUGHING-IN MEASUREMENTS

Chromium finish Lateral edges of back of door	Full mirror door			Part mirror door			Square top			Colonial top			Semi-hex top		
	No.16010	No.16020	No.16025	No.16015	No.16030	No.16035	No.62019	No.62029	No.62059	No.62018	No.62028	No.62058	No.62016	No.62026	No.62056
Extreme of moulded edges....in.	19x25	21x27	23x29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Extreme of mirror plate....in.	.....	.....	.....	.....	.....	.....	18 x24	20 x26	22 x28	18 x28	20 x32	22 x34	18 x30¾	20 x32¾	22 x34¾
Extreme of body flange....in.	.....	.....	.....	.....	.....	.....	17¼x23¾	19¼x25¼	21¼x27¼	17¼x23¾	19¼x25¼	21¼x27¼	17¼x23¾	19¼x25¼	21¼x27¼
Body....in.	15x21	17x23	19x25	15 x21	17 x23	19 x25	15 x21	17 x23	19 x25	15 x21	17 x23	19 x25	15 x21	17 x23	19 x 25
Mirror in door without bevel..in.	14x20	16x22	18x24	14 x14	16 x16	18 x18	.....	.....	.....	.....	.....	.....	.....	.....	.....
Open shelf under door....in.	.....	.....	.....	14⅜x5¾	16⅜x5¾	18¾x5¾	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wall line to face....in.	1	1	1	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wall line to back....in.	⅜	⅜	⅜	⅜	⅜	⅜	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛
Opening required for installation:															
Wide....in.	15¼	17¼	19¼	15¼	17¼	19¼	15⅝	17⅝	19⅝	15⅝	17⅝	19⅝	15⅝	17⅝	19⅝
High....in.	21¼	23¼	25¼	21¼	23¼	25¼	21¼	23¼	25¼	21¼	23¼	25¼	21¼	23¼	25¼
Deep....in.	3⅜	3⅜	3⅜	3⅜	3⅜	3⅜	4⅜	4⅜	4⅜	4⅜	4⅜	4⅜	4⅜	4⅜	4⅜
White vitrolite glass shelves in ea.in.	2	2	3	3	3	3	2	3	3	2	3	3	2	3	3

The plate numbers apply to frameless doors and miter lines as shown.
Manufactured without miter lines and with door framed ½ in. wide with or without miter lines.

"EVALAST" MIRRORS

Homes
Hotels
Schools
Hospitals
Institutions
Public Buildings

Many of the finest hospital installations during the past year have included Brasscrafters' "Evalast" Mirrors for permanency and continued brilliancy.

Frame Material and Finishes

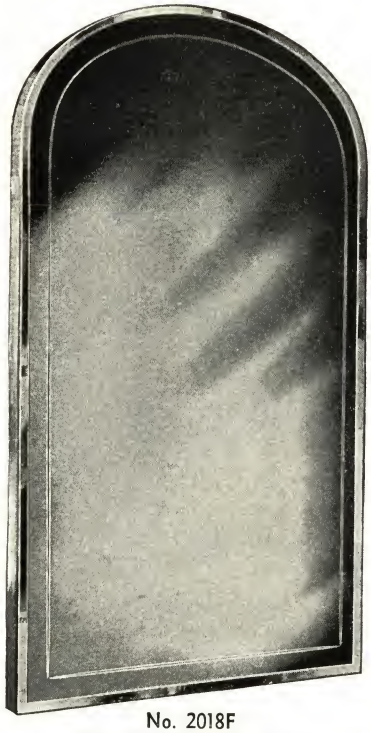
Brass: Ground, Polished, Buffed and Nickel Plated.

Brass: Ground, Polished, Buffed, and Chromium Plated.

Brass: Finished in the Brasscrafters' "White."

Solid White Metal: Ground, Polished and Buffed.

Gold or Silver Plate.



No. 2018F
Sizes 18x28, 20x32, 22x34

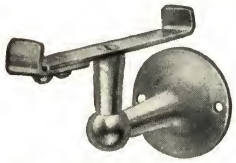
Square Cornered
Round Cornered
Colonial Top
Round
Oval
Special Shapes
Plain or Beveled

Size, in.	Width of frame, in.
10 x 16	1/2
14 x 18	1/2
12 x 20	1/2
14 x 20	3/4
16 x 24	3/4
18 x 24	3/4
20 x 30	3/4
24 x 36	3/4

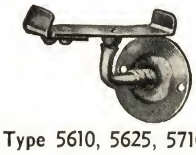
Note: Furnished with or without concealed hanging devices.

Square Corner Plain Mirror

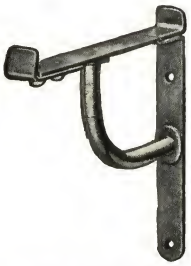
A LISTING OF TYPICAL BRASSCRAFTERS' ACCESSORIES



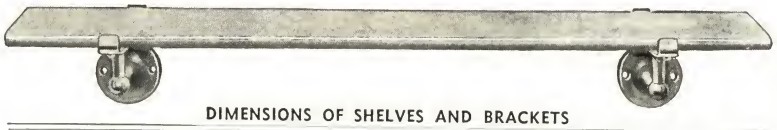
Type 5600, 5615, 5700



Type 5610, 5625, 5710



Type 5605, 5620, 5705

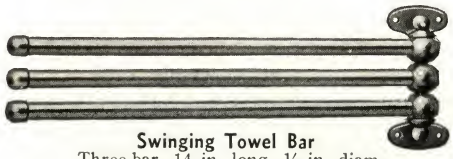


DIMENSIONS OF SHELVES AND BRACKETS

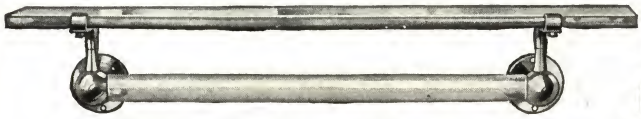
Exposed screw	Concealed screw	Thick, in.	Glass	Width, in.	Length, in.
5600	C-5600	3/8	Polished plate	5 and 6	18, 20, 24, 27, 30
5615	C-5615	1/2	Polished plate	5 and 6	20, 24, 27, 30, 33
5700	C-5700	1/4	White vitrolite	5 and 6	18, 20, 24, 27, 30
5605		3/8	Polished plate	5 and 6	18, 20, 24, 27, 30
5620		1/2	Polished plate	5 and 6	20, 24, 27, 30, 33
5705		1/4	White vitrolite	5 and 6	18, 20, 24, 27, 30
5610	C-5610	3/8	Polished plate	5 and 6	18, 20, 24, 27, 30
5625	C-5625	1/2	Polished plate	5 and 6	20, 24, 27, 30, 33
5710	C-5710	1/4	White vitrolite	5 and 6	18, 20, 24, 27, 30

A LISTING OF TYPICAL BRASSCRAFTERS' ACCESSORIES (Cont.)

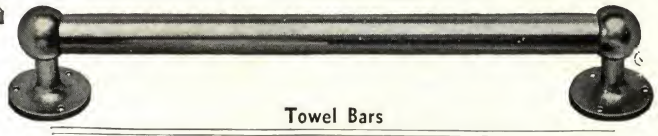
Brass Towel Shelf
Shelf, 24 in. long, 8 in. wide; 5-bar
No. 4751 with exposed screws
No. C-4751 with concealed screws



Swinging Towel Bar
Three-bar, 14 in. long, ½-in. diam.
No. 2103 with exposed screws
No. C-2103 with concealed screws

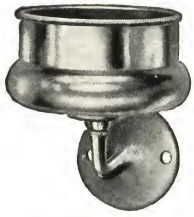


Glass Towel Shelf; Annealed Glass Towel Bar
Shelf, 24 in. long, 5 in. wide; bar, 18 in. long, 1-in. diam.
No. 5351 with exposed screws
No. C-5351 with concealed screws



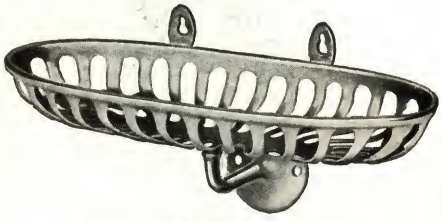
Towel Bars

Exposed screw	Concealed screw	Series	Diam., in.	Length, in.
1600	C-1600	Metal	1	8, 12, 18, 24, 30, 36
2900	C-2900	Glass	1	18, 24, 30, 36
1800	C-1800	Metal	¾	12, 18, 24, 30, 36
189	C-189	Glass	¾	18, 24, 30, 36



Tumbler Holder
No. 5191 with exposed screws
No. C-5191 with concealed screws

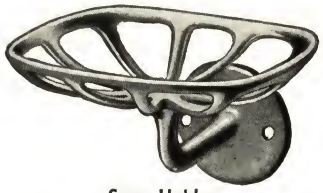
Tooth Brush Holder
No. 5192 with exposed screws
No. C-5192 with concealed screws



Soap and Bath Brush Holder
No. 4801 with exposed screws
No. C-4801 with concealed screws

Soap Holder
No. 4039 with exposed screws
No. C-4039 with concealed screws

Soap Holder
No. 4077
Removable glass lining



Soap Holder
Heavy radial design 5x3¾ in.
No. 4043 with exposed screws
No. C-4043 with concealed screws

Toilet Paper Box
Plain solid reinforced edge
No. 5451 with exposed screws

Toilet Paper Holder
Lock roll. Extra heavy, three-piece
No. 5435 with exposed screws
No. C-5435 with concealed screws

Toilet Paper Holder
Extra heavy plain design. Black rubber enamel roll springs into ball sockets
No. 5420

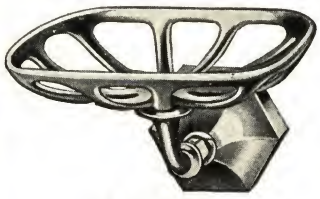
A LISTING OF TYPICAL BRASSCRAFTERS' ACCESSORIES (Cont.)

600 Series

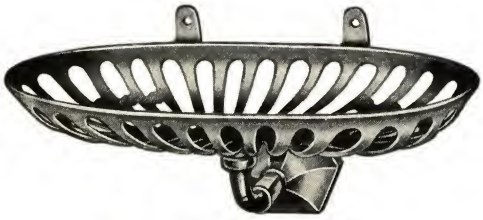
The accessories shown on this page represent the choice of many outstanding architects for some of the finest residences in the country, and reflect the pride of the guildsmen in combining extreme beauty of design, selection of materials used, method of construction, and the in-built quality.

From this page the architect may select accessories, with complete confidence as to the beauty and quality of his selection.

Furnished in chromium plate, and also obtainable in gold or silver plate.



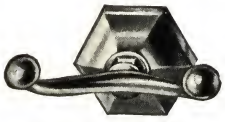
Soap Holder
No. 643CP. 5x3¾ in.



Soap and Bath Brush Holder
No. 641CP. 10½x4¼x2 in. deep

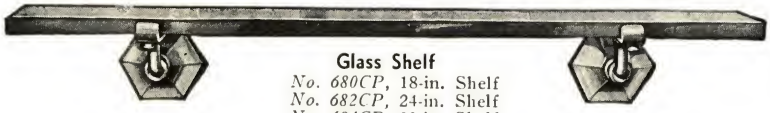
Soap Holder
No. 649CP. Chromium finish
Black or crystal insert, 6x4½ in.

Tumbler Holder and Tumbler
No. 651CP. Black or crystal tumbler



Double Robe Hook
No. 657CP. Projects 2½ in.
Spread 3¼ in.

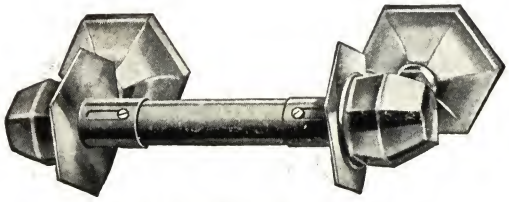
Tumbler Holder, Tumbler, and Tooth Brush Spreader
No. 652CP. Black or crystal tumbler



Glass Shelf
No. 680CP, 18-in. Shelf
No. 682CP, 24-in. Shelf
No. 684CP, 30-in. Shelf
Furnished with black glass, 7/16 in. thick, in 5 or 6-in. widths.
Furnished in polished plate glass, ½ in. thick, in 5 or 6-in. widths

Glass Towel Bar
No. 618, length, 18 in. *No. 630,* length, 30 in.
No. 624, length, 24 in. *No. 636,* length, 36 in.
Black or crystal square bars, ⅞-in. sides
Black or crystal round bars, 1-in. diam.

Hand Rail
No. 609, length, 9 in.; diameter, 1¼ in.
Black round, crystal round, all-metal round



Lock Roll Toilet Paper Holder
No. 635

IDEAL CABINET CORP.

DIVISION OF DESLAURIERS METAL PRODUCTS COMPANY, INC.
FACTORY AND MAIN OFFICE
8841 Central Avenue, DETROIT, MICH.
BRANCH OFFICES
CHICAGO, ILL. ST. PAUL, MINN. LOS ANGELES, CAL. OAKLAND, CAL.

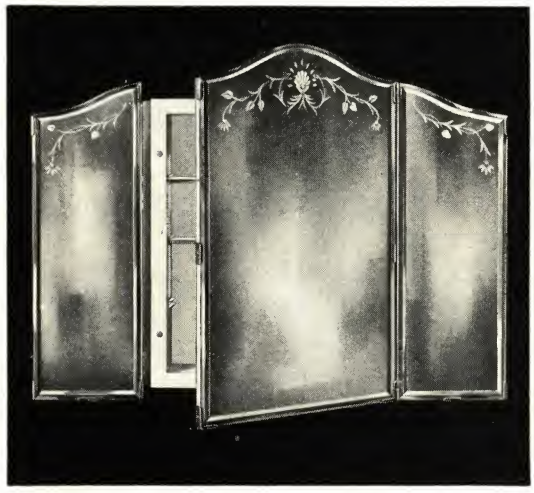
Products

MEDICINE CABINETS of die-stamped and die-folded steel; UTILITY CABINETS; STEEL PACKAGE and MILK RECEIVERS; METAL CLOTHES CHUTE DOORS.

Also Coal Chute Doors and Clean out Doors; Metal Column Forms for casting concrete columns, round, octagon and rectangular with rounded ends.

The Steel Medicine Cabinet Line

Standardization and quantity production on a quality basis make it possible to offer the architect and builders five different models of regular recessed cabinets and five various models of Venetian type cabinets. Models A, B and J have die-stamped moulded frame. All other models have 1⅛-in. narrow frame die-folded. Models C, D and L have concealed hinges. All cabinets snow-white baked enamel finish. All mirrors are select quality ¼ in. plate glass.

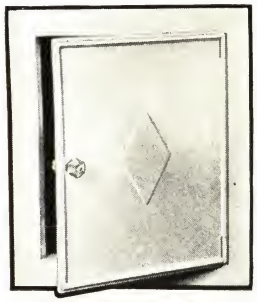


Model F Venetian Wing Type
All Venetian cabinets can be had with wing mirrors

Model G	9-in. wing	Total spread 37¼ ins.
Model F	8-in. wing	Total spread 35¼ ins.
Model R	7-in. wing	Total spread 31¼ ins.
Model O	6-in. wing	Total spread 27¼ ins.

Model "L" Cabinet

Model "C" Cabinet



Clothes Chute Door

FRAMING-IN MEASUREMENTS

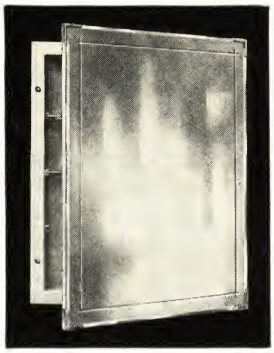
Model	Type	Wall opening and recess, in.	Inside depth, in.	Outside, in.	Mirror, in.	Door frame, in.	Shelves
A	Regular closed	15 x19 x3¾	4½	21¼x25¼	12 x16	1¾	2
B	Regular open shelf	16 x25 x3¾	4½	21¼x31¼	12 x16	1¾	3
C	Narrow frame closed	15½x19½x3¾	4½	18 x22	12 x16	1¾	2
D	Narrow frame	14 x18 x3¾	4½	16 x20	12 x16	1	2
E	Wall hung		4½	18 x22	12 x16	1¾	2
F	Venetian	15½x19½x3¾	5	18 x22	18 x26		2
G	Venetian	15½x25¼x3¾	5	17½x27¼	18 x32		3
J	Hotel type	16 x 5 x3¾	5	21½x31½	15¼x19¾		1
L	Hotel type	15½x25¼x3¾	4½	17½x27¼	12 x16	1¾	4
M	Venetian	15½x19½x3¾	4½	18 x22	18 x22		2
O	Venetian	12½x16½x3¾	5	13½x17½	14 x20		2
P	Venetian	12½x16½x3¾	5	13½x17½	14 x18		2
R	Venetian	14 x18 x3¾		16 x20	16 x24		2
	Utility cabinet	10¼x12¼	5	13x15x4¾	None		1
	Clothes chute	10¼x12¼		13 x15	None		
	Package and milk receiver	10¼x12¼	6 to 10	13 x15	None		

Note: Models "A," "B," "C," "L" and "E," may be had with mirror 14x18 in., door frame 1⅛ in.; other measurements same as shown. This size takes slightly higher price. Unless otherwise specified, mirror 12x16 in., door frame 1¾ in., will be shipped.

Venetian Cabinet Model "6"

Hotel Type Cabinet Model "J"
No medicine chest behind mirror

Package and Milk Receiver
For a small additional cost the outside door can be equipped with a locking feature which, by opening the inside door, releases the lock of the outside door and permits it to be opened for use



Square Venetian Top Model M Cabinet

HESS WARMING & VENTILATING CO.

Hess Mirrored Bathroom Cabinets and Lavatory Mirrors

1211 South Western Avenue, CHICAGO, ILL.

BRANCH OFFICES

DETROIT, MICH., 3931 Grand River Avenue
Telephone, Glendale 5028

MILWAUKEE, WIS., 1130 West National Avenue
Telephone, Mitchell 5770

For Hess Indoor Climate Control System, see Manufacturers' Index

THE CLASSIC—THE CABINET WHICH CONFORMS TO THE HIGHEST QUALITY

Hess Classic Cabinets are built entirely from the standpoint of quality and their simple beauty reflects the height of good taste. Hess Classic Cabinets are for use in the finest homes, apartments, clubs and hotels where the highest quality of design, material and workmanship are desired. The heavy plate mirror, of selected quality

the CLASSIC

to avoid the defects of commercial plate, conceals the sturdy white cabinet of steel. The hardware is all of non-ferrous metal and chromium plated. The three locking adjustable shelves and the extra one for the bottom of the cabinet are heavy plate glass and their edges are polished as finely as their surfaces.

HESS CLASSIC (UNFRAMED)

Code word	Mirror, in.	Wall opening, in.	Ship. weight, lb.	Price
Pity	18x30	15x24x4¼	51	$46.50
Pick	16x28	13x22x4¼	40	42.00
Page	20x32	17x26x4¼	61	56.00

HESS CLASSIC (FRAMED)

Code word	Mirror, in.	Wall opening, in.	Ship. weight, lb.	Price
Plank	18x30	15x24x4¼	52	$60.00
Path	16x28	13x22x4¼	41	54.50
Perch	20x32	17x26x4¼	62	68.50

HESS CLASSIC WINGED CABINET

Code cord	Center mirror, in.	Wing mirrors, width, in.	Wall opening, in.	Ship. weight, lb.	Price
Pitch	18x30	9	15x24x4¼	85	$100.00

Mirrors on all unframed Classic Cabinets both carved and square top and on the Winged Classic Cabinet as well, have square polished edges

CLASSIC SQUARE TOP (UNFRAMED)

Code word	Mirror, in.	Wall opening, in.	Ship. weight, lb.	Price
Peg	18x28	15x24x4¼	51	$44.00

CLASSIC SQUARE TOP (FRAMED)

Code word	Mirror, in.	Wall opening, in.	Ship. weight, lb.	Price
Pale	18x28	15x24x4¼	52	$56.50

Left-hand doors each $1.50 net.

Classic Framed

Mirror frames on Hess Framed Classic Cabinets are made of solid monel metal, chromium plated and have a $\frac{7}{16}$-in. face

The doors of all Hess Classic Cabinets are paneled. This presents a pleasing appearance and insures a substantial and rigid door.

The solid monel metal adjustable shelf brackets are small and do not occupy useful space in the cabinet.

Each Hess Classic Cabinet has chromium plated spring door check. It checks the door gently and without noise.

Hess Classic Cabinets are finished with the finest white lacquer finish and rubbed between coats to produce a satiny texture.

Any Classic mirror can be supplied with steel back for wall hanging over lavatories. A neat chromium plated towel rod can also be supplied on wall hung mirrors. Plain mirrors without mitre lines will be supplied if desired.

Classic utility or supply cabinets with mirrors 60 in. long can be supplied on special orders.

Trade discounts on application.

A Few Buildings Using Hess Classic Cabinets

Location	Architect
San Francisco, Cal., Albert K. Miller Residence	Louis De Martini
Chicago, Ill., 1301 Astor Street, Apartment	Philip Maher
Highland Park, Ill., Allen Loeb Residence	Walcott & Work
Chicago, Ill., Arthur F. Best Residence	E. Benson & Son
Hinsdale, Ill., Walter H. Eckert Residence	Thielbar & Fugard
Winnetka, Ill., Arthur Reebie Residence	Walcott & Work
New York, N. Y., 602 East 84th Street, Apartment	George B. Post & Son
Fair Haven, N. J., W. D. Potts, Jr. Residence	G. D. Morrow & Sons
Baton Rouge, La., Governor's Mansion	Weiss, Dreyfous & Seyferth
Lincoln, Neb., R. E. Campbell Residence	Wilson & Davis
Oshkosh, Wis., Rupert Brown Residence	Auler, Jensen & Brown
Milwaukee, Wis., Edwin B. Bartlett Residence	Thomas S. Zan Alyea

DE LUXE CABINETS

Without Frame

Framed

Without Frame

Framed

De Luxe Venetian—Simplicity, good taste and beauty combine to make the De Luxe Venetian the ideal cabinet for the modern bathroom. The large expanse of plate glass reflects a perfect image framed in a simple design that will harmonize with the finest bathroom. A spacious mirror opens at a touch to disclose gleaming shelves arranged for toilet necessities. Furnished complete with adjustable glass shelves—bulb edge.

Telegraph code word	No.	Mirror size, in.	Wall opening, in.	Bulb edge glass shelves	Shipping weight, lb.	List price complete
Unframed						
Vamp	*1628	16x28	13x22x4¼	3	40	$30.00
Vent	1824	18x24	15x19x4¼	2	40	28.60
Verb	1830	18x30	15x24x4¼	3	50	30.00
View	2032	20x32	17x26x4¼	3	60	42.75
*No. 1628 Venetian will fit between studs without cutting.						
Framed Has narrow brass frame chromium plated						
Monvent	F1824	18x24	15x19x4¼	**2**	41	$45.25
Monverb	F1830	18x30	15x24x4¼	**3**	51	49.25

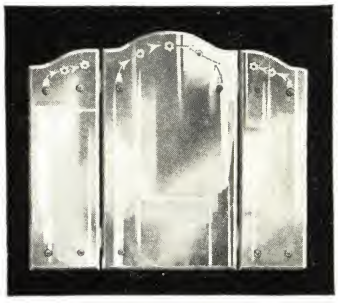
Additional bulb edge glass shelves, $0.50 each.
Any of the above mirrors can be furnished with steel backs for wall hanging, without cabinets; prices on request.
The mirrors in framed cabinets are not beveled.

De Luxe Colonial—Designed in the modern tone of simplicity, the De Luxe Colonial Cabinet offers a distinctive beauty to the home owner who prefers quiet, unostentatious elegance.

A large plate glass mirror, beveled, covers the sturdy steel cabinet that is placed behind. Furnished complete with adjustable glass shelves, bulb edge.

Telegraph code word	No.	Mirror size, in.	Wall opening, in.	Bulb edge glass shelves	Shipping weight, lb.	List price complete
Unframed						
Calf	*620	16x20	13x17x4¼	2	38	$28.50
Cast	828	18x28	15x24x4¼	3	50	33.50
*No. 620 Colonial will fit between studs without cutting.						
Framed Has narrow brass frame chromium plated						
Moncalf	*F620	16x20	13x17x4¼	2	39	$38.00
Moncast	F828	18x28	15x24x4¼	3	51	45.00

*No. F620 Colonial will fit between studs without cutting.
Additional bulb edge glass shelves, $0.50 each.
Any of the above mirrors can be furnished with steel backs for wall hanging, without cabinets; prices on request.



De Luxe Elite

De Luxe Rosetteless Venetian—This new Venetian cabinet is similar in design to other Hess Venetian Cabinets. The heavy beveled plate glass mirror, however, has no holes nor rosettes, being secured by a lip at the bottom of the door which supports the weight of mirror and tiny clips on each side of door at top and bottom hold it in place. It is furnished in beautiful and wonderfully durable white enamel.

Telegraph code word	Size of mirror, in.	Wall opening, in.	Bulb edge shelves	Shipping weight, lb.	List price
Vote	16x24	13x19x3½	2	30	19.00

The above mirror can be furnished with steel back for wall hanging, without cabinet, price on request.

DE LUXE ELITE CABINETS

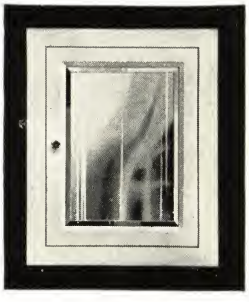
Telegraph code word	Center mirror size, in.	Wall opening, in.	Bulb edge glass shelves	Shipping weight, lb.	List price complete
Elite	18x30	15x24x4¼	3	85	$80.00

De Luxe Rosetteless Venetian

Style R Cabinet

Sturdy, strong, built for utility in the bathroom demanding the finest in a plain, attractive cabinet. The mirror is of heavy plate glass with beveled edges. Furnished complete with adjustable plate glass shelves.

R and S Cabinet doors have invisible hinges and the cabinets are protected by a hard, white porcelain-like finish.



Style R

Style S

Style S Cabinet

Similar to Style R, this large, spacious cabinet provides a convenient shelf below for the holding of toilet accessories. Its simple, sturdy lines make it practical for every type of bathroom. Furnished complete with adjustable plate glass shelves.

Telegraph code word	No.	Mirror size, in.	Wall opening, in.	Bulb edge glass shelves	Shipping weight, lb.	List price complete
Rare	*10	10x14	13x17x4¼	2	22	$12.10
Reach	12	12x16	15x19x4¼	2	26	13.35
Rent	14	14x18	17x21x4¼	2	30	14.65
Rack	16	16x20	19x23x4½	3	35	20.00

*No. 10 Style R will fit between studs without cutting.
Additional bulb edge glass shelves, $0.50 each.
If mirror without bevel is wanted, deduct $0.90 from above prices.
Left hand doors, $1.50 net.

Telegraph code word	No.	Mirror size, in.	Wall opening, in.	Bulb edge glass shelves	Shipping weight, lb.	List price complete
Oak	*100	10x14	13x22x4¼	3	27	$12.85
Oil	120	12x16	15x24x4¼	3	31	13.95
Ohm	140	14x18	17x26x4¼	3	35	15.45
Ore	160	16x20	19x28x4¼	4	40	21.00

*No. 100 Style S Cabinet will fit between studs without cutting.
Additional bulb edge glass shelves, $0.50 each.
If mirror without bevel is wanted, deduct $0.90 from above prices.
Left hand doors, $1.50 net.

All cabinets with left hand doors, $1.50 net extra. Trade discounts on application.

THE F. H. LAWSON CO.

Famous since 1816 as Manufacturers of High Grade Metal Products

MAIN FACTORY AND OFFICES

Evans, Whately, Boston and B. & O. R. R.

CINCINNATI, OHIO

BRANCH OFFICES: NEW YORK, N. Y., and CHICAGO, ILL.

For Lawco Steel Access Units, see Manufacturers' Index

LAWCO BATHROOM CABINETS

Nos. 915 and 925 DeLuxe — Exquisite mirror in beautiful lacquer or chromium-plated frame.

No. 915 door size 15½x25½ in., wall opening 12¾ x20¼x3½ in.

No. 925 door size 18x32 in., wall opening 15⅜x26⅞ x3½ in., outside dimensions 17⅞x 29⅜ in.

No. 915 (lacquered frame) ...$24.00
No. 915 (chromium-plated) ..$31.00
No. 925 (lacquered frame) ...$40.00
No. 925 (chromium-plated) ..$50.00

Lawco Mirror Door Cabinet with Side Lights

A mirror-cabinet for modern bathrooms. Graceful design — mirror etched in new water-lily and cat-tail motif. Attractive side brackets, furnishing even illumination for mirror, enough light for whole bathroom. Cabinet has switch and convenience plug. Furnished with black, orchid, green mirror-borders. Venetian style mirror, with pan-shaped door, door stop, concealed hinges, removable door. A fine cabinet at a very low price. Outside dimensions 17x23½ in.; inside dimensions of cabinet 14¼x 20¾x4¼ in.; mirror size 18x28 in.; wall opening 14¾x21¼x2¾ in.

No. LX (completely wired, with switch, convenience plug) list price $36.00 (can be furnished also in our regular bow-shaped mitred line mirror or flower etched mirror, same price)

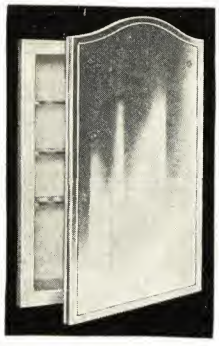
Bears Underwriters' Label

Nos. 800 and 900—Unusual decorative value. Beautiful design. DeLuxe construction with many exclusive features.

No. 800 outside dimensions 17¾x23½ in., mirror 18x26 in., wall opening 15⅛ x20⅞x3½ in.

No. 900 outside dimensions 19¾x31 in., mirror 20x34 in., wall opening 17⅛x28⅜ x3½ in.

No. 800, list price $33.50
No. 900, list price $41.50



Nos. 780, 785 and 795—No. 780 standard. Large Venetian type at medium price. Outside dimensions 15½x21½ in., mirror size 16x24 in., wall opening 13½x19½x3 in.

No. 785 mirror size 18x26 in., outside dimensions 17½x23½ in., wall opening 15⅜x21⅜x3¼ in.

No. 795 mirror 18x32 in., outside dimensions 17½x29 in., wall opening 15⅜x26⅞x3¼ in.

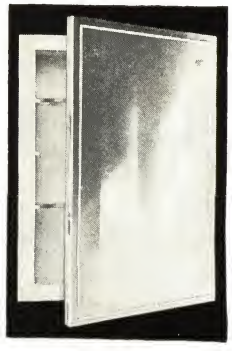
No. 780, list price.$17.00
No. 785, list price. 20.00
No. 795, list price. 23.00

Nos. 750 and 775—Junior. Quality and beauty of appearance at low cost.

No. 750 mirror size 16x22 in., wall opening 13½x19½x 3 in., outside dimensions 15½x21½ in.

No. 775 mirror size 18x24 in., wall opening 15½x21½x3 in., outside dimensions 17½x23½ in.

No. 750, list price $15.00
No. 775, list price 18.00



LAWCO CHALLENGERS

Nos. 5600 and 5650—Extremely low priced. Highest grade materials and workmanship. A superlative cabinet value.

No. 5600 plain mirror size 12x16 in. wall opening 13⅜x23⅜x3⅜ in. Outside dimensions 16x26x1¼ in.

No. 5650 plain mirror size 14x18 in., wall opening 15⅜x25⅜x3⅜ in., outside dimensions 18x28x1¼ in.

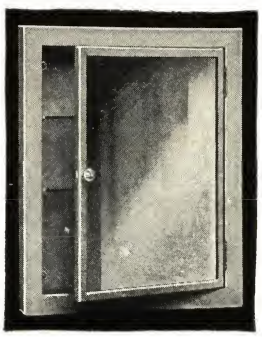
No. 5600, list price.....$10.00
No. 5650, list price..... 12.00

No. 56 Challenger—In keeping with modern simplicity. Beautiful lines. Chromium-plated steel frames, cabinets finished in Lawco Vitro-like White Enamel resembling porcelain.

No. 56 door size 16x30 in., wall opening 12⅞x23⅜x3⅜ in., weight 45 lbs. Three heavy, bulb-edge shelves.

No. 56, list price.....$24.00

Mitred line mirror can be furnished at an extra list price of $5.00 per cabinet.



Nos. 3100, 4100 and 5100—Challengers on price, quality, utility. Bulb-edge shelves.

No. 3100 plain mirror size 12x 16 in., wall opening 13⅜x17⅜x3⅜ in. Outside dimensions 16x20x1¼ in.

No. 4100 plain mirror size 14x 18 in., wall opening 15⅜x19⅜x3⅜ in. Outside dimensions 18x22x1¼ in.

No. 5100 plain mirror size 16x 20 in., wall opening 17⅜x21⅜x3⅜ in. Outside dimensions 20x24x1¼ in.

No. 3100, list price.....$ 8.50
No. 4100, list price..... 10.50
No. 5100 list price..... 12.50

Nos. 31, 41 and 51—Lawco Challengers are made of heavy materials, with chromium-plated steel frames. The workmanship is the usual Lawco quality. They have aristocratic appeal, yet are made for the modest budget.

No. 31 door size 16x21 in., wall opening 12⅞x17⅜x3⅜ in. No. 41 door size 18x23 in., wall opening 14⅞x19⅜x3¾ in. No. 51 door size 21⅛x27⅛ in., wall opening 18x24x3⅜ in.

No. 31, list price.....$17.50
No. 41, list price..... 20.50
No. 51, list price..... 23.50

Mitred Line Mirror can be furnished at an extra cost of $5.00 per cabinet, list.

METROPOLITAN ELECTRIC MFG. CO.

LONG ISLAND CITY, N. Y.

For Metropolitan Electrical Wiring and Control Equipment, see Manufacturers' Index

"FACEALITE" ELECTRIC MIRRORS AND BATHROOM CABINETS

The "Facealite" comprises a mirror, electric light and bathroom cabinet combined in one compact unit.

The patented principle of the "Facealite" is that the reflected rays from lamps which are concealed behind the mirror are thrown upward into the face. This arrangement of indirect lighting provides perfect facial illumination in the mirror with no glare and no shadow. The mirrors when lighted will not steam up but will remain clear and dry.

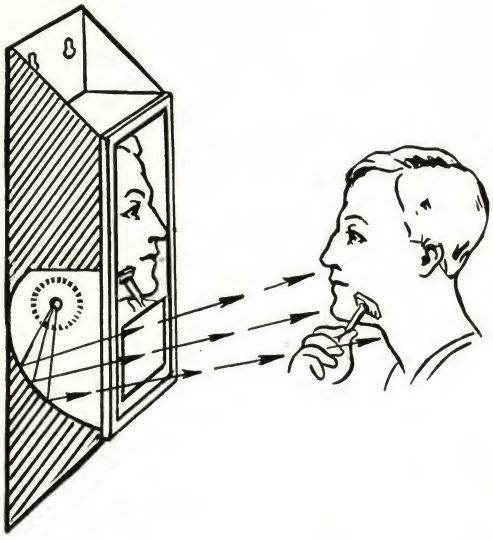
"Facealite" Electric Bath Room Cabinets are now specified by leading Architects for the better class of residence, club and apartment house work, and are used extensively on yachts.

They are made in flush and surface types of several sizes each, and are furnished in three styles as illustrated below. The cabinets and reflector are of pressed steel; finished in white enamel. The shelves are of glass. Top lights can be furnished extra when requested.

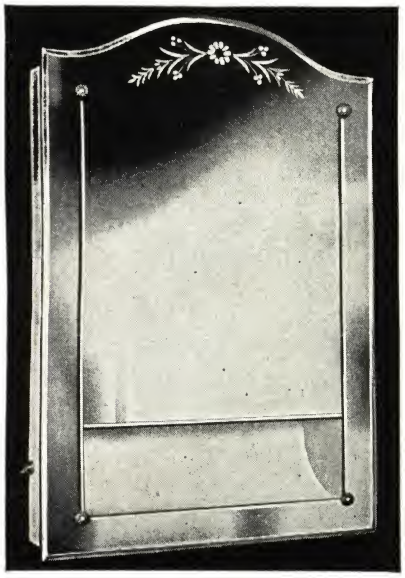
Directions for Installing

To get the best lighting results the bottoms of the wall cabinet recess (usually about 3½ in. deep and to the sizes given) shall be 4 ft. 2 in. from the floor. The wires should be brought in at the lowest left hand side 2 in. from the bottom. The reflector is removable.

Recessed Wall Lights can be furnished made on the same principle as "Facealite".



Models of "Facealite" Bathroom Cabinets



De Luxe Venetian Model

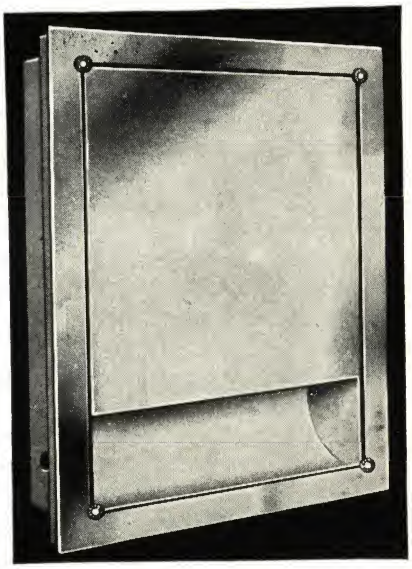
Heavy steel cabinet and reflector. Two 25-watt lamps, toggle-switch. Wired complete. 3 glass shelves.

Cat. No.	Wall recess	Mirror
2501	16½x20½	19½x26
2503	16½x22½	19½x28

Waldorf Model

French plate glass mirror. Chromium frame. Wired complete same as No. 2501.

	Cat. No. 6501	Cat. No. 6502
Mirror	19x24	21"x27"
Wall recess	16½x20½	19"x25"
Glass shelves	Three	Four



Colonial Model

3 glass shelves. Wired complete same as No. 2501.

Cat. No.	3002
Wall recess	16½x20½
Mirror	19x23

THE MIAMI CABINET COMPANY

Bathroom Cabinets and Accessories, Wall Cabinets

MIDDLETOWN, OHIO

Products

MIAMI PURE WHITE BATHROOM CABINETS.
MIAMI WALL CABINETS.
Also Miami Bathroom Accessories and Miami Steel Ironing Board Cabinet.

Miami Pure White Cabinets

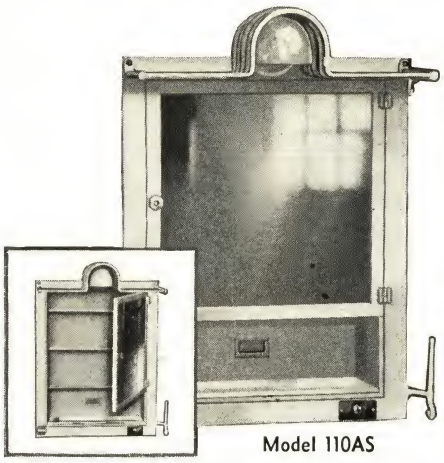
Construction—Miami Cabinets are made from heavy gauge Armco steel.

Thick, air-cushioned doors, used on all models, are swung on specially designed hinges drop-forged from solid brass.

Finish—The *crystal snow* finish used on all Miami products is not a baked-on enamel.

It is of a pyroxylin nature, applied by a special process, and is guaranteed not to discolor with age, nor to crack, craze or peel.

The American Standard



Model 110AS

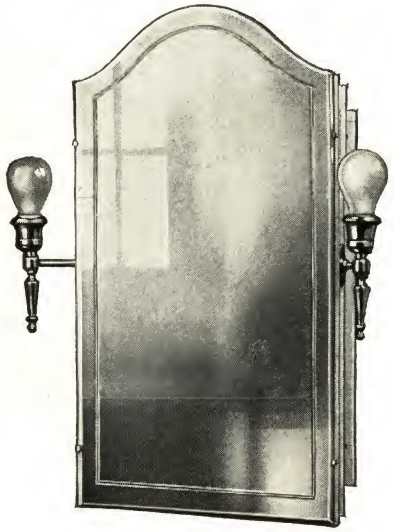
Mirror, 16x16 in.; inside, 17x23 in.; over all, 21x27 in.; opening, 17½x24½ in.

Advantages—It saves the separate installation of a number of essential items. As regularly furnished it eliminates completely one electric outlet in every bathroom. Total savings average $5 to $6 per room. It is exceptionally convenient for guests.

Equipment—Towel tray, combination light fixture, opal shade and holder; water bag hook; used towel and razor strop hook; luminous tipped switch; switch box; junction box; razor blade drop; bottle opener; vitrolite shelf. Complete details on this and other hotel models are given in Catalog No. 8.

Venetian Cabinets with Light Brackets

Three models are made in the "all-mirror" Venetian style with a variety of mirror designs; one of the models is shown at the left fitted with chromium plated light brackets which may be either of the keyless or pull chain type. These brackets may be attached to any of the models in the Miami line, except the wing type Venetians.



Cabinet Equipped with Light Brackets

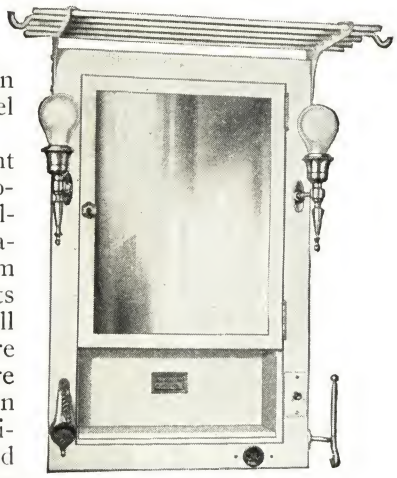
The models in the "all-mirror" Venetian series are designated by the numbers 750V, 710V, and 700V. The complete range of mirror designs is shown in Catalog No. 8.

CABINET DIMENSIONS, INCHES

Model	Venetian			Roman
	750V	710V	700V	410V
Mirror	18x28	16x26	14x22	14x28
Over all	18x28	16x26	14x22	15¾x29¾
Inside	15x21	13x19	11x15	12¾x22¾
Wall opening	15¾x21¾	11¾x15¾	11¾x15¾	13½x23½

Special Hotel Cabinet

The special hotel cabinet at right can be made up by attaching fixtures shown to any flush door model in the Miami line.



Special Hotel Model

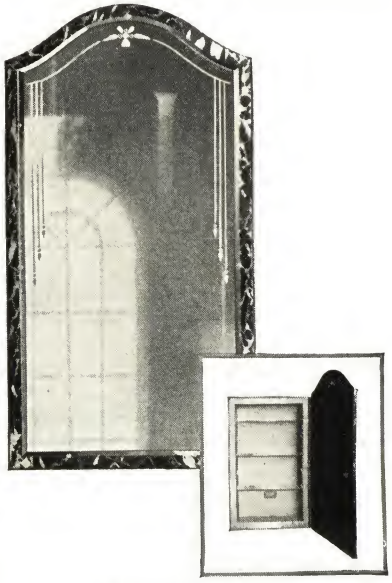
Regular equipment includes either chromium plated or enameled towel tray with waterbag hooks, chromium plated light brackets (either keyless or pull chain), switch (where keyless brackets are used), combination hook, hot plug, combination corkscrew and bottle opener, vitrolite shelf, junction box for connecting house and cabinet wires, and razor blade drop.

The regular equipment is very flexible and can be altered to meet individual requirements.

Roman Model

The Roman Model which is shown at the right is one of several "panel door" models, noted for their attractive design and rugged construction. An attractive feature of these cabinets is that the door panel can be finished in special color to match the walls or other fixtures.

Other cabinets of this type are illustrated in our complete new Catalog No. 8.



Roman Model 410V

Models 310 and 410

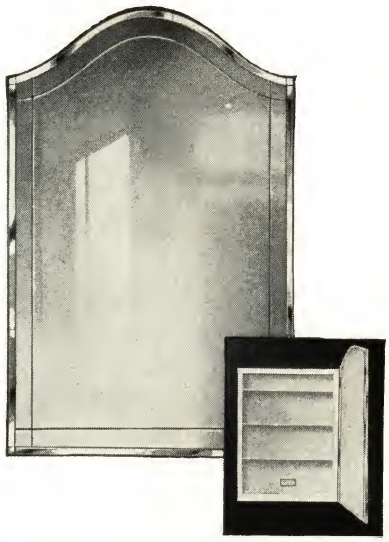
Chromium Framed Bathroom Models

Chromium framed models are made in two styles. The curved top Venetian pattern is shown at the right and a similar cabinet with a square top is also a popular model. Each style is made in three sizes—the curved top models designated as numbers 1000V, 1050V, and 1075V, and the square-top models as numbers 1100V, 1150V, and 1175V.

In these cabinets the beautiful chrome finished mirror covers the entire front of the body and there is nothing to indicate that a spacious cabinet is hidden behind the door. The mirrors are etched with a simple mitred line.

Standard Models

Models 310 and 410 are especially recommended for the modest bathroom where price is to be considered. These cabinets are very rugged in construction and of a uniformly high quality. Models 300 and 400 are similar to Models 310 and 410, respectively, but do not have the open shelf below the door.

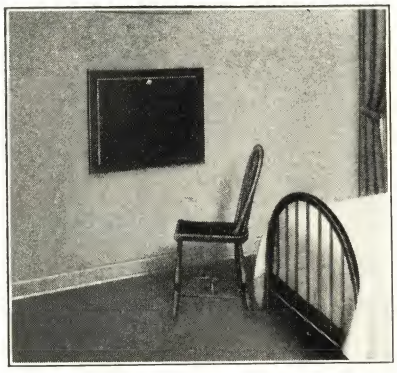


Models 1000V, 1050V, and 1075V

DIMENSIONS, INCHES

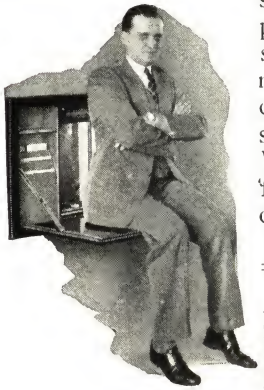
Model	1100V	1150V	1175V	1000V	1050V	1075V	310	410	300	400
Mirror	16 x22	18 x24	20 x28	16 x26	18 x28	20 x32	14 x18	12 x16	14 x18	12 x16
Over all	16½x22½	18½x24½	20½x28½	16½x26½	18½x28½	20½x32½	19 x29	17 x27	19 x23	17 x27
Inside	13 x19	15 x21	17 x25	13 x19	15 x21	17 x25	15 x25	13 x23	15 x19	13 x23
Wall opening	13¾x19¾	15¾x21¾	17¾x25¾	13¾x19¾	15¾x21¾	15½x23½	15½x25½	13½x23½	15½x19½	13½x23½

Miami Wall Desk and Dressing Table



When not in use the Miami Wall Desk may be folded back out of the way

The combination writing desk and dressing table shown above is adapted to use in homes, hotels, and apartments. It is recessed into the wall or where special conditions make this impossible, it may be hung on the surface of the wall. The unit is made entirely of steel and is practically indestructible. (The door will support a man's weight easily.) When not in use, the desk may be folded back into the wall, thus conserving valuable room space.



The dark imitation walnut exterior blends with the soft tones of the interior which is done in antique copper; the darker shade on the mirror frame, light, pencil rack, and shelf edges provides a beautiful two-tone effect. The light shade and writing top are decorated with an attractive design of inlaid wood and mother-of-pearl. The writing surface is protected by a removable plate glass top. Write for additional information.

SPECIFICATIONS

	Height, in.	Width, in.	Depth, in.
Over all	23⅛	32⅝	4⅞
Wall opening	20⅝	29⅛	3¾
Mirror	16	10	
Glass top	17¾	26½	

MIRROR SLIDE LIGHT COMPANY, LTD.

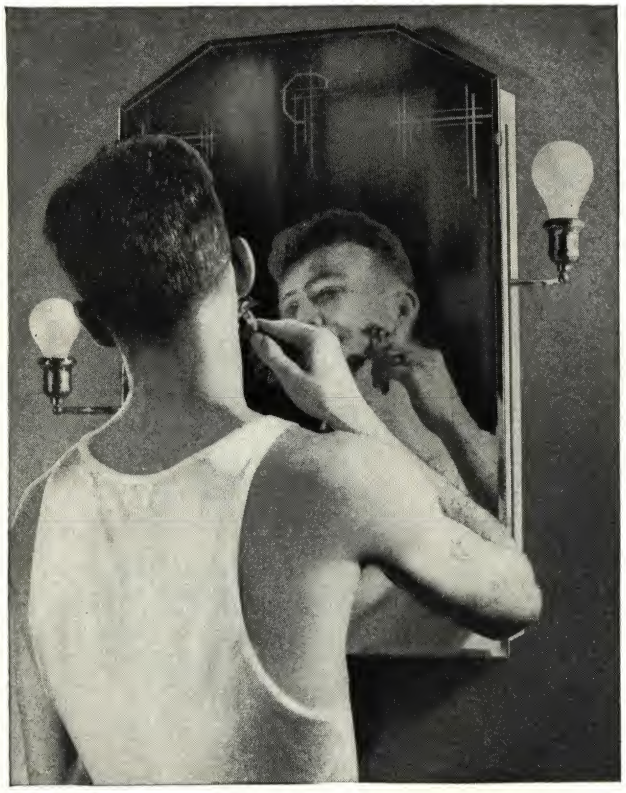
SALES OFFICE
810 Citizens National Bank Building
LOS ANGELES, CALIF.

DISTRIBUTORS IN ALL PRINCIPAL CITIES THROUGHOUT THE UNITED STATES
Consult Telephone Directory for Local Distributor's Address or communicate with us direct

MIRROR SLIDE LIGHT CABINETS

Controlled Illumination

Harmonizing with the finest of bathroom fixtures, Mirror Slide Lights are furnished in numerous mirror designs and with either steel or wooden cabinets. Mirror Slide Lights are the newest creation for aiding masculine and feminine toilets. Fitted to the modern Venetian type cabinets with concealed wiring and instantaneous adjustment, the new Slide Lights eliminate all shadows and give perfect facial illumination. Beauty of line and sturdy fabrication are combined with operating efficiency to make a product of exceptional merit.



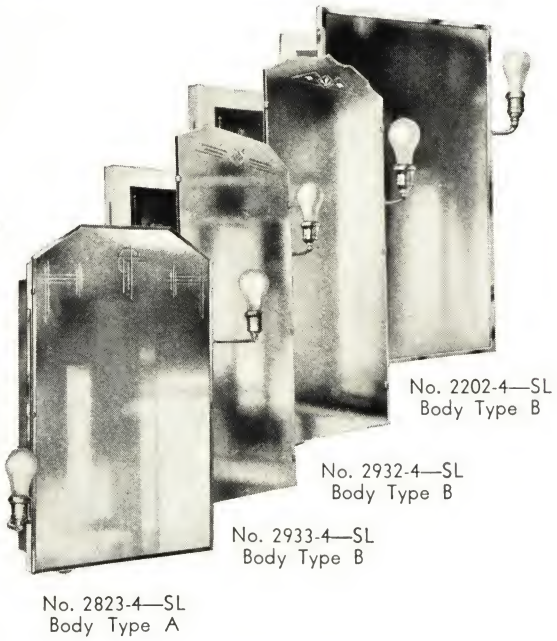
For the Masculine Toilet

Men appreciate the advantages of perfect face illumination while shaving. The Mirror Slide Light puts the light ray where it is needed without shadow or reflection.

Although an innovation in the bath and dressing room field, the Mirror Slide Light is a proven article which operates easily, is fool-proof and cannot "short". The lights are moved up or down on either side of the mirror by a slight touch of the hand and are held in place without any form of notching or set screws.

Architects and builders have been quick to recognize the beauty, economy and value of this device.

Mirror Slide Light cabinets are furnished in many different types and mirror designs. Several of the more popular types are illustrated below.



Types of Mirror Slide Light Cabinets

May be Adjusted to Any Angle

Above is illustrated the manner in which lights on Mirror Slide Lights Cabinets may be adjusted to throw a ray from any height or angle. By a slight touch the lights may be moved up or down to any desired position and will automatically remain in that position without the aid of set screws or notches.

Wooden Mirror Slide Light Cabinets

For the speculative builder two wooden Mirror Slide Light Cabinets are illustrated above. They are finished with the same high-grade workmanship which is characteristic of the all-metal cabinets.

For Milady

Indispensable in the dressing room, as well as bathroom, Mirror Slide Light Cabinets are easily installed over dressing tables.

Detail Specifications

Cabinets are built of heavy copper-bearing rust-resisting sheet metal, pressed from one piece, eliminating seams. Doors are made from one piece of steel, utilizing the cushion type check which stops the door at 110° angle. Special hinge design permits the removal of door without the use of loose pins. Each cabinet is furnished with three heavy clear glass rolled edge shelves, having an exclusive adjustment design. Mirrors are of high-grade specially selected plate glass, and danger of breakage is eliminated through attaching them to the door with heavy Monel Metal clips. Each cabinet is equipped with two chromium plated electric fixtures mounted on adjustable bracket arms. The cabinet itself is finished in the finest white baked enamel and is resistant to alcoholic toilet preparations.

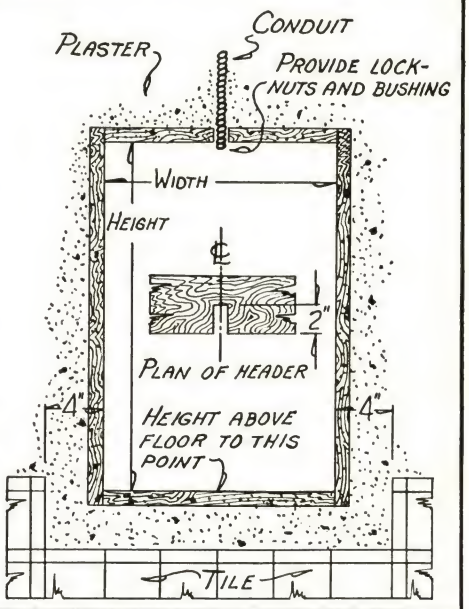
CABINETS CAN ONLY BE INSTALLED WITH FLANGES OVERLAPPING FINISHED WALL. IN CASE OF TILE AND PLASTER COMBINATION TILE CAP MUST BE SET AS SHOWN TO ALLOW CLEARANCE FOR MOVABLE LIGHT ARMS.

GROUNDS MUST BE SET AND WALL FINISHED UP TO EDGE OF THE OPENING.

CONDUIT TO ENTER AT TOP AND CENTER OF RECESS. NOTCH HEADER 2" DEEP.

ALL CABINETS FURNISHED WITH GLASS SHELVES.

RECESS DIMENSIONS INCLUDE CLEARANCE.



BODY		OVERALL			WALL OPENING				MISCELLANEOUS
TYPE	KIND	WIDTH	HEIGHT	DEPTH	WIDTH	HEIGHT	DEPTH	ABOVE FLOOR	
ASL	STEEL	19"	29"	4"	18"	27"	3"	47"	STUB IN CONDUIT $\frac{5}{8}$"
BSL	STEEL	17"	25"	4"	16"	23"	3"	49"	BELOW HEADER
KWSL	WOOD	$16\frac{5}{8}$"	$26\frac{5}{8}$"	$5\frac{1}{4}$"	$14\frac{1}{2}$"	$24\frac{1}{2}$"	$3\frac{1}{2}$"	49"	STUB IN CONDUIT $1\frac{1}{4}$"
LWSL	WOOD	$18\frac{5}{8}$"	$30\frac{5}{8}$"	$5\frac{1}{4}$"	$16\frac{1}{2}$"	$24\frac{1}{2}$"	$3\frac{1}{2}$"	47"	BELOW HEADER

STEEL & WIKE COMPANY

Manufacturers of Kleer-Vu Insulated Medicine Cabinets

533 North 13th Street
PHILADELPHIA, PA.

BRANCH OFFICES
NEW YORK, N. Y., 234 Bridge Street, Brooklyn—Telephones, TRiangle 5-2912, 5840

KLEER-VU INSULATED SANITARY MEDICINE CABINETS

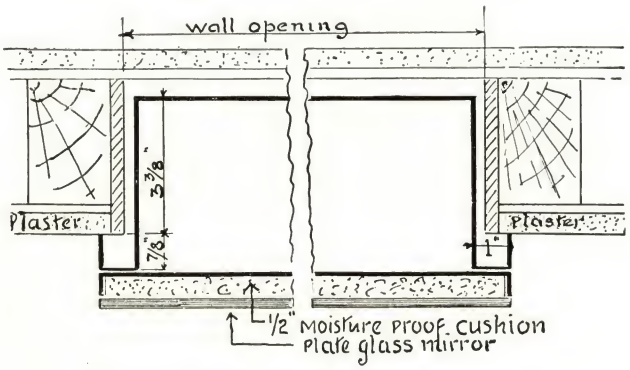
Description

Kleer-Vu Insulated Medicine Cabinets derive their name from the fact that they provide full vision over the entire surface of the mirror front, without screws or bolts through the face, and that they are insulated against breakage through normal use.

PATENTED KLEER-VU COPYRIGHTED

Reg. U. S. Pat. Office No. 1682584

Each mirror is imposed on an insulating composition which is entirely invisible, and is held in place permanently by small corner plates of brass, plated in chromium and so polished as to be practically non-apparent against the silver background of the mirror.



Detail Plan of Installation

Complete and Sanitary

Kleer-Vu line of cabinets is complete for the reason that for every medicine cabinet there is a wall mirror of identical design, which is specified by simply using the letter M as a prefix to the catalogue number. Because these mirrors are frameless, unusually sanitary in fact and appearance, they are admirably adapted to use in hospital lavatories, nurses' homes, public buildings and sanatoria, as well as residences.

Finish and Hinges

All etchings in matte finish, except 1830E, which is part matte and part high lighted, giving new and particularly beautiful effect. All square top cabinets are reversible for either hand.

Standard hinging for curved top cabinets is at left-hand side. Other hand is special.

Chromium Framed Mirror

Any sizes or design with square tops shown on following page can be furnished with chromium frames. Special sizes on request

Specifications

Body and Door—Patent leveled furniture steel.

Corner Clips—Brass, chromium plated, insulated with rubberized cork.

Door—Insulated with ½-in. moisture-proof and shockproof composition.

Shelf Brackets—Adjustable at 1½-in. intervals.

Mirrors — ¼-in. polished plate with all edges polished. All mirrors have narrow bevel, except 1830 and 2032 styles, which carry wide bevel.

Shelves — Glass with bulb edge.

Finish — Pyroxylin, with primer baked to insure flexible durable finish, in a smooth satin.

Note: All cabinets furnished with nickeled screws and cup washers for erection and packed in individual cartons. The 1830 and 2032 sizes are equipped with special door stop, finished in chromium.

Linen Cabinet

Mirror 18x60 in.
Wall opening 15¾x58 in.
Made in any depth up to 12 in.
Equipped with five glass shelves and two hanging hooks

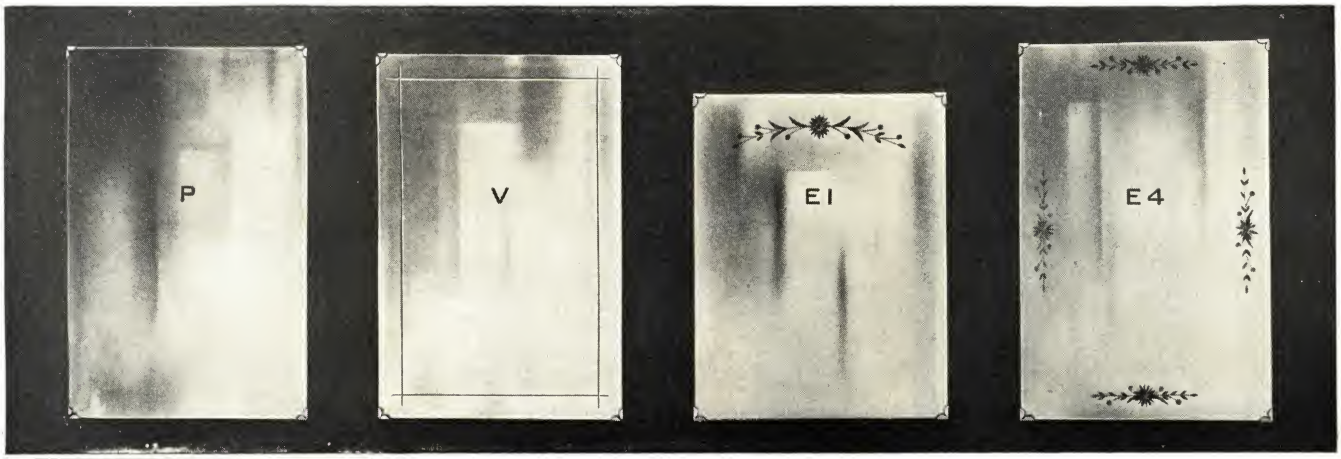
Triplicate Mirrors

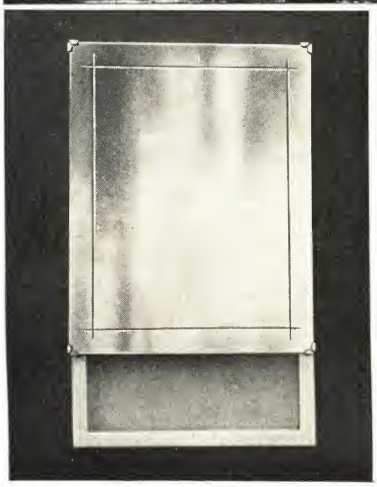
Ask for Catalogue "F" for triplicate mirrors or cabinets with triplicate mirrors.

SIZES AND DESIGNS OF CURVED TOP, RECESSED TYPE, KLEER-VU MEDICINE CABINETS AND WALL MIRRORS

Cat. No.	Mirror, in.	Mirror designs				Wall opening required, in.
1420½	14x20½	P	V	E1	.....	12½x16½x3½
1622½	16x22½	P	V	E1	.....	14½x18½x3½
1626½	16x26½	P	V	E1	E3	14½x22½x3½
1830	18x30	P	V	E	.....	15¾x26 x3½
2032	20x32	.....	V	.....	.....	17¾x27½x4¼

After Cat. No. be sure to specify mirror design desired.
For mirror without cabinet, prefix letter M to Cat. No.



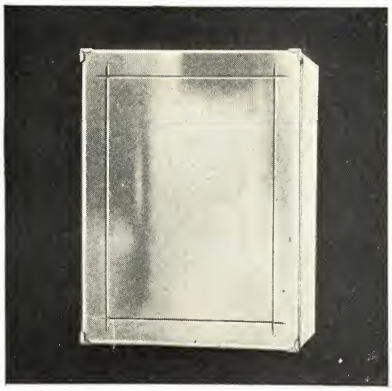


Recessed Type D with Open Shelf

SIZES AND DESIGNS OF SQUARE TOP KLEER-VU MEDICINE CABINETS AND WALL MIRRORS

Cat. No.	Mirror, in.	Mirror designs				Wall opening, in.	Over all in.
Recessed Type							
1418	14x18	P	V	E1	E4	12½x16½x3½	
1620	16x20	P	V	E1	E4	14½x18½x3½	
1624	16x24	P	V	E1	E4	14½x22½x3½	
1827½	18x27½	P	V	E1	E	15¾x26 x3½	
2024	20x24	P	V	E1	....	18½x22½x3½	
Recessed Type D with Open Shelf							
D1418	14x18	P	V	E1	E4	12½x22½x3½	14x24
D1620	16x20	P	V	E1	E4	14½x24½x3½	16x26
D1624	16x24	P	V	E1	E4	14½x28½x3½	16x30
Type H—To Hang on Wall							
H1418	14x18	P	V	E1	E4		14x18x4½
H1620	16x20	P	V	E1	E4		16x20x4½
H2024	20x24	P	V	E1	.....		20x24x4½

After Cat. No. be sure to specify mirror design desired.
For mirror without cabinet, prefix letter M to Cat. No.



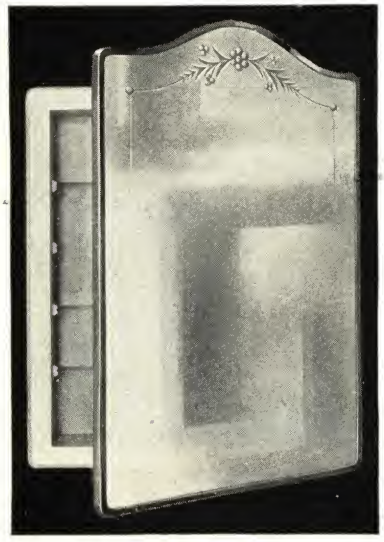
Type H—To Hang on Wall

UNITED METAL BOX CO., INC.

Manufacturers of

"United" Steel Bathroom Cabinets and
"United" Apartment House Mail Boxes

473-491 President Street, BROOKLYN, N. Y.



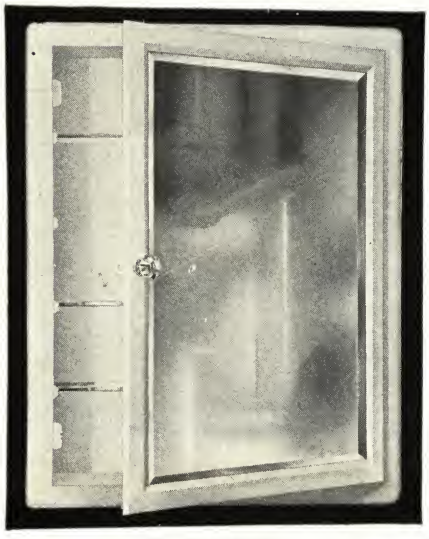
Series 7500

Steel Bathroom Cabinets

The "United" line of steel bathroom cabinets is complete. It ranges from the simple, clean-cut white enamel cabinet to the luxurious Venetian type cabinet. It includes open shelf cabinets, clothes hampers, utility cabinets, and the beautiful 3-wing vanity cabinets.

The Venetian type cabinet has been greatly improved. A one-piece channel frame completely encloses and protects the handsomely engraved mirror. This channel frame is made of cold rolled steel or when chromium plating is desired, of solid brass. The door is removably mounted on the cabinet by ball tip hinges and has a brass link to limit outward swing of the door and an easy working adjustable brass catch.

Series 6500



Series 1500

Constructional Features of All "United" Cabinets

Indestructible—Entire cabinet is made of heavy gauge steel and protected against rusting.

Dustproof Interior—Front of cabinet is made from one piece and the door fits snugly to exclude dust and dampness.

Hinges—The cabinets are made with concealed hinges, and are specially mounted so that the door will not tear loose or sag with rough usage.

Doors—All doors are of built-up hollow steel construction specially made for rigidity without excess weight.

Adjustable Shelves—Bulb edge glass shelves are furnished with each cabinet, and are supported by permanent, attached shelf clips.

Substantial Door Knob and Catch—Door knob where used is of ornamental glass, and all doors are secured by means of concealed bullet catches.

Best Quality Plate Glass Mirrors—Mirrors are of high grade double plate glass mounted on inside of door and completely encased and protected.

High Grade Enamel Finish—Cabinets are finished in a permanent smooth baked-on finish in white or colors.

Clothes Hamper

Literature

Write for literature on complete line.

CATALOGUE NUMBERS AND DIMENSIONS

Cat. No.	Wall opening, in.	Over all, in.	Mirror, in.	Cat. No.	Wall opening, in	Over all, in.	Mirror, in.
1500	14½x18½	17x21	10x14	7500	14½x18½		17⅛x23 11/16
1500A	14½x18½	17x21	12x16	7501	16½x20½		19⅛x25 11/16
1501	16½x20½	19x23	12x16	7502	19 x25	Venetian	21⅜x29 15/16
1501A	16½x20½	19x23	14x18	7503	16½x22½	Mirror	19⅛x27 11/16
1502A	19 x25	21x27	16x22	6500	14½x18½	Cabinets	17⅛x22
1503	16½x22½	19x25	14x20	6501	16½x20½		19⅛x24
X1601A	16½x22½	19x25	14x14	6502	19 x25		21⅜x28
X1602A	19 x25	21x27	16x16	6503	16½x22½		19⅛x26
X1604A	16½x26½	19x29	14x18	2003	16 x36¼	18¾x38¼	Clothes hamper
				1000	14½x36	17 x38½	Utility cabinet

Cabinets can be furnished for surface mounting.

X—Open shelf type.

ESTABLISHED 1906

BOBRICK MANUFACTURING CORPORATION

750 Belair Avenue
MONTREAL, CANADA

215 Fourth Avenue
NEW YORK, N. Y.

111-117 South Garey Street
LOS ANGELES, CALIF.

SOP-O-ZON LIQUID AND POWDERED SOAP DISPENSERS

One of the most complete lines of dispensers obtainable is the result of 25 years' experience.

SoP-O-zoN

Stocks—Immediate delivery from New York, Chicago, Los Angeles, Montreal, and by over 300 distributers in the United States and Canada.

Guarantee—All products unreservedly guaranteed to operate to the complete satisfaction of the user regardless of the quality of soap used.

Patents—Owned and controlled by us. This fact insures your clients against litigation.

No. 7

Bronze and nickle silver. Hinged filler-cap locks. One-piece construction. Opal or clear glass globes.

Nickelplated $3.50
Chromium plated..... 4.25
All metal globe $1.25 extra

No. 8

Slab bracket type of No. 7. Attached to basin with ¼-in. round bolt.

Nickelplated $3.75
Chromium plated..... 4.25

No. 9

Heavy pressed steel. Globe cemented into body. Large filler-cap permits of easy filling.

Nickelplated $2.00
Chromium plated 2.75

No. 10

Vitreous porcelain enamel fused to steel. Unbreakable. Theft-proof. Filler-cap locks.

No. 10 pint size $3.50
No. 12 quart size 4.00

No. 829

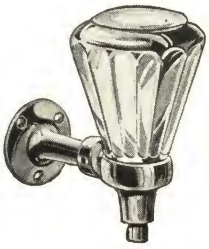
Exposed parts nickel silver. Fills from top. 1¼-in. hole required. Fits basins 1¼-in. thick. Longer shanks to order.

Nickelplated $5.00
Chromium plated 5.50
Art crodon finish..... 7.00

No. 11

Heavy vitreous china. Nickel silver fittings chromium plated. Filler-cap locks. Holds over pint. No screws visible.

White $5.00
Fawn, green, rose, black and orchid stock colors. 6.00



No. 15

Brass. Swivel bracket permits globe to be inverted to fill. Can not deliver continuous stream.

Nickelplated $2.25
Chromium plated 3.00
All metal globe $1.25 extra.

Dispensers for Powdered Soap

No. 31 for Powdered Soap

Indestructible pressed steel. White vitreous porcelain enamel. One-piece construction. All parts enclosed and locked. Operating pressure against the wall and not against screws. Five pocketed paddle wheel delivers exact quantity soap powder with each operation. Large capacity. Easy to fill.

White porcelain $4.00
Standard colors 75¢ extra.

No. 25 for Powdered Soap

White metal. No. 31 mechanism. Each operation agitates the soap powder preventing packing in dispenser.

Nickelplated $2.50
Chromium plated..... 3.25

No. C866

Exposed metal nickel silver. Famous Pullman car soap valve. 1¼-in. faucet holes required. Fits basins up to 1½ in. thick. Longer shanks to order. Coupling ⅜-in. iron pipe size.

Nickelplated $4.50
Chromium plated 5.00
Art crodon finish..... 7.00

No. C860

Bronze and nickel silver for tank systems. ⅜-in. iron pipe size. Can not deliver continuous stream.

No. 860 Horizontal type.
No. 862 Vertical type.
No. C863 Elbow type.

Nickelplated $2.25
Chromium plated 2.75

Iron Soap Tanks

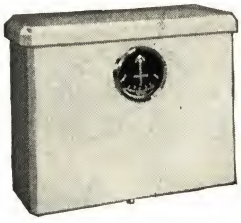
Black iron not affected by soap. White enamel finish. Gauge indicates contents in quarts. Outlets ⅜-in. iron pipe size.

No. C904—1 gal...$5.00
No. C905—2½ gal. 6.50

Black Iron, Aluminum Finish Tank

Cork float with wire attachment indicates contents.

No. C901 3 gal.$6.00
No. C902 5 gal. 7.00



China Soap Tank

Heavy vitreous china. Gauge, rim and flange chromium plated.

No. 814—1 gal. $12.00
No. 815—2 gal. 13.50
No. 816—5 gal. 22.00

THE GERSON-STEWART CORPORATION

Manufacturers of Liquid Soap Systems and Softasilk Liquid Soap

CLEVELAND, OHIO

Softasilk Gravity Liquid Soap System

For factories, hotels, clubs, public buildings, schools, hospitals, institutions, etc., with over sixteen years of satisfactory performance.

Softasilk

TRADE-MARK
(Registered)

Advantages of the System

With the perfected valve, the Softasilk Gravity Liquid Soap System has become a necessity in solving the soap problem in washrooms. It is easily installed in old or new buildings at low cost. The liquid soap is fed by gravity from a tank, through a pipe to valves directly over each basin. In new buildings, the pipe is concealed, with only the valve exposed, as shown on the illustration below. The *most important part* of the system is naturally the discharge valve. Particular attention is called to the Softasilk Valve, its *sightliness, sturdiness, simplicity* in construction, *accessibility.* The Softasilk Valve is operated by pushing the button which displaces a measured amount of soap. The important feature is that the opening and closing are alternate, and there is, therefore *no point in the travel of the piston at which a continuous flow may be obtained.*

There are only two washers in the valve, neither of which moves, and there is very little wear. The front nut is securely locked, but may be easily removed, and a washer replaced in a few minutes. The Softasilk Valve is beautifully chrome finished.

What It Does

A push of the button delivers a measured amount of liquid soap directly into the palm, eliminating all contact with the dispenser. There is nothing to fool with, and it is easy to operate. It gives 16,200 pushes to each gallon of soap.

What It Saves

In dispensing only a *measured* amount of liquid soap directly into the palm, the Softasilk Gravity System prevents waste inevitable with ordinary soap. There are no soap dishes or receptacles to clean, there is nothing that must be replaced because of accidental breakage or other damage, and, as there is only one reservoir for the liquid soap, the work of replenishing the soap supply is reduced to a minimum.

Tanks

The tanks, as shown in the illustration, are made with a view of giving lifelong service, beauty and ease in cleaning. They are welded as one piece, and finished inside and outside in white vitreous enamel. A gauge shows the level of the soap at all times. Stock sizes are 1, 3 and 5 gallons. Special sizes and individual colors to order.

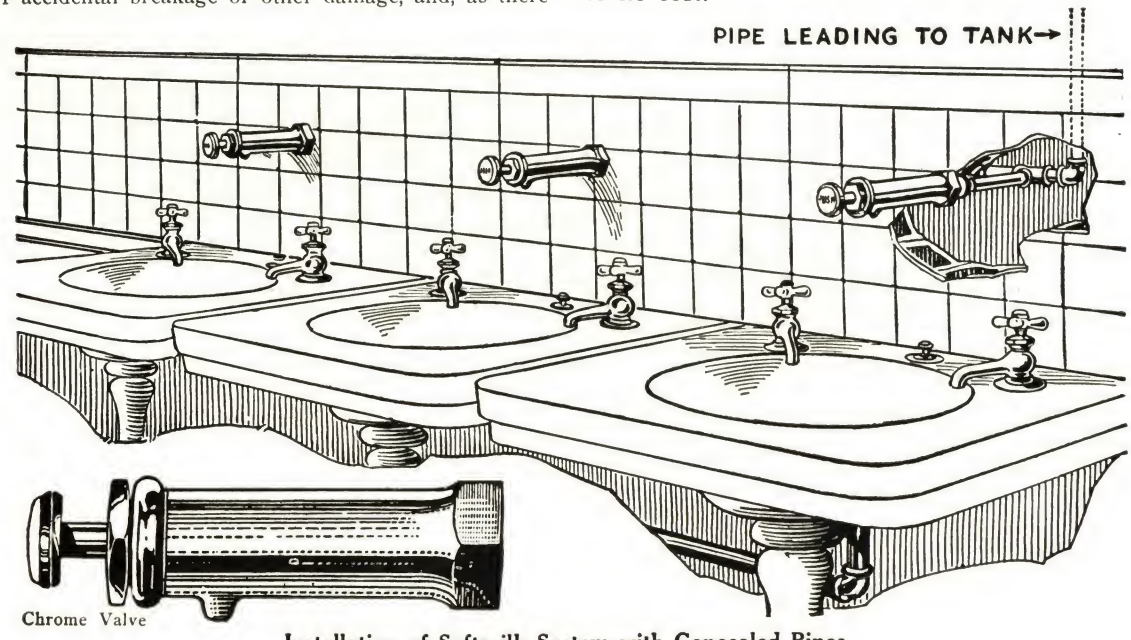
Softasilk System Tank

Softasilk Gravity Specifications

Furnish and erect complete a liquid soap system with outlets at every washroom and shower, located as directed. This system shall include vitreous enamel tanks, capacity ½ gallon per fixture. Install shutoff cock and union below each tank. The lines from the tanks shall be ⅜-in. black iron pipe with ⅜-in. branches to the dispensing valve. All piping shall be concealed. Softasilk Gravity System tanks are to be placed as shown on the plans. Over each lavatory furnish and install one Softasilk Soap Dispensing Valve as manufactured by THE GERSON-STEWART CORPORATION, Cleveland, Ohio.

Complete Service and Guarantee

THE GERSON-STEWART CORPORATION supplies valves, tanks, pipe and fittings complete. You may consult our Service Department on any special problems for proper installation without charge. The proof of the success of the Softasilk Gravity System is our unqualified guarantee of *"After Sales Satisfaction,"* or no cost.



Installation of Softasilk System with Concealed Pipes

Pipes and tanks may be exposed on wall, or concealed, as conditions warrant

THE IMPERIAL BRASS MFG. CO.

Manufacturers of the Watrous Liquid Soap Specialties

1222 West Harrison Street
CHICAGO, ILL.

Products

WATROUS LIQUID SOAP FIXTURES.

Also, Combination Lavatory Fixtures, Lavatory Wastes, Self-closing Faucets.

For Imperial Window Washing Devices, Safety Belts, Builders' Hardware and Watrous Flush Valves, see Manufacturers' Index.

Watrous Individual Liquid Soap Fixtures

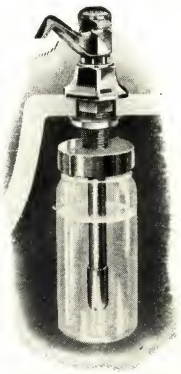
Economy and cleanliness are principal reasons why Watrous Fixtures are regularly specified by leading architects. Their installation stops waste and theft of soap—washing becomes more pleasant and more sanitary. Where several lavatories are to be supplied with soap, use Watrous Gravity Liquid Soap System.

No. M-807—A new Push-in Type Wall Fixture with glass container. Refilled through cap in top cover.

No. M-801—With concealed container. Fits faucet hole in lavatory top. Soap is secured by pushing down on button on top. Refilled by removing push button. Furnished with round jar like M-830, if desired.

No. M-807. Wall Type Fixture

No. M-801. Lavatory Type Fixture

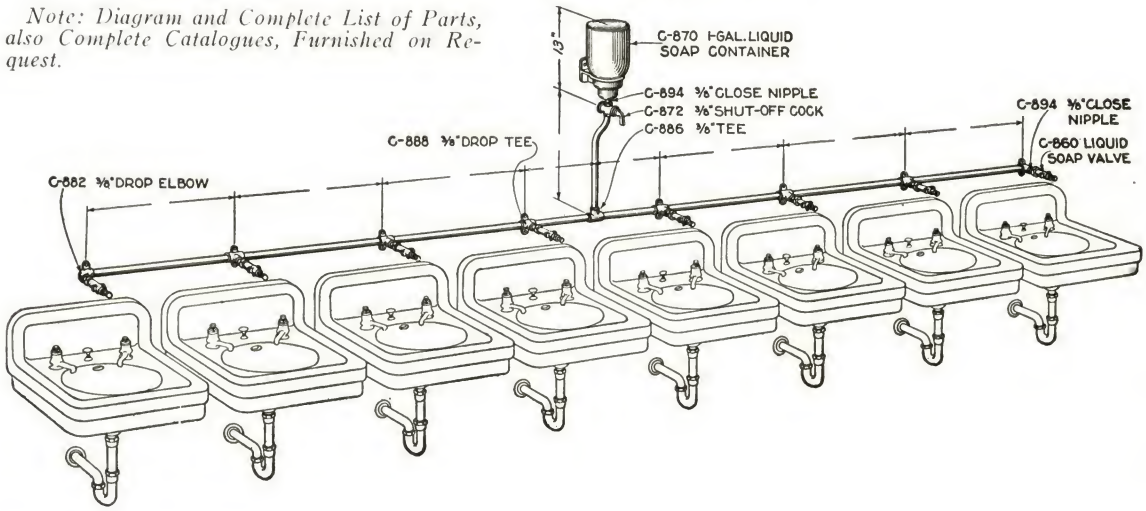


No. M-830. Art Crodon Lavatory Type Fixture

No. M-830—Art Crodon. Can be furnished with same type of jar as M-801.

Watrous Gravity Liquid Soap Systems

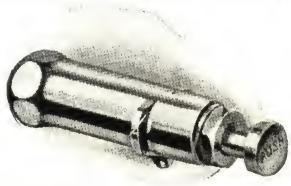
Note: Diagram and Complete List of Parts, also Complete Catalogues, Furnished on Request.



No. C-860 Liquid Soap Valves—Operated in a horizontal position. Threaded ⅜-in. iron pipe size. A push on button delivers a measured quantity of liquid soap through spout hole. Made of brass, heavily nickel-plated or chromium plated. Soap valves can also be furnished in vertical or elbow types.

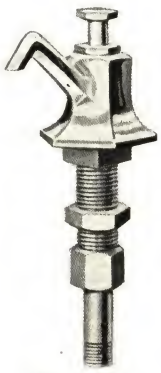
No. C-866 Liquid Soap Valve—Operated in upright vertical position. Provided with shank to fit 1¼-in. faucet hole in lavatory top. Shank is equipped with a 1¼-in. iron pipe coupling nipple and nut for connecting to piping which can be concealed underneath lavatory. Made of nickel silver, heavily nickel-plated, or chromium plated. Can be furnished with chain stay for plug.

No. M-817—Same as No. C-866 but is Art Crodon Style.



No. C-860. Liquid Soap Valve

No. C-866



No. M-817

Gravity Liquid Soap Tanks

No. M-832—This attractive tank is for use with gravity liquid soap system and is made of vitreous china and is easily cleaned and sanitary. Furnished with gauge in 5-qt., 2-gal. and 5-gal. sizes.

No. C-901—Made of black iron with welded seams and in aluminum finish. Gauge on top of tank drops when tank is ¾ empty on the 3 and 5-gal. sizes. One-gallon size has a glass gauge on front of tank.

No. M-832

No. C-901

PALMER PRODUCTS, INC.

Manufacturers of Liquid Soap Dispensers

MAIN OFFICES, FACTORY AND LABORATORIES
WAUKESHA, WIS.
(Adjacent to Milwaukee)

Products

INDIVIDUAL SOAP DISPENSERS.
LIQUID SOAP TANK SYSTEMS.
Also manufacturers of Soap Powder Dispensers, Fixtures for Toilet Tissue and Paper Towels and Palmer Mystic Gloss Floor Finish.

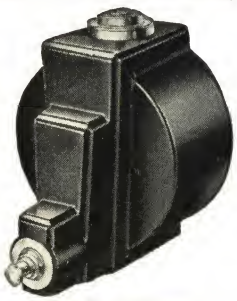
For Toilet Paper and Paper Towel Fixtures, see Manufacturers' Index.

MULTI-SERVICE LIQUID SOAP DISPENSERS

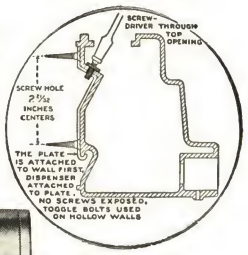
The Pre-Eminent Dispenser

Advantages—The Pre-Eminent Dispenser is a solid casting fixture securely attached to the wall in a simple and unexposed manner. It is unbreakable and of such large capacity that it serves to do away with the necessity of tank systems. A spring lock requires a key to open. The chrome plated valve, below, is removable. Fixture extends an adequate distance from the wall.

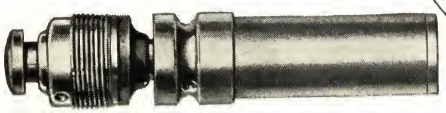
Colors—This fitting is finished in vitreous or porcelain enamel and may be supplied to harmonize with other bathroom fixtures in ivory, green, orchid, fawn and black, chrome trimmed.



The Pre-Eminent

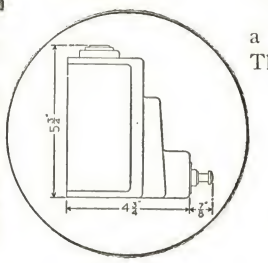


Attachment



A complete valve unit (not part of a valve) removable for repairing or replacing without removing the dispenser from the wall

Convenient Automatic Shut-off—Valves are sold with or without automatic shut-off. The automatic shut-off is a cleverly arranged, inside, fool-proof valve—when it is necessary to repair or replace the valve unit, this unit can be removed from the main body of the valve with a wrench, and the automatic shut-off valve automatically shuts off the flow of soap to that particular soap valve, permitting the continuous use of other valves without interfering with same while repairs are being made.



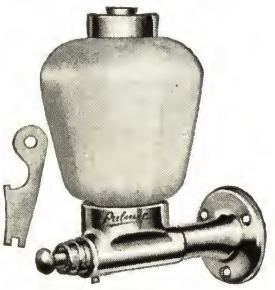
The Silver Server Dispenser

Silver Server

This is a permanent dispenser cast in solid nickel silver, commonly called german silver. It is con-corrosive and non-tarnishing. It may be chrome plated if desired.

It is equipped with a spring lock cap requiring a key to open. It has a replaceable valve of nickel silver. Type A is equipped with crystal decagon bowl, type B with opal decagon bowl. It is 5½ in. from wall to valve button and 6 in. from bottom of valve to top of bowl.

The 6XR Line of Dispensers



6XRA

These dispensers are equipped with solid bronze cast brackets nickel or chrome finished. Cleaning is accomplished easily and occasional replacement of parts quickly achieved because bowls, gaskets and valves are removable without demounting dispenser from wall.

Like all Palmer dispensers it has a large 1-in. opening easy to fill. These dispensers are equipped with spring lock cap and require a kep to open. The key is also used to remove valve unit which is the same as that illustrated in the first column.

A Palmer exclusive, patented attachment securely locks the bowl to bracket and yet can be replaced when broken.

6XRA is equipped with decagon opal bowl; 6XRB with crystal decagon bowl, and 6XRC with a metal bowl.

MULTI-SERVICE LIQUID SOAP TANK SYSTEM FOR SERVING ANY NUMBER OF WASHBASINS

Opal Glass Tank
Pipe may be concealed in wall

When a central source of soap supply fed to valve units through piping is required, Palmer is prepared to deliver the entire equipment with all fittings and pipes cut and threaded to proper length.

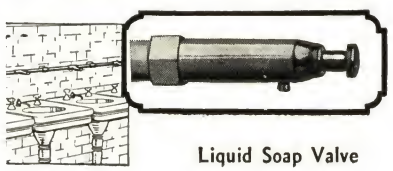
Piping may be exposed or concealed. For concealed piping, ⅜-in. iron pipe should be used; open piping should be nickel-plated or chrome brass pipe of the same size.

Palmer Liquid Soap Valves—Recognized as *dependable* and have become standard equipment with many nationally known critical buyers, after extensive tests conducted in their own engineering departments. The valves are made up in brass, nickel plated or chromium plated, as desired. They are entirely foolproof, with gaskets that are readily replaced. Exclusive design and knife-edge shutoff assures positive closing, and valve is guaranteed not to leak or clog.

Palmer Liquid Soap Tanks—Available in heavy rust-resisting terne plate, in two sizes and equipped with lifetime gauge. The No. 1 metal tank has a capacity of 3 gal.; the No. 2 metal tank holds 1 gal.

The No. 3 tank is an ornamental white opalescent glass tank with highly nickel-plated or *chromium* brass fittings (illustrated to the left), and also equipped with lifetime gauge. Capacity, 1½ gal.

Metal Tank



Liquid Soap Valve

Pullman Type Valve—Designed to provide a gravity valve to attach to the wash basin where a third opening is provided in the basin when the cold and hot water faucets are combined, or where the hot water faucet is eliminated. Can be installed with either concealed piping or open piping—all valves chromium or nickel plated.

THE PROCTER & GAMBLE CO.

Ivory Soap Dispensers

CINCINNATI, OHIO

Ivory Soap Dispensers

For public washroom installation only.

The Ivory Soap Dispenser is designed to meet the requirements of public washroom installations in hotels, office buildings, industrial plants, hospitals, clubs and restaurants. (It is *not* sold for use in residences.)

Construction

All metal parts made of a special aluminum alloy, chromium plated. Will not rust, tarnish or corrode. Original luster easily retained by an occasional rubbing with a dry cloth. Virtually airtight and moistureproof. Graceful proportions. (Dimensions indicated on sketch below.) Shapely bowl of heavy glass holds the flaked soap.

Operation

Dispenser self-contained. Occupies minimum space. Foolproof. Wet hands do not come in contact with discharge orifice, and hence it cannot become clogged. Always delivers.

Installation

Can be fastened to either vertical or horizontal surfaces in a few minutes. Gooseneck bracket supplied at no extra cost for installation on lavatory. See line drawing for methods of installation.

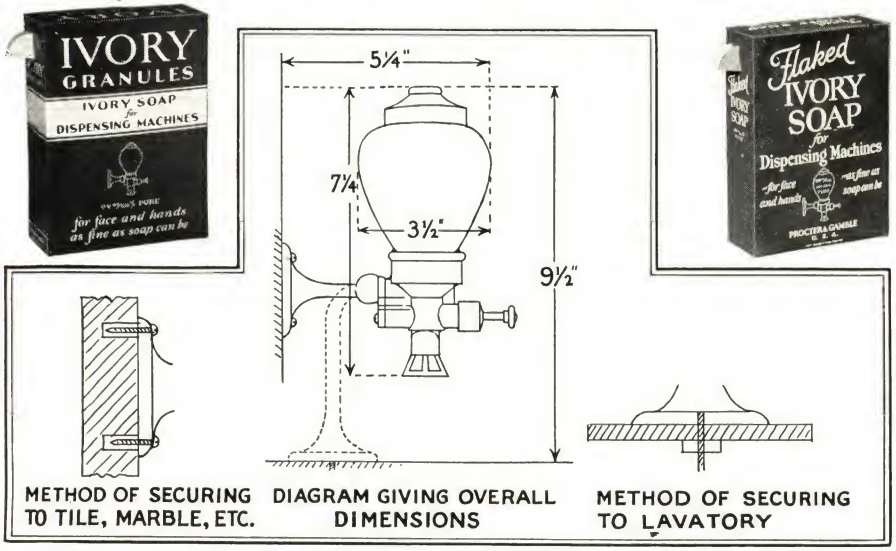
Economy

Careful tests have shown that use of the Ivory Dispenser assures a reduction of one-third to one-half in soap costs. A single push of the plunger delivers enough flaked Ivory for a generous lather. Dispenser is leakproof—no soap is wasted.

Ivory Soap Dispenser, Standard Wall Type

Soap

Ivory Soap in uniformly fine, free flowing flakes or granules is provided for dispenser. Comes in pound boxes with handy metal spout for easy filling of dispenser. Ivory's 99 44/100% purity and its rich lathering and free-rinsing qualities are universally known and appreciated.



Refilling

Dispenser equipped with airtight filler cap removable only with a special key provided for the purpose. Can be refilled as easily as a salt cellar.

Prices

Special contract prices for large installations mailed upon request.

Patented

Dispenser can be purchased only from PROCTER & GAMBLE.

U. S. SANITARY SPECIALTIES CORPORATION

Originators "Soaperior" Liquid Soap Systems

435 South Western Avenue, CHICAGO, ILL.

BRANCH OFFICES

NEW YORK, N. Y., 59-63 East 12th Street

BIRMINGHAM, ALA., 3 South 20th Street

Products

"Soaperior" Gravity Liquid Soap Dispensing Systems and Individual Dispensers for hotels, theaters, clubs, banks, schools, hospitals, institutions, public buildings, factories, etc.

Also Paper Towel and Toilet Paper Fixtures and other Sanitary Requisites.

The Company

For more than a dozen years, the U. S. Sanitary Specialties Corporation has blazed the trail in developing new methods and appliances in the field of sanitation. Scientific control of production is guided by a busy laboratory and research department. Three plants, Chicago, New York, and Birmingham, make for prompt service.

"SOAPERIOR" GRAVITY LIQUID SOAP DISPENSING SYSTEMS

Description

A small investment and practically no maintenance cost provides sanitary hand-washing facilities in the lavatory. Perfect hygiene and efficient soap supply service are insured. A measured quantity of clean liquid soap is delivered to each user.

"Soaperior" Soap System consists of an elevated, adequately sized soap tank installed above the horizontal soap line. From this, liquid soap is piped to especially designed hexagon, foolproof valves located over each basin—batteries or single lavatories.

Where practical, a single large soap tank (35, 65 or 110 gal.) may be installed on top floor of pent house, the soap piped to each washroom.

Installation of all-metal gravity soap systems insures permanency, obviates breakage, eliminates frequent fillings of dispensers, etc.

Pipe is concealed in wall or exposed if desired.

Over factory wash troughs, exposed pipe is clamped to water line.

Exclusive Patented Valve

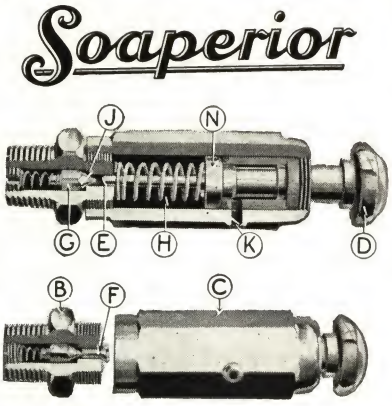
The "Soaperior" Hexagon Soap Valve is the *heart* of the gravity system. (Cutaway view at top of page shows the reasons for dependability, leakproof and foolproof features.)

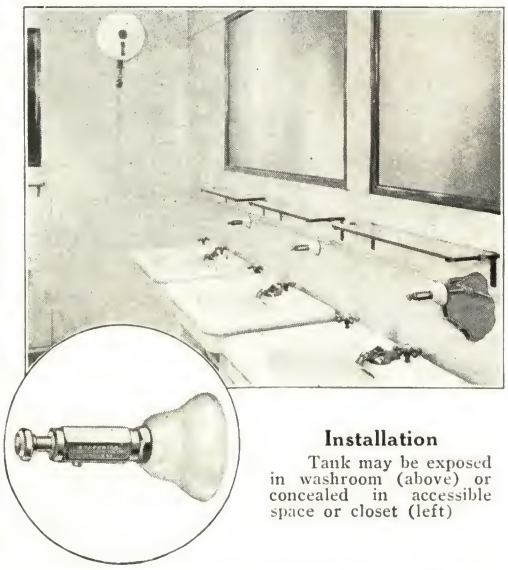
Discharges only a measured quantity of soap—14 to 16 drops.

Soap cannot flow in a continuous stream.

"Soaperior" Valve incorporates an exclusive patented feature.

The rear union (B) holds unusual pressure and acts as an individual shutoff cock, permitting removal of the body of valve for cleaning, and allowing other valves on the line to remain in use.





Installation

Tank may be exposed in washroom (above) or concealed in accessible space or closet (left)

Construction

Because it stands up under heavy duty requirements and does not corrode or form verdigris, white metal was selected for the "Soaperior" Hexagon Soap Valve. Chromium plating insures lasting finish. Push button comfortably fits the hand. Piping may be chromium or nickel plated brass for installations where piping is exposed—galvanized or black iron where concealed.

Guarantee

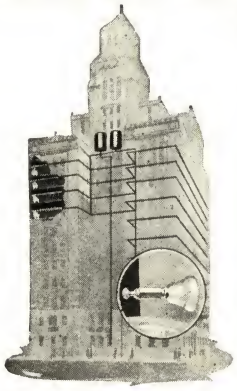
Every "Soaperior" Soap Valve and Individual Dispenser carries a year's guarantee against mechanical defect.

Specifications

Furnish and install a Liquid Soap Supply consisting of an elevated soap tank located adjacent to each battery of basins, from which soap lines (concealed or exposed) shall run to liquid soap valves located over each wash basin. Valves shall include cone shut-offs and check in rear union (catalogue No. 103 U. S. Sanitary Specialties Corporation of Chicago). Tanks figures No. 100, 101 and 102 (see next page) catalogue U. S. Sanitary Specialties Corporation of Chicago shall be equipped with glass gauge protected by three steel bars. Tank figure No. 203 shall be equipped with float gauge and vertical indicator. Tank Fig. 200 (see next page) shall be equipped with float gauge and strainer. Tanks shall be located so that top when installed is not less than 18 in. below finished ceiling. Pipe and fittings standard ⅜ in. iron pipe size.

Note: For high pressure installations, see "Soaperior" H.P. Valve described under "Penthouse Type Installations."

"SOAPERIOR" PENTHOUSE TYPE INSTALLATIONS



Mayo Clinic Building, Penthouse Installation—250 Valves

Description

A central soap supply tank (Fig. No. 300) is installed in an upper section of the structure. Liquid Soap is piped to "Soaperior" H. P. (high pressure) Soap Valves used in systems where location of supply tanks develops 20-lb. to 100-lb. pressure by gravity. Adjust to regulate amount of soap discharged. Designate the distance from the tank to each horizontal pipe line and the number of valves in each battery. Specify a U. S. Pressure Regulator or a small auxiliary soap tank (Fig. 100-1-2-200-3) installed in the main riser at approximately every 10 floors.

Further information on request.

Tank Specifications

Cone bottom, float gauge with indicator. Necessary faucet opening. Heavy iron stand. Necessary fill opening. Constructed of heavy steel. Tank finished in green enamel, stand in black japan. Equipped with funnel top under opening with long tube extending to tank bottom to prevent foaming of soap, also screen to prevent introduction of foreign substances. Guaranteed leakproof. Capacities: 35, 65 and 110 gal. Dimensions and weights: 35 gal., 23½x24x36 in. over all; 12-in. stand; weight, 32 lb. 65 gal., 23½x36x48 in. over all; 12-in. stand; weight, 64 lbs. 110 gal., 30x36x48 in. over all; 12-in. stand; weight, 78 lb.

Fig. 300

Tanks for "Soaperior" System

Fig. 203—A distinctive white porcelized enamel tank harmonizing with modern lavatory appointments. Made of heavy metal, finished inside and out with porcelain enamel. Gauge shows soap level. Capacities 1, 2½ and 5 gal.

Fig. 100—Round spun tank, white or gray (or special color if desired) baked-on enamel. Capacities 1, 2, 3 and 5 gal.

Fig. 101—Round spun monel metal (not shown, shaped exactly like Fig. 100) complete with glass fluid gauge. Capacities 1, 2, 3 and 5 gal.

Fig. 102—Graceful circular pure white heavy china tank with glass fluid gauge. Capacities 1 and 2 gal. (Shaped exactly like No. 100 tank illustrated.)

Fig. 200—Made of heavy metal gray or white enameled, equipped with float gauge. Capacities 1, 2, 3, 5 and 10 gal.

Fig. 201—Monel metal, same specifications as Fig. 200.

Fig. 300—For penthouse installations. (See illustration opposite page.) Made of heavy steel, finished in green enamel. Capacities 35, 65 and 110 gal.

Fig. 200

Fig. 100

Fig. 203

"Soaperior" 121 Dispenser

A perfect balance of beauty and sturdy strength. Incorporates the famous foolproof Soaperior valve mechanism. One-piece bracket of non-corrosive white metal, heavily nickel or chromium plated; 18 oz. corrugated opalescent, or clear crystal globe. Push-button comfortably fits the hand. Also furnished with all-metal globe, nickel or chromium plated. Filled through opening at top. Lock top if desired.

Dimensions: projection over all, 6⅛ in.; height, 7¼ in.; weight, 1.6 lbs.

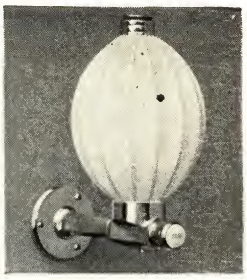


Fig. 121

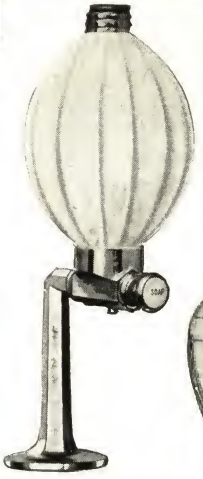


Fig. 122

"Soaperior" 122 Dispenser

"Soaperior" Model 122 is identical with Model 121, except that it is equipped with right angle bracket (made in one piece) to permit attaching to top of washstand through cock-hole.

Dimensions: height, 10¾ in. above bowl, 4 in. below; projection, 6¾ in. Weight, 2.3 lb. Capacity, 18 oz.

Fig. 125

Perfection 125 Dispenser

Leakproof push-up type dispenser made of white metal heavily nickel or chromium plated. Graceful paneled clear glass globe. All working parts enclosed in housing. Cone-type shutoff keeps the channel free from hardened soap.

Dimensions: height, 6½ in.; projection, 5½ in. Capacity of globe, 14 oz. Weight, 1 lb.

"Soaperior" 124 Dispenser (Pullman Type)

Where desirable to locate valves on basins instead of walls, specify Model 124. Made of white metal, chromium plated. All the features of "Soaperior" Hexagon Valve. Can be adjusted for high pressure installations. Lavatories should be furnished with opening drilled 1 in. square in top as directed.

"Soaperior" 123 Dispenser

Made of brass or white metal, nickel plated. Container is concealed beneath wash basin. Only the top of pump is exposed. Filled through top by removing button cap.

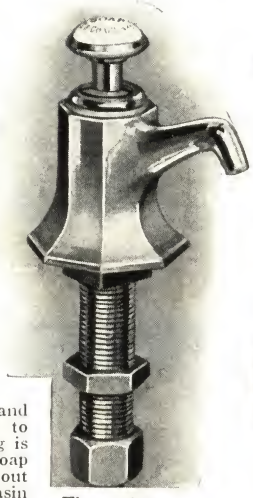


Fig. 124

Fig. 126 Combination Pop-up Waste Plug and Liquid Soap Valve

Combination pop-up waste plug and liquid soap valve attachment connected to gravity tank pipe line system. All piping is concealed. Makes it possible to install soap valve at same point as waste plug without necessity of drilling special holes in basin or attaching dispenser to wall. Waste operating rod fits all standard waste connections.

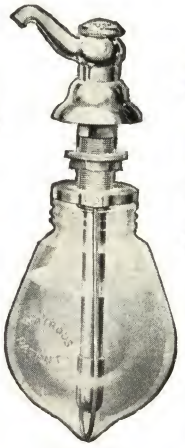


Fig. 123

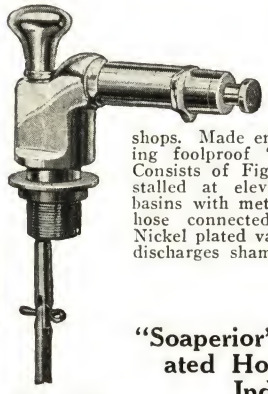


Fig. 126

"Soaperior" Shampoo Distributor

(Not illustrated.) For beauty parlors and barber shops. Made entirely of metal and incorporating foolproof "Soaperior" Valve mechanism. Consists of Fig. 100 or 203 tank (above) installed at elevation (either over battery of basins with metal pipe exposed or with rubber hose connected from tank to soap valve). Nickel plated valve at slight pressure on handle discharges shampoo in a continuous flow.

"Soaperior" Portable Hospital Dispenser Model 104

Heavy rugged metal body makes dispenser impervious to wear. Pedestal, hexagon shape, finished white porcelain enamel. All exposed metal parts chromium plated. Double foot pedal and swivel arm serves two basins. Globe corrugated, made of heavy white opalescent glass.

Mechanism precision tooled — plunger made entirely of metal. Valve designed so that release of pressure on pedal draws back soap through suction. Exclusive continuous flow feature. Positive shutoff.

Dimensions: height, 50 in.; diameter of base, 14 in.; clearance of spout, 39½ in.; arm reach, 12½ in. Globe capacity ½ gal. Also made with two arms.

"Soaperior" Hospital Dispenser Model 104B with Treadle Attachment

Consists of a soap tank (Figs. 100, 102 or 203), connecting pipe, "Soaperior" Hexagon Valve (Fig. 103) and foot pedal attachment, which may be installed from either right or left side of basin.

Hands do not touch the device. Continuous flow of soap while foot remains on pedal. Positive shutoff when pressure is released. When not in use, foot pedal attachment may be raised to upright position.

Fig. 104

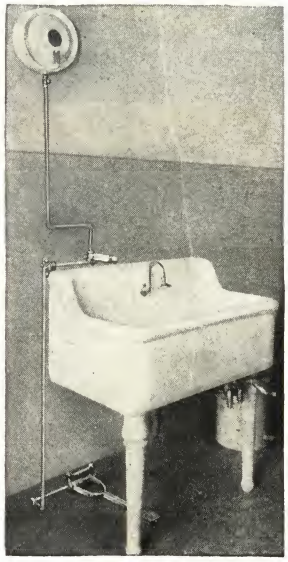


Fig. 104B

"Soaperior" 121-E Elbow Operated Hospital Dispenser for Individual Basins

Fool-proof, inexpensive hospital wall dispenser. Pressing elbow or forearm on lever discharges soap in a continuous stream. Embodies the well-known Soaperior Hexagon Soap Valve.

Made of non-corrosive white metal, chromium plated. Bracket is made in one piece and is fitted with a shapely 18 ounce clear crystal or opalescent corrugated glass globe. Easily attached to wall with three screws.

Dimensions: Projection over all, 11 in.; height, 7¼ in.; weight, 2½ lbs.

Fig. 121-E

SOAPITOR COMPANY, INC.

160 West 14th Street, NEW YORK, N. Y.

OFFICES IN ALL PRINCIPAL CITIES

The Soapitor, a Soap Dispenser That Supplies Powdered Soap Ground from a Solid Cake

In the Soapitor, the manufacturers offer the architect an individual soap dispenser *that is different.* The soap is furnished in the form of cylindrical cakes, but is dispensed by the Soapitor as a powder, so extremely fine, that, when wet, it forms an almost instantaneous lather. So little soap is used each time that a single cake lasts a surprisingly long time. There is absolutely no waste, and the dispensers themselves are guaranteed for life. Soapitors have been in successful use for more than 20 years.

Construction

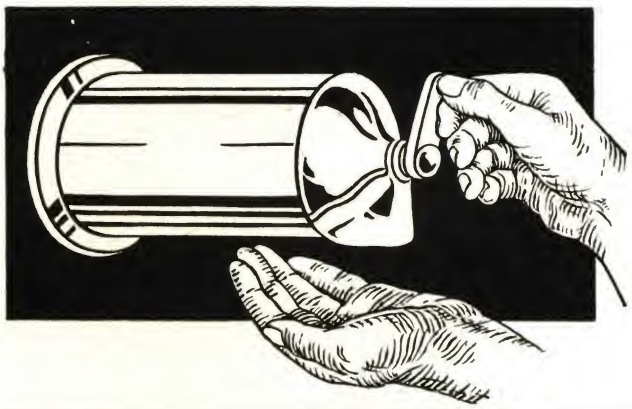
The Soapitor consists primarily of a locked, horizontal, cylindrical container, in the front end of which is a cutter or grinder. The soap is fed against the grinding head by a positive screw feed operated by a small hand crank. The feed contains no springs of any kind; the mechanism is simple, foolproof, and so designed that a single turn of the hand crank dispenses the exact amount of soap needed.

The Soapitor fits onto any wall, basin or bowl, no matter what the material or construction, by means of special hardware which we supply free.

Furnished in chrome plate over solid brass and monel metal.

Operation and Economy

The soap cakes are notched on the ends, and fit into similar notches in the feed mechanism, being held firmly against the cutter at all times. When a soap cake is nearly used up, a new cake is inserted behind it, the notches matching so that the two cakes become practically one. "Heels" are not thrown away—every cake is used to the last grain. The finely powdered soap is dispensed through a slot beneath the cutter. Locked high and dry in the Soapitor, the soap cake can not become wet—is never touched by the user—there is no possible chance for contamination, and the soap is safe from pilferers.



Perpetual Guarantee

At any time, the company will replace any part needed, or will even supply a new Soapitor for a defective one—*without any charge.*

Soapitor Soap

Two kinds are supplied—an unscented creamy white soap, and a green, slightly scented all vegetable oil soap. Both are as pure as can be made, and every cake is air-seasoned for at least a year so that, when placed in the Soapitor, it is entirely free of water.

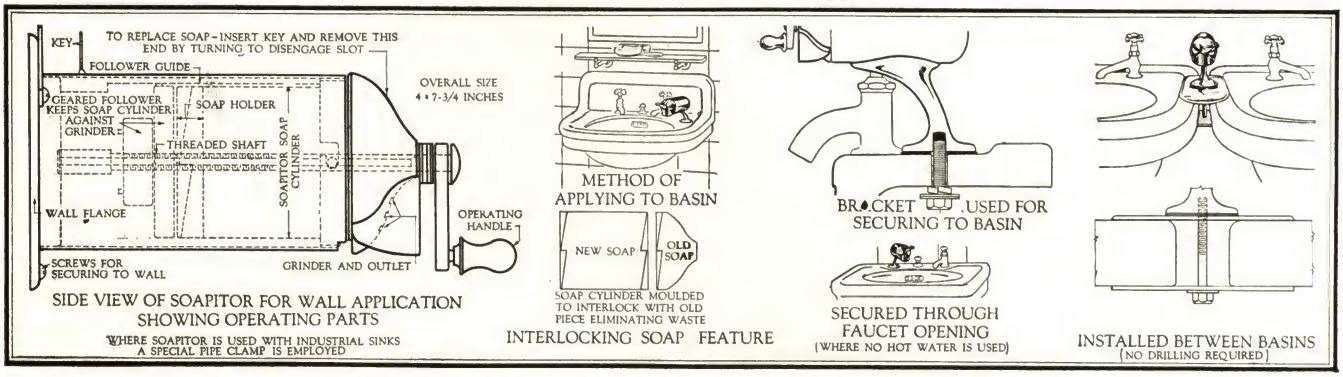
The price of Soapitor Soap is such that the annual soap bill for a washroom equipped with Soapitors is the lowest possible.

Some of the Firms That Have Used Soapitor for More Than Ten Years

Guaranty Trust Co.
Great A. & P. Tea Co.
Carnegie Steel Co.
Western Union Telegraph Co.
International Harvester Co.
American Tobacco Co.
U. S. Steel Corp.
Western Electric Co.
National Biscuit Co.
E. I. du Pont de Nemours & Co., Inc.
American Radiator Co.
U. S. Rubber Co.
Texas Company
Gulf Refining Co.

Liquid Soap and Dispensers

If the use of liquid soap is preferred to the Soapitor, the company will gladly furnish estimates on such soap and dispensers. The soap is made of the best oils and fats and contains the proper amount of antiseptic. The dispenser is built to withstand abuse and hard wear.



Details and Methods of Installation of Soapitor—Wall and Bracket Types

WEST DISINFECTING COMPANY

Manufacturers of Liquid Soap Dispensing Systems

16 Barn Street, LONG ISLAND CITY, N. Y.

BRANCHES AND OFFICES

ALBANY, N. Y.
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BALTIMORE, MD.
BIRMINGHAM, ALA.
BOSTON, MASS.
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KANSAS CITY, MO.
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WASHINGTON, D. C.
WINNIPEG, MAN.

FACTORIES: LONG ISLAND CITY, N. Y. and MONTREAL, QUE.

Products

SOAPARATUS LIQUID SOAP DISPENSING SYSTEMS.

Scope of West Service

WEST DISINFECTING COMPANY is an organization with a national reputation for the quality of its products, which are disinfectants, chemicals, liquid soap and liquid soap dispensing equipment.

This concern has a large, advantageously located plant, with facilities for quantity production, and scattered throughout the country in the larger cities are service organizations equipped to co-operate with clients to their complete satisfaction.

The experience of this company in installing soap dispensing systems in buildings of every type offers architects, builders and owners a service that will prove of exceptional value. Advice can be given on problems that might prove troublesome, and complete data on problems similar to your own is at your disposal for new construction or for installation in buildings already erected and occupied.

In addition to a proper layout, proper apparatus and proper soap, there is still a very important element that architects and owners should consider—that of future service.

WEST DISINFECTING COMPANY is firmly established with a line of products having a strong national demand, and showing a yearly increase of business that augurs well for the future.

West Soaparatus Liquid Soap Dispensing System Installed in a Theater

Soaparatus Tanks

The Soaparatus Tanks are made of vitreous china, vitreous enamel on welded sheet iron or white enamel on rustproof sheet metal. They are designed to cover as little wall space as is commensurate with good proportion and pleasing appearance.

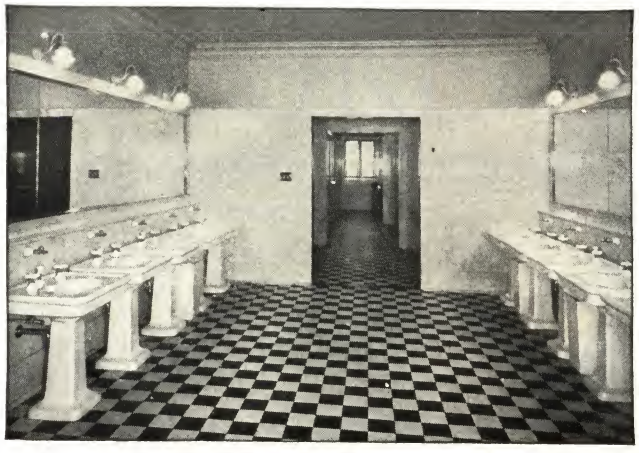
The vitreous china soap tank is considered superior to the others, because its appearance conforms perfectly with washroom fixtures, and it is more readily kept clean.

They are made in five sizes: 1, 2, 3, 5 and 10 gallon. The dimensions are shown below.

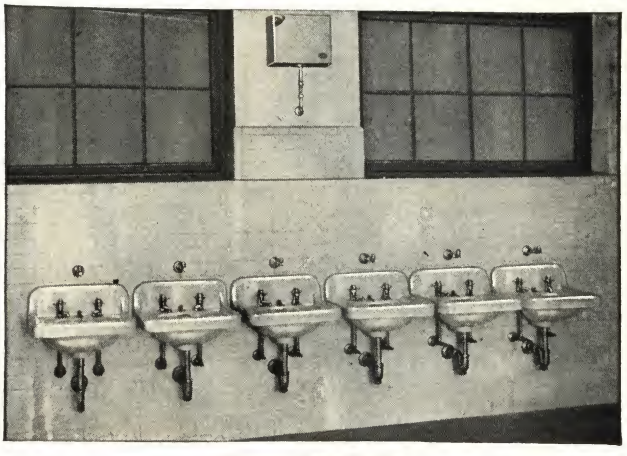
If it is desired, the entire system, including nickel-plated piping, unions, shut-offs and all parts, can be made at our factory to be shipped complete and assembled for exposed installation.

TANKS

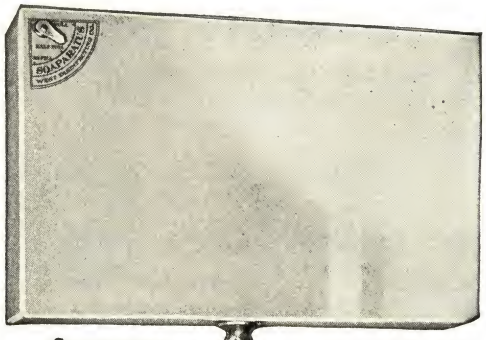
No.	Fluid content, gal.	Height, in.	Width, in.	Depth, in.
		Vitreous China Soaparatus Tanks		
1	1	8 5/8	10	4 3/8
2	1 3/8	9 1/4	12 3/4	4 1/4
3	2 1/8	9 3/4	15 3/4	4 1/2
5	3 7/8	12 3/4	16 1/4	5 1/2
		Monel Metal Tanks		
2	2	12	13	3 7/8
3	3	12	15	3 7/8
5	5	15	16	5 1/2
		Metal Tin Tanks		
1	1	8 1/2	9 1/8	3 3/4
2	1 3/4	9 3/4	12	3 7/8
3	2 1/2	10 1/2	15	3 7/8
5	4 1/4	12	15 3/4	5 1/4
10	10	18	22	6



Hotel Installation



School Installation

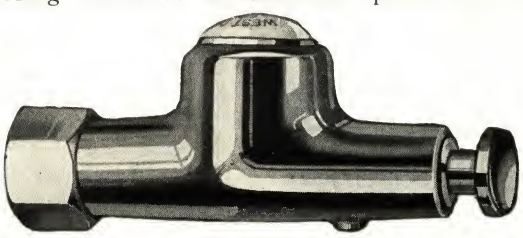


Soaparatus Tank

Soaparatus Valve

Designed primarily with one end in view—mechanical efficiency. It was then refined to harmonize in appearance with the finest plumbing fixtures.

The patented air chamber, within the dome on the upper side of the valve, contains just enough air over the soap to start a gravity discharge of the soap in the dome when the plunger is pushed. A slight push of the plunger shuts off the supply from the main reservoir by closing the inlet. A continued push emits a discharge of soap from the dome. This flows gently into the hand without splashing or squirting and without suds. The amount of soap released is the pre-determined amount proper for a satisfactory hand wash, and is released by one push of the plunger.



Soaparatus Valve

Another feature of the Soaparatus Valve is the plunger rod and inlet. This inlet is made of tool steel gauged within .00025 in. The plunger which fits into this inlet is made of selected drill rod. These two parts fit so accurately that they can withstand the pressure of more than 150 lb. without causing the valve to leak. This careful gauging is carried through on every part of the valve so that the assembled product is as nearly mechanically perfect as possible.

The Soaparatus Valve has been adapted also to a basin fixture. Many architects are making provision for a liquid soap valve on, or through, the wash basin. This Soaparatus basin fixture is a simple adaptation of the standard valve to meet this condition.

The Soaparatus Valves are finished in nickel or chromium to conform with the other fixtures.

Basin Type Soaparatus Valve

Soap

Liquid soap is being piped through buildings because, by this method, an uninterrupted supply of soap is assured; because liquid soap is more conveniently used than cake soap; because it is more sanitary; and last, but important, it is more economical.

West Disinfecting Company was a pioneer in the liquid soap industry, and has maintained its leading position because it manufactures only pure cocoanut oil liquid soaps of a standard high quality. To assure proper lathering and soothing qualities, it is necessary that the soap should be treated and retreated, aged and tested before it is allowed to leave the factory.

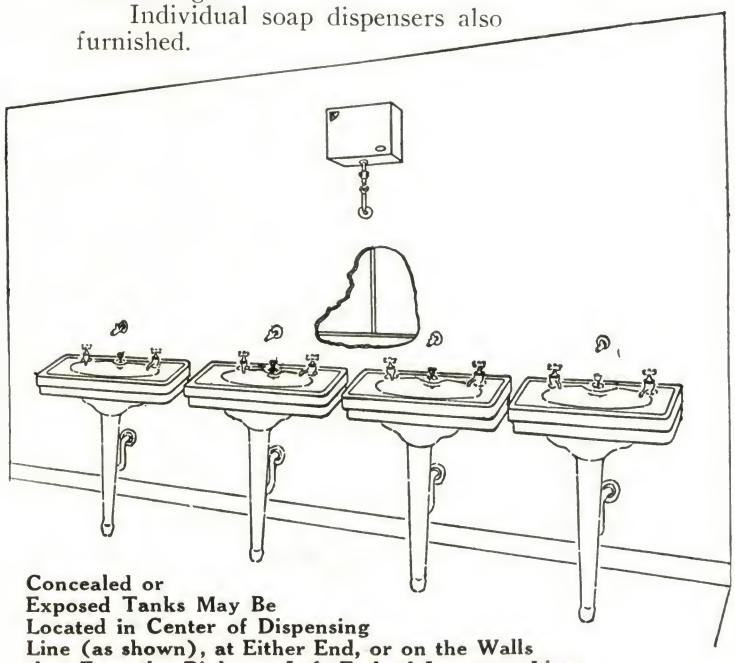
Installation

The Soaparatus system, due to its flexibility, is admirably adapted to varying conditions of installation. One tank may be used to supply any number of valves, and extensions may be made as required, provided they are at a level at least a foot lower than the location of the supply tank in order to provide proper gravity flow. When installed in connection with new construction, where provision has been made in the plans or where existing conditions will permit, the piping from the tank to taps may be concealed, creating an exceptionally neat appearance. In cases where it is impossible to conceal the piping a thoroughly attractive installation is provided by the use of nickelplated piping throughout.

Engineering Service

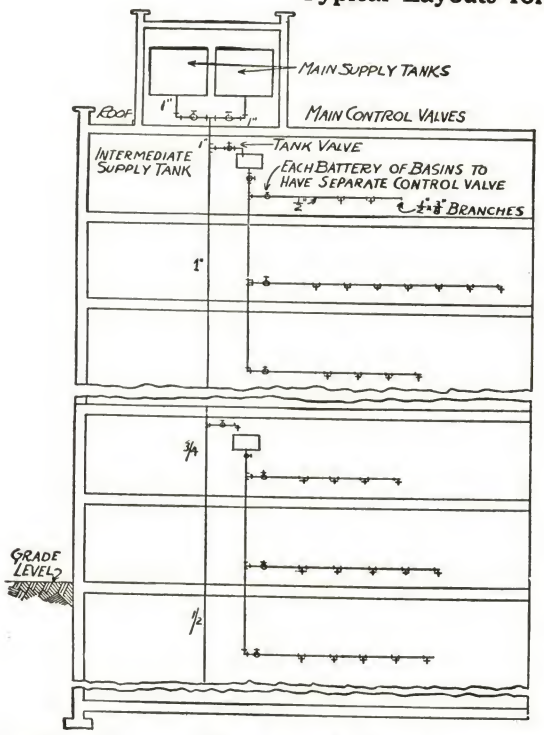
We maintain an Engineering Department Service—consultation with architects and engineers or owners of buildings.

Individual soap dispensers also furnished.

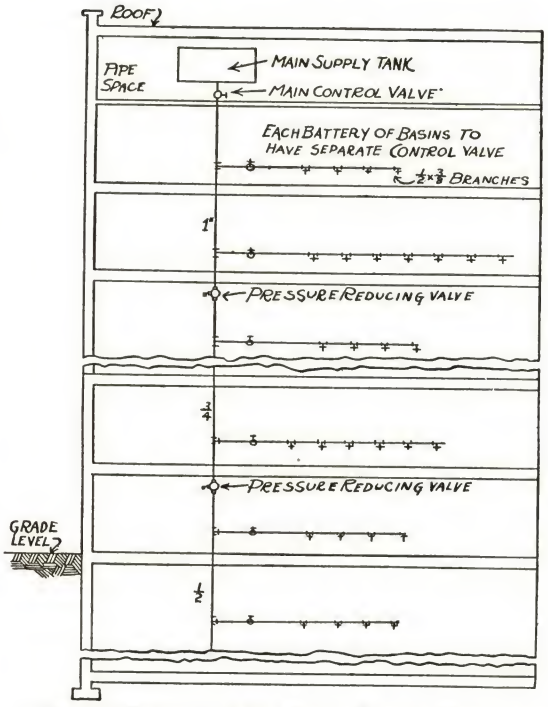


Concealed or Exposed Tanks May Be Located in Center of Dispensing Line (as shown), at Either End, or on the Walls that Face the Right or Left End of Lavatory Line

Typical Layouts for Soaparatus Systems

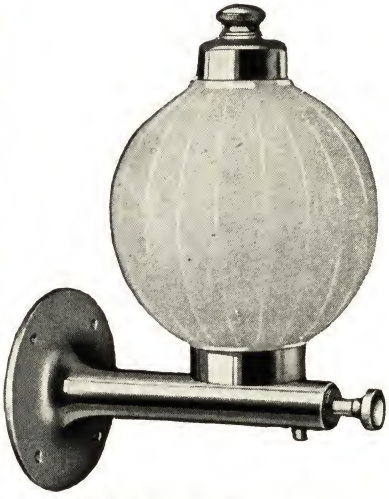


Preferred Layout, Using Double Supply Tank and Relay Tanks to Reduce Pressure

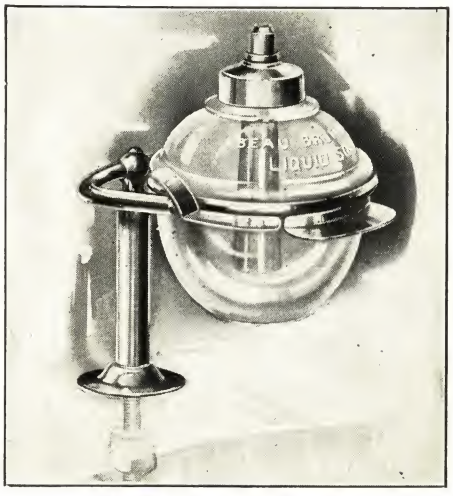


Alternate Layout, Using Single Supply Tank, and Pressure Reducing Valves, Instead of Relay Tanks

Model No. 1 Dispenser



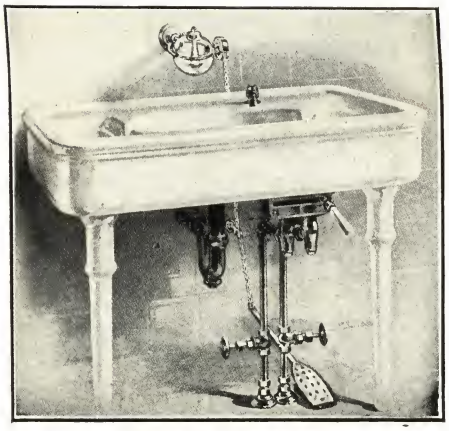
Model No. 51 Dispenser



Model No. 4 Dispenser

Individual Pump Valve

Shower Bath Dispenser



Treadle Dispenser

A. P. W. PAPER COMPANY

Manufacturer of Onliwon* Interfolded Toilet Paper and Paper Towels

ALBANY, N. Y.

BRANCHES IN ALL PRINCIPAL CITIES

A.P.W.

TRADE MARK REGISTERED IN U.S. PATENT OFFICE

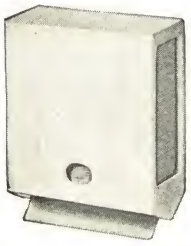
Code 606 Green Enamel
Code 611 White Enamel
Code 622 Chromium Finish

Metal Surface Type Cabinet

Especially desirable for buildings having public lavatories. Will not rust or tarnish.

Has lock and key. Indicator tells when to refill. Adjustable to space formerly occupied by roll or other fixture.

Dimensions: 5½ in. wide, 8 in. high, 2¾ in. deep. Capacity: 1250 sheets of Onliwon Toilet Tissue



Code 615 Without Door
Code 616 With Door

Porcelain Surface Type Cabinet

Suitable for use in hotels and private residences. Made from solid piece of porcelain. Opening for filling on right side.

Dimensions: 5¾ in. wide, 6¾ in. high, 3 in. deep. Capacity: 1250 sheets of Onliwon Toilet Tissue.

Code 616 carries chromium plated door with Corbin lock

Code 617

Porcelain Surface Type Cabinet (Sloping Top)

Adapted for use in hotels and private residences. Sloping top adds to appearance of fixture and prevents placing of cigars or cigarettes. Made from solid piece of porcelain. Opening for filling on right side. Available with or without chromium plated door and Corbin lock.

Dimensions: 5⅝ in. wide, 7⅝ in. high, 3 in. deep. Capacity: 1250 sheets of Onliwon Toilet Tissue

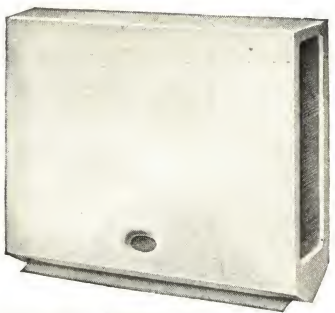
*Reg. U. S. Pat. Off.

Health and Economy

Health protection is the most important single factor in specifying for washrooms used by large numbers of people. The common, repeatedly used cloth towel and ordinary, harsh toilet papers can spread many contagious diseases and infections.

A. P. W. Onliwon Interfolded Toilet Tissue and Towels are the original sanitary washroom service. *Onliwon Toilet Tissue* is soft and non-irritating, strong and absorbent. *Onliwon Towels* assure an individual, clean, fresh towel every time the hands are dried. *Onliwon Cabinets* protect both tissue and towels from dust, dirt and other contamination.

A. P. W. Onliwon Service is economical as well as sanitary. The cabinets will not release more than two sheets of tissue or one towel at a time. They put a stop to waste and theft. *Onliwon Towels,* moreover, are double-folded—a feature that gives them double strength and double absorbency. One *Onliwon Towel* will dry a person's hands thoroughly.



Code 659 Without Door
Code 660 With Chromium Plated Door and Corbin Lock

Porcelain Surface Type Towel Cabinet

Designed for use in public lavatories finished in white tile or marble, especially in fine hotels, department stores and theatres.

One-piece porcelain with opening for filling on right-hand side. Bulls-eye signals for refilling. Fastenings furnished for any type of wall. Accommodates towels 11¼x14¾ in.

Dimensions: 12¾ in. wide, 10½ in. high, 4 in. deep. Capacity: 150 Onliwon Paper Towels

Code 651 White Enamel
Code 652 Green Enamel
Code 657 Chromium

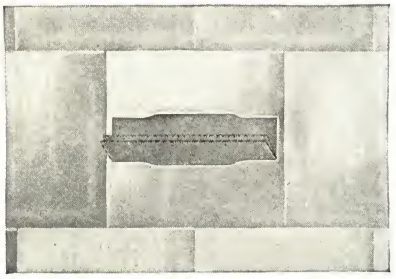
Metal Surface Type Towel Cabinet

Suitable for hotels, railroad stations, department stores, and other buildings having public lavatories. Carries lock and key. Bulls-eye signals when supply of towels is needed. Accommodates towels 11¼x14¾ in.

Dimensions: 12 in. wide, 13 in. high, 3⅛ in. deep. Capacity: 150 Onliwon Paper Towels

Code 653—White Enamel and *Code 654*—Green Enamel. Same as 651 and 652 except that they accommodate towels 9x14¾ in. Especially recommended for schools.

Dimensions: 9¾ in. wide, 13 in. high, 3⅛ in. deep. Capacity: 150 Onliwon Paper Towels



Code 621 and Code 627

Porcelain Recess Type Cabinet

One-piece porcelain. Designed to place in recess with face flush with surface of wall.

Code 621—for standard 6x6-in. tile. Recess required: 5¾ in. wide, 2⅝ in. high, 3⅜ in. deep. Capacity: 500 sheets Onliwon Toilet Tissue.

Code 627—for standard 3x6-in. tile. Recess required: 5¾ in. wide, 2¾ in. high, 3⅜ in. deep. Capacity: 500 sheets Onliwon Toilet Tissue

Code 642 Green Enamel
Code 643 White Enamel

Metal Surface Type Single Fold Towel Cabinet

This cabinet is made from heavy sheet steel. Very durable, contains no working parts, and is fitted with lock and key. Slot on side of cabinet tells when to refill. Accommodates any standard single fold towel.

Dimensions: 7½ in. high, 14⅜ in. wide, 6 in. deep. Capacity: 150 single fold towels

NORTHERN PAPER MILLS

Manufacturers of Bathroom and Lavatory Equipment

Home Office:

GREEN BAY, WIS.

Branch Offices

Resident Representatives in Principal Cities

Products

NORTHERN FOLDED TOWEL CABINETS
NORFOLD TOWEL CABINETS
NORTHERN CABINET TISSUE FIXTURES
NORFOLD AND NORTHERN FOLDED TOWELS
NORTHERN INTERFOLDED CABINET TISSUE
NORTHERN BLEACHED CABINET TISSUE
HOMETOWL CABINETS FOR PERSONAL TOWEL SERVICE

Norfold Towel Cabinet

The Norfold cabinet gives the finest towel service. The compact cabinet 13″ high x 10″ wide x only 3½″ deep.

The drawn steel cabinet is finished in heavy, baked-on Vitreous enamel, chrome plate or gunmetal green. The great strength of the drawn steel gives a durable cabinet with a firm, non-chipping finish. Rounded corners give added beauty and prevent injury to anyone brushing against the dispenser.

The Norfold pressed steel cabinet comes in white enamel or gunmetal green. Pressed steel dispensers are less expensive.

Both cabinets work on the same principle. Simple, positive, gravity feed eliminates troublesome wheels, levers and springs. Slots on each side indicate when to refill.

Northern Folded Towel Cabinet

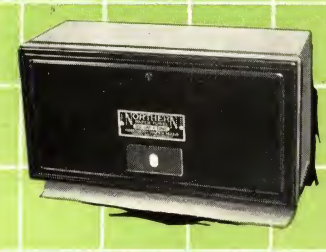
Dimensions of this cabinet are 14½″ wide x 7½″ high x 6¼″ deep. It is made of heavy gauge pressed steel. The deep stamped corrugation gives it great strength and long life. Comes in heavy baked enamel finished either in white or gunmetal green. Holds standard folded towels.

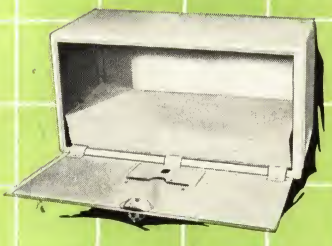
The cabinet is a strong simple box. There are no wheels, levers or springs to get out of order. Slots in each end indicate when to refill. The entire front of the cabinet swings out so re-filling is a simple matter of one motion. The cabinet feeds only one towel at a time, effecting a real economy. A simple, strong lock keeps towel supply under lock and key.

Every Northern towel and tissue cabinet comes equipped with screws for mounting. Slots in the back permit adjustment of screws to fit any standard arrangement of holes.

All the metal towel and tissue cabinets, except the Hometowl fixture, come equipped with a strong, simple lock and keys. Hometowl cabinet has no lock.

Both towel and tissue sheets are interfolded. The withdrawal of one sheet leads the front edge of the next one out of the cabinet ready for service





Northern Cabinet Tissue Dispensers

The compact Vitreolite Northern Cabinet Tissue fixture measures only 3″ deep x 4⅞″ wide x 5⅞″ high. Made of drawn steel, it has great strength and durability. It is made with a baked vitreous enamel finish or a non-tarnishing chrome plate. These unusually hard finishes resist scratching and stains and may be easily cleaned with a damp cloth. Visible feed through the side slots makes it easy to see when paper supply is low. The cabinet is easily refilled when wholly or partly empty. The entire front drops forward when unlocked and cabinet takes a complete package of 1000 sheets while there are still 200 sheets unused.

The pressed steel cabinet operating on the same principle is made in the square design. It is finished in gunmetal green or white enamel.

Paper for Northern Cabinet Tissue fixtures is silky smooth in finish. Each package contains 1000 sheets 4½x4½ cut 500 sheets 4½x9. They are dispensed fully extended from the cabinet.

Porcelain Dispensers

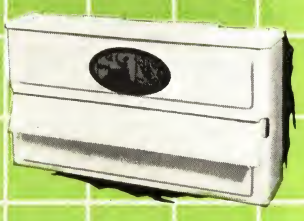
In addition to the metal cabinets, porcelain dispensers can be supplied in both recess (built-in) and projecting types. Both measure 6x6 inches across the front. They occupy the wall space of two standard tile. The recess type requires a wall opening 3″ deep x 6″ wide x 6″ high. The projecting type extends 3 inches from the wall. It attaches to the surface of the wall by two screws.

These dispensers are made entirely of porcelain — built of one piece construction with a heavy glazed finish. They contain no working parts to get out of order. Paper is inserted through the front opening and is dispensed one sheet at a time.

Northern Hometowl Cabinet

The Northern Hometowl cabinet is unique in the towel field. It is designed for a personal towel service in private executive offices and washrooms.

This compact easily mounted cabinet measures only 10⅞″ wide x 5⅞″ high x 2¼″ deep. It fills from the top and dispenses from the front. It has no mechanical parts. Five colors are supplied to match colored walls and equipment — Jade Green, Prussian Blue, Canary Yellow, English Red and White.



EQUIPMENT & SUPPLY COMPANY, INC.

Sole Distributors of Jantzen Towel Stands and Cabinets

51 Madison Avenue, NEW YORK, N. Y.

For our pages on Adjustable Steel Paneldor, see Manufacturers' Index

Products

"JANTZEN" TOWEL STANDS and CABINETS. (Patent No. 1697654. Other patents pending.)

Also Hine Bookstack System and Steel Furniture for banks and public buildings.

Advantages of "Jantzen" Towel Stands and Cabinets

"Jantzen" Stands and Cabinets have all the combined advantages of other towel-dispensing fixtures without any disadvantages. They are designed for all-inclusive interchangeable service in dispensing the various sizes and makes of folded paper towels, so that the owner is not confined to the purchase of one make of towel, as is the case with cabinets furnished by the towel makers.

'Jantzen" fixtures are equipped with adjustable interior fittings by which all makes of interfold paper towels may be dispensed with equal convenience. This feature provides complete interchangeable service, as any number of different types of folded towels may be inserted and dispensed in successive order by merely regulating the adjustable fittings.

Specifications of Construction

All stands and cabinets embody the highest grade of material and workmanship throughout. Built of heavy gauge steel, reinforced to insure rigid construction; finished in any color of baked enamel; hardware, base and vanity shelf; chromium plated; plate-glass mirror.

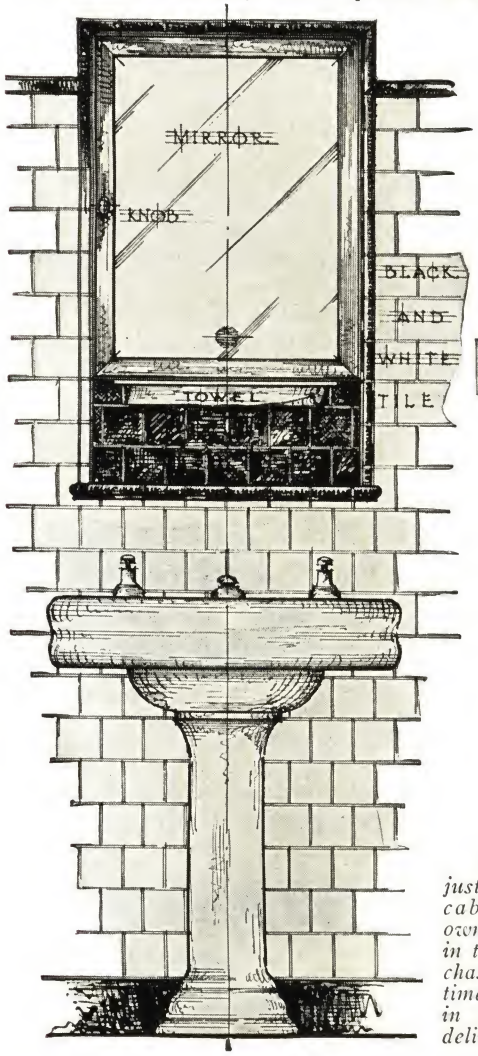
The stands, as distinguished from the cabinets, are complete units consisting of a mirror, vanity shelf, and a compartment for waste towels—all combined in a single unit.

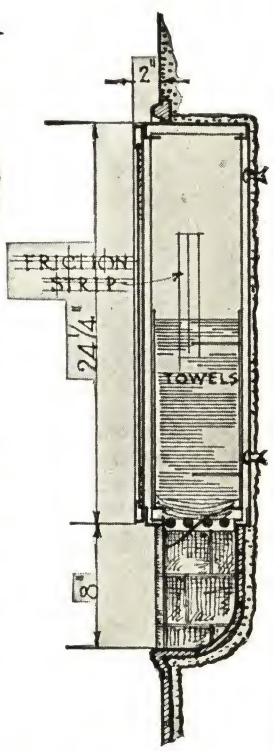
The size of a single unit stand, wall or double faced, is: 20 in. wide, 13 in. deep, and 72 in. high.

The cabinets, considered as single units, consist of the mirror cabinet with adjustable towel container but without compartment for waste towels. All "Jantzen" Cabinets are identical in every detail and provide the same service, whether attached to the surface of the wall or recessed.

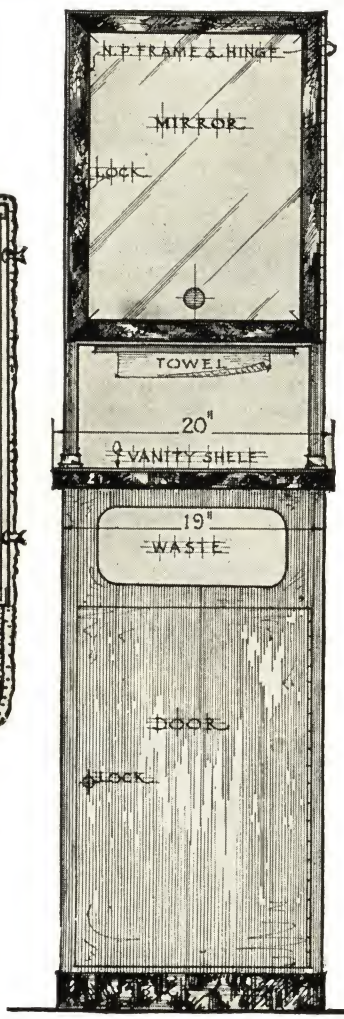
The size is 20 in. wide, 7 in deep, and 24 in. high in over-all dimensions.

We manufacture special designs to meet any requirements; details and prices on request.

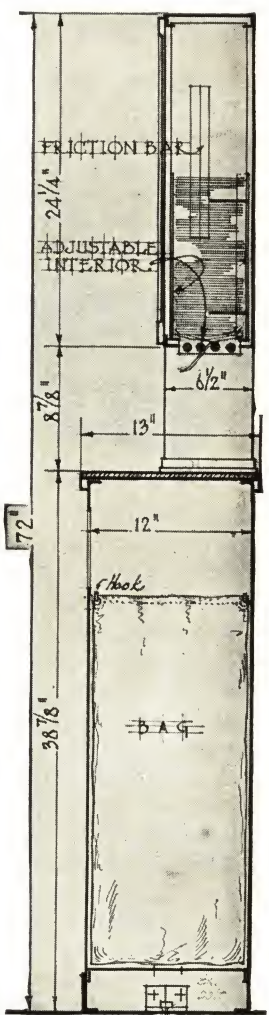




The universal adjustment feature of these cabinets assures the owner absolute freedom in the selection and purchase of towels at all times. Cabinets shown in stock for immediate delivery.



Front



Section

PALMER PRODUCTS, INC.

Manufacturers of Toilet Paper and Paper Towel Fixtures

MAIN OFFICES, FACTORY AND LABORATORIES
WAUKESHA, WIS.
(Adjacent to Milwaukee)

Products

TOILET PAPER and PAPER TOWEL FIXTURES.
Also manufacturers of Soap Powder Dispensers, Fixtures for Toilet Tissue and Paper Towels and Palmer Mystic Gloss Floor Finish.

For Liquid Soap Dispensers and Liquid Soap Dispensing Systems, see Manufacturers' Index.

MULTI-SERVICE TOILET PAPER AND PAPER TOWEL FIXTURES

Advantages

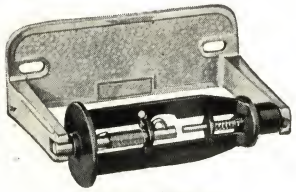
Palmer paper fixtures are constructed to permit the paper to be at all times visible and accessible. The mechanism is simple and will not fail to operate. This equipment eliminates littering of the floor with loose sheets and avoids long hanging streamers, thus affecting definite saving with each installation whether for toilet tissue or paper towel service.

Where Used

Nearly a million of these fixtures are in operation in plants like Studebaker Corporation, several General Motors units, Pennsylvania R. R. Co., Union Pacific R. R. Co., State, county and city institutions, schools, hospitals, hotels, office buildings, Y.M.C.A's, etc., in all parts of the world.

Economy Toilet and Towel Fixture

Description—Provide a regulated, waste-eliminating service, with *standard roll toilet paper and paper towels*— equally as economical as the most efficient cabinet type of equipment—*at about half the cost* because of the lower price on roll paper per sheet compared to the higher cost per sheet of folded paper.

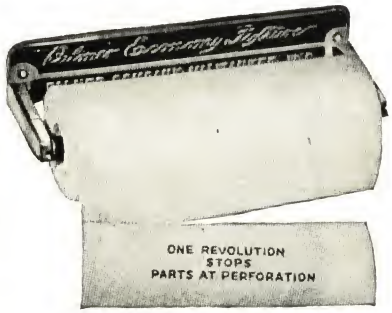

Economy Fixture

These fixtures are substantially built of gray iron, heavily nickel-plated, assembled as one complete unit (no loose spindle) and are equipped with a spring tension, operating much like a roller shade. The roll of paper revolves to a stop, paper parts at perforation and roll returns to original position for next operation—delivering one or two sheets at a time.

Advantages—*Self-locking* and *foolproof*—roll cannot be removed, or fixture opened, until roll is used up.

Neat and *attractive* in appearance—it harmonizes with all modern lavatory equipment.

Uses standard roll paper—obtainable in highly competitive market, generally at about 50% less than folded tissue or towels.



Economy Fixture with Towels

Guaranteed satisfaction—fixture is guaranteed indefinitely against defective material or poor workmanship; spring is guaranteed for the lifetime of fixture.

Saves 25 to 50% in paper consumption—compared with ordinary roll fixtures or cabinet tissues.

De Luxe Toilet Fixture

De Luxe Fixture

Supplies the same economical, regulated, waste-eliminating service as the Economy fixture, with standard roll toilet tissue, but operates by means of a counterweight in place of a tension spring—the spindle being off balance and returning the roll of paper to original position after delivering one or two sheets.

This fixture is plain and designed in good taste, for exclusive hotels, apartment houses and hotels, theaters, clubs and other buildings, where a plain unlettered fixture of exclusive design is preferred.

This De Luxe fixture *is made of brass*—durably plated in nickel or crodon (chromium) finish.

It is also one complete assembly (no loose spindle) is self-locking, theftproof and foolproof; and functions no matter which way the paper roll is attached.

No-Waste Toilet and Towel Fixtures

No-Waste Fixture

These are lower priced fixtures, but also furnish a regulated, waste-eliminating delivery with standard roll toilet paper and towels.

The No-Waste Fixture functions in the same manner as the De Luxe, by means of the spindle being off center and operating as a counterweight; but the spindle is a detachable unit. Fixture is self-locking, theftproof and foolproof—made of gray iron—heavily nickelplated, attractive and ornamental in design.

No-Waste Towel Fixture

D 4445

HEATING, VENTILATING AND POWER PLANT

SINCE 1880

CAMPBELL HEATING CO.

Manufacturers of Campbell Fan System of Heating and Ventilating

DES MOINES, IOWA

Engineering Service

Our Engineering Department consists of trained graduate engineers backed by 50 years' practical experience. We will be glad to help solve any heating or ventilating problems or help with layouts and specifications for churches, schools, garages, or any large building.

Method of Designing Warm Air Fan System

(1) *Figure heat losses* including ventilation requirements if any, or the cubic contents for rough estimating, in buildings with average heat losses, such as churches, schools, etc.

(2) *Select heater* according to ratings given in third column of table which are conservative and have allowances included for quick heating of the building and a reasonably long firing period. If these capacities are used *we guarantee the heater for 10 years against repairs from any cause,* except the grates and according to other conditions given below. These ratings are based on coal having 12,000 B.t.u. per lb. and a 7-lb. combustion rate.

(3) *Air delivery* is based on the heat losses or the cubic feet per minute ventilation requirements, whichever is the greater. Where all recirculated air is used, the cubic feet per minute given in the table should be used or can be figured by the formulae $\text{C.f.m.} = \frac{\text{B.t.u.}}{\text{T}} \times .917$

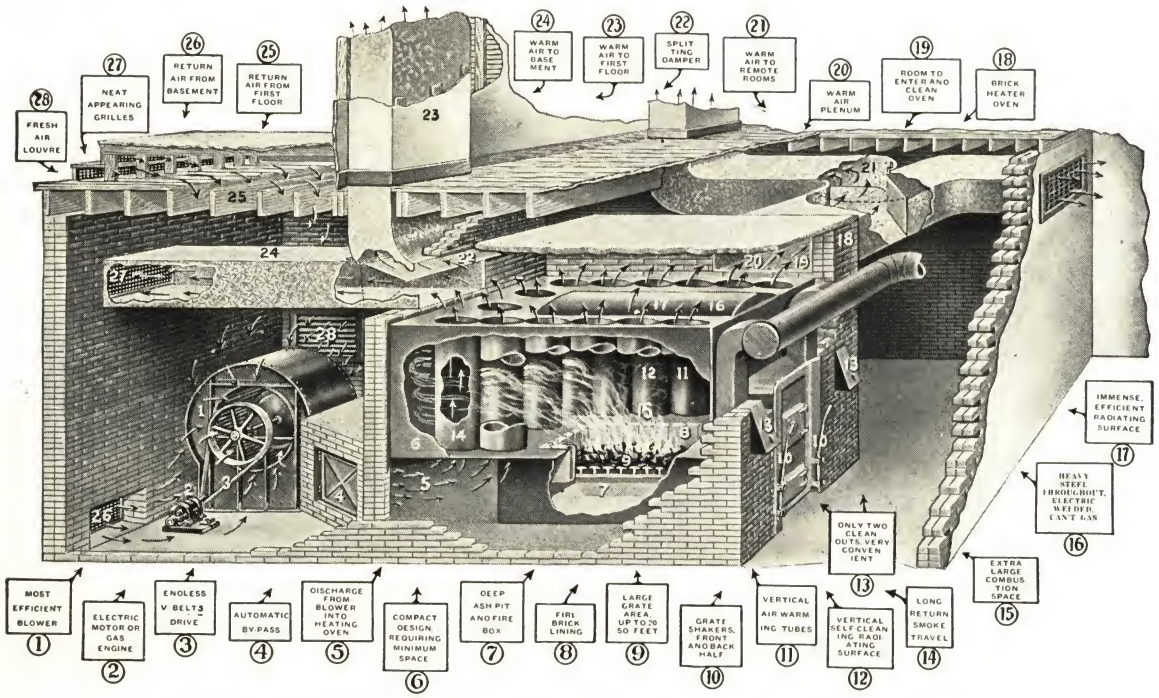
B.t.u. = Actual heat losses of the building not including ventilation requirements.

T = Temperature difference of the air entering and leaving the heater which is ordinarily 40° F. based on delivering the air to the rooms at 110° F.

(4) *Duct sizes* are based on 1 sq. ft. cross sectional area of duct carrying 30,000 B.t.u. per hour in the main ducts reducing to 20,000 for longer and smaller ducts and to as low as 10,000 in the longest and smallest ducts. The latter figures allow for cooling of the air and added friction to the flow of the air.

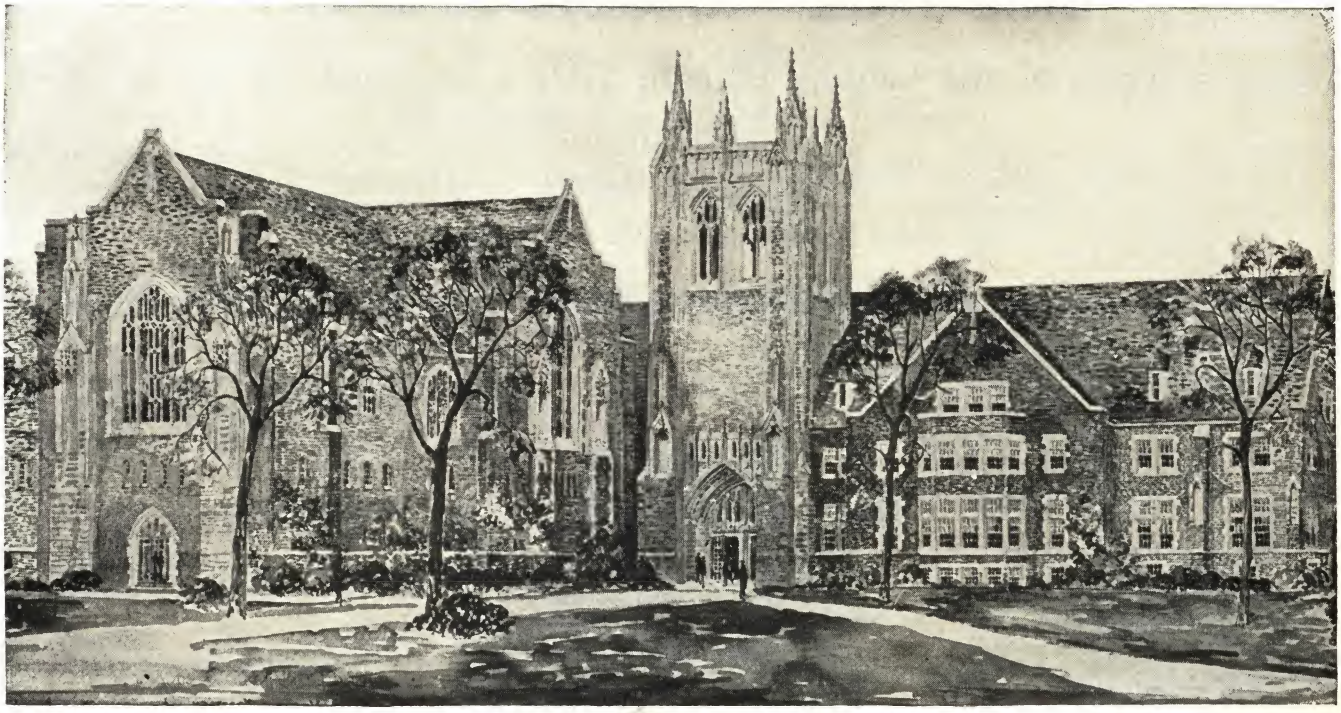
This duct system will make the static pressure of the entire system not to exceed ¼ in. which gives the maximum economy in operation. If the cubic contents of the building are used to get approximate duct sizes figure 1 sq. ft. of duct for every 6000 cu. ft. of space heated for the main ducts reducing to 4000 cu. ft. for the longer and smaller ducts and as low as 2000 cu. ft. for the smallest-longest ducts. Dampers should be provided for every branch or opening in the duct system so that any one room or any combination of rooms can be heated separately or so an even distribution of the heat can be obtained.

Our Engineering Department will be glad to check any layout or co-operate in working them out.



SIZES, CAPACITIES AND PRINCIPAL DIMENSIONS OF CAMPBELL FAN SYSTEMS

No.	Max. capacity B.t.u. per hr.	Capacity to use B.t.u. per hr.	Capacity cu. ft. space average building	Grate area, sq. ft.	Fire heating surface, sq. ft.	C.f.m. recirculation	Inside measurements of heating oven and fan room				Size smoke pipe, in.	Size chimney, in.	Min. height chimney, ft.
							Length, ft. in.	Width, ft. in.	Min. height, ft. in.	Feeding space, ft. in.			
805	612,000	306,000	69,000	5	170	7,000	8— 3	6—7	7—0	4—0	12	12x12	35
806	716,000	370,000	83,000	6	200	8,500	9— 0	6—7	7—0	4—0	12	12x16	35
807½	866,000	433,000	97,000	7.5	225	10,000	9— 9	6—7	7—0	5—0	12	12x16	35
808	1,200,000	510,000	115,000	8.1	289	11,700	10— 7	7—9	8—0	5—0	14	16x16	35
810	1,190,000	595,000	134,000	10.	320	13,600	11—11	7—9	8—0	6—0	14	16x16	35
812½	1,440,000	720,000	162,000	12.5	375	16,500	13— 0	7—9	8—0	6—0	16	16x20	40
815	1,730,000	865,000	194,000	15	450	20,000	15— 0	7—9	8—0	6—0	16	16x20	40
817½	2,000,000	1,000,000	225,000	17.5	525	23,000	16— 8	7—9	8—6	6—0	20	20x20	40
820	2,230,000	1,115,000	250,000	20	600	25,500	18— 0	7—9	9—6	6—0	20	20x20	40



Grace M. E. Church, Des Moines, Iowa

VORSE-KRAETSCH & KRAETSCH, Architects, Des Moines

The many rooms of this large church have been evenly and comfortably heated since 1927 by a Campbell Fan System. In sub zero weather the entire building was heated in two hours having been unheated for several days previous. The large auditorium was heated in less than one hour. Tests by disinterested engineers show the over-all efficiency of this heating plant to be 70.6%.

The fan is used for ventilation in the summer making the building very comfortable

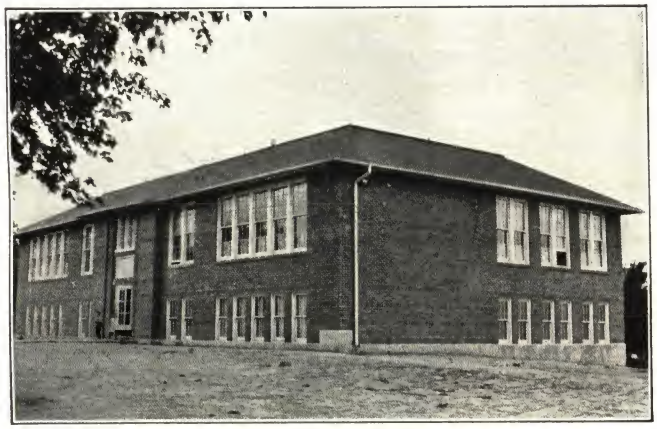
Heater

The heater is constructed of heavy boiler plate steel, riveted and electric welded so as to be permanently gastight. It has plenty of heating surface for maximum efficiency and very fine for burning oil. These surfaces are vertical and self-cleaning.

The heater includes brickset fixtures such as steel entrance door, warm air plenum thermometer, automatic humidifier pan, permanent sheet iron form for the concrete top of the heating oven, etc. The heater is ordinarily shipped welded and riveted as a unit but can be shipped in sections to go through a 26-in. door and assembled in the basement.

Guarantee

If the duct system is designed as described above or approved by our Engineering Department and the heater blower motor and drive are furnished by us and are according to our ratings we will guarantee the heater for 10 years against repairs from any cause with the exception of the grates, and will guarantee the heating of all rooms to which warm air is delivered at 70° in the coldest and windiest weather and will furnish the owner with a surety bond for one year to back up this guarantee.



Public School, Swan, Iowa

DOUGHER, RICH & WOODBORN, Architects, Des Moines, Iowa

This building heated for $216.81 worth of coal last winter. The school board is enthusiastic about the heating plant. The superintendent says it is fine. This is only one of more than 1000 buildings heated with the Campbell Fan System

Congregational Church, Vermillion, S. D.

BEUTTLER & ARNOLD, Architects, Sioux City, Iowa

It was at first thought that a Campbell Fan System could not be used in this building because of structural reasons. Our Engineering Department, however, co-operating with the architects, designed a satisfactory duct system that did not mar the appearance of the building

DAIL STEEL PRODUCTS COMPANY

Manufacturers of the Lansing Dailaire System Designed for Oil and Gas

Main Street
LANSING, MICH.

WASHED AIR, HUMIDIFIED AIR, HEATED AIR, FORCED AIR AND SUMMER COOLING ALL IN ONE CASING

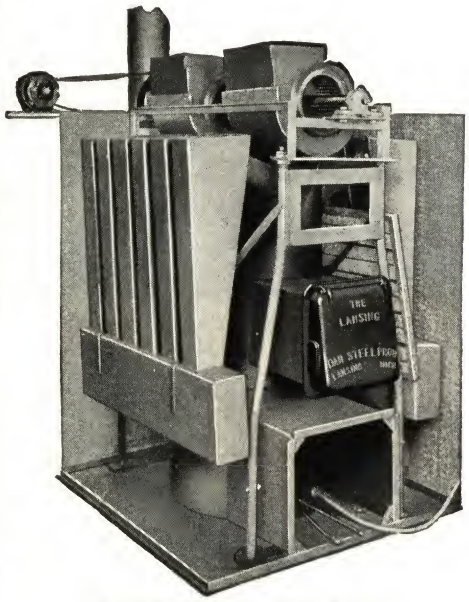
The Lansing Dailaire Furnace is designed to give the greatest possible efficiency. This result is evident by records obtained which show a stack temperature of 250° F. which is far below ordinary furnace records.

Large Radiating Surface

The Lansing furnace has large radiating surface, several times the surface of the average furnace. This assures real efficiency. Heats on oil at approximate cost of soft coal.

Chrome Steel Dome

The use of *chromium steel* in wedge shaped dome insures a long-life furnace, as well as quick radiating and better efficiency—chrome steel is recognized as proper material for high temperatures by leading metallurgists.



Cross Section of Dailaire System

Rock Wool Blankets

This is an added feature to Lansing Dailaire Furnace and its addition reduces the stack temperature 100°. These blankets are placed between dome and flues and create an entirely different air travel, the heat from dome travels upward which in turn creates a current of air upward and inward over the flues from outside of casing, thus scrubbing the entire radiating surface of furnace.

The Lansing Dailaire System is designed to give complete air conditioning all in one unit, incorporating the principle of blower of sirroco type in top of casing, and washers on side through which cold return air is taken. Blower is mounted on separate stand, does not contact furnace and is rubber mounted and noiseless; makes a compact attractive unit, requiring minimum of basement space and may be placed anywhere, so the basement may be used for recreation and other purposes.

Note: No. 18 Lansing Furnaces work well in large buildings, being equal to 3 ordinary 36-in. furnaces in heating capacity.

LANSING FURNACE RATINGS ON GRAVITY

Size	Output B.t.u. per hr.	Burner capacity per hr., gal.	Maximum heat pipe area, sq.in.
6	85000	¾	625
8	115000	1	890
12	160000	1½	1200
18	300000	3	2200

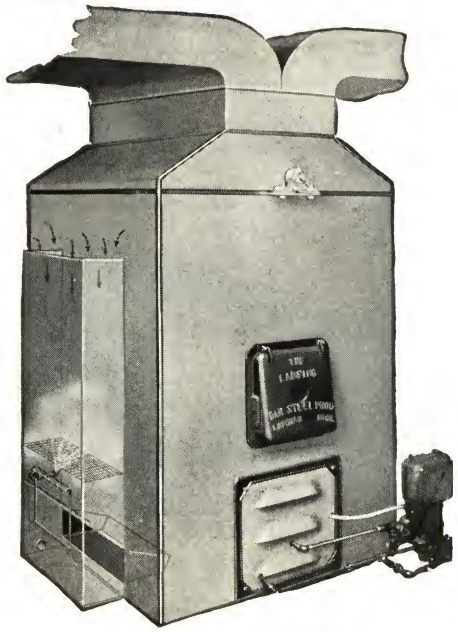
LANSING DAILAIRE RATINGS

Size	Output B.t.u. per hr.	Burner capacity per hr., gal.	Standard size pulley, in.	Blower heads
6B	115000	1	3½	1
8B	175000	1½	3½	2
12B	225000	2	4	2
18B4	375000	3⅓	5¼	4
18B6	560000	5	5¼	6

Note: Blowers will deliver 750 c.f.m. per head with 3½-in. pulley; 1000 c.f.m. per head with 4-in. pulley, and 1500 c.f.m. per head with 5¼-in. pulley on ⅛ static pressure.

FURNACE AND CASING DIMENSIONS

Size	Diam. combustion chamber, in.	Lower opening, in.	Door opening, in.	Smoke flue, in.	Casing dimensions, in.			Radiating surface, sq. in.
					Width	Length	Height	
6-6B	20	15x18	12x13	8	45	26	66½	9735
6 BW	20	15x18	12x13	8	61	26	66½	9735
8-8B	22	15x18	12x13	8	45	35	66½	11670
8-BW	22	15x18	12x13	8	65	35	66½	11670
12-12B	24	15x18	12x13	8	45	44	66½	17000
12-BW	24	15x18	12x13	8	69	44	66½	17000
18	30	15x18	12x17	9	56	44	68½	22800
18B4-18B6	30	15x18	12x17	9	56	66	70½	22800
18B4W-18B6W	30	15x18	12x17	9	78	66	70½	22800



Showing Washer on Side

HOLLAND FURNACE COMPANY

HOLLAND, MICH.

The Holland Vaporaire Heating System

Advantages

The Holland Vaporaire System is especially adapted for home heating because:

(a) It burns all types of fuel—gas, oil, coal or wood—without waste. One may burn either bituminous or anthracite, including the small pea and buckwheat sizes, without changing grates; (b) low maintenance and servicing cost; (c) economical in the use of fuel; (d) efficient heat transfer from the fuel to the air; (e) provides healthful heat because it furnishes ventilation, the required humidity, circulation, and moderately warmed air; (f) prevents cold floor drafts; (g) easy to operate; (h) it is flexible and can be operated in accordance with outdoor weather conditions; (i) it provides even temperature throughout the home; (j) it may be converted into a fan forced air system; (k) guaranteed heating service.

Construction

Holland Castings—(a) Made of the highest grade of cast iron; (b) without bolted joints; (c) minimum number of sections; (d) constructed of non-corrosive materials; (e) are of durable construction for long serviceable life; (f) no leakage of combustible gases or smoke into the air-heating chamber; (g) cup joints are deep and wide to allow for proper expansion; joints sealed with asbestos furnace cement made to our own specifications.

Furnace Base Plate—Cast in one piece with deep flange to allow proper sealing to ash pit.

Ash Pit—Deep, cast in one section, machined to fit over base.

Grate—Is of a special design. Operates on roller bearings; cast in one piece and slightly cone-shaped to keep the fuel rolling to the walls of the fire pot; thus, the burning fuels are in intimate contact with the casting surfaces providing maximum heating efficiency. The air slots are narrow, preventing fuel of the smaller sizes from dropping into the ash pit.

Fire Pot—Made in two sections to allow for expansion and contraction of the metal. The lower half is cast with funnel shaped air jets for injecting preheated air to unite with the combustibles.

Combustion Chamber—Designed to provide the maximum of space to complete combustion. Cast in one section to prevent smoke and gas leaking into the air-heating chamber.

Radiator—Cast in one piece (excepting the special and steel dome types) and is gas and smoke proof. The damper provides complete gas flow around the radiator before the hot gases enter the chimney flue, thus the maximum of heat transmitting surfaces are available.

Humidity

For healthful atmosphere the air must contain the correct amount of water vapor. Water pans do not materially increase humidity because they are lacking in evaporating surface area.

Humidifier—The Holland Humidifier is an integral part of every Holland Vaporaire Heating Unit. It is automatic in action. Water for evaporation flows through flexible copper pipe to the humidifier. Evaporates sufficient water to provide from 40% to 60% relative humidity. An overflow outlet allows the surplus water to saturate the ashes which eliminates dust when cleaning the furnace.

Aire-U-Well Fan

A product of the HOLLAND FURNACE COMPANY.

(a) It is placed in the air distributing chamber; (b) draws the cold air off the floor of the rooms and brings the warmer air down from the ceiling, thus the floors are always warm; (c) operates noiselessly; (d) increases circulation to provide from four to six air changes per hour in each room heated; (e) heats all rooms regardless of the direction of the wind outdoors; (f) increases over-all efficiency of the heating system; (g) reduces the heat loss through the heat conductor ducts; (h) prevents overheated furnaces; (i) lowers fuel consumption; (j) permits cooling of the home during hot weather; (k) its effect is equal to an electric fan in every room and creates a positive circulation of air throughout the home; (l) power consumption less than a cent per hour.

Holland Furnace with Sectional View of Aire-U-Well Installation

HOLLAND HEAT GENERATOR, WEIGHTS AND CAPACITIES

	Diam. firepot, in.	Diam. casing, in.	Over-all height of casings, in.	Area of grate, sq. in.	Diam. of smoke pipe, in.	Wt. of castings and casings, lbs.	Gross rating, B.t.u.	Pipe capacity, sq. in.	Residence heating capacity cu. ft.
37	19	37	64	227	8	980	58,000	440	8,000
40	22	40	65	276	8	1085	71,000	520	13,000
45	25	45	66	355	8	1245	91,000	630	20,000
50	28	50	67	462	9	1500	122,000	810	28,000
60	32	60	69½	605	9	1990	156,000	1030	40,000

Guarantee Bond

The "Holland" Guarantee Bond is transferable from the builder to the ultimate home owner. This company assumes undivided responsibility for the performance of every Holland heating plant manufactured, sold and installed by the HOLLAND FURNACE COMPANY.

Holland Service

Every Holland Branch Office, of which there are 575, is a permanent local institution. Holland engineers are trained to render efficient heating service to the public. They are especially well equipped to assist architects and builders in designing heating plants. If a building is so constructed that warm air heat is not practical they frankly tell you so. Architects familiar with Holland service usually select Holland Vaporaire heat for warm air installations.

Consult your telephone directory for address of nearest Holland Branch Office.

THE FOX FURNACE COMPANY

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

ELYRIA, OHIO

SALES OFFICES

NEW YORK, N. Y., 40 West 40th Street
CHICAGO, ILL., 816 So. Michigan Avenue
DETROIT, MICH., 1344 Broadway
CLEVELAND, OHIO, 1294 E. 55th Street
BOSTON, MASS., 493 C Street
PITTSBURGH, PA., 310 Second Avenue
SAN FRANCISCO, CAL., 1123 Harrison Street
PORTLAND, ORE., 355 Everett Street

CUSTOM MADE CLIMATE FOR THE HOME

HEATING · VENTILATING · HUMIDIFYING

Gas Automatic

AIR CONDITIONING UNIT

Approved by American Gas Association

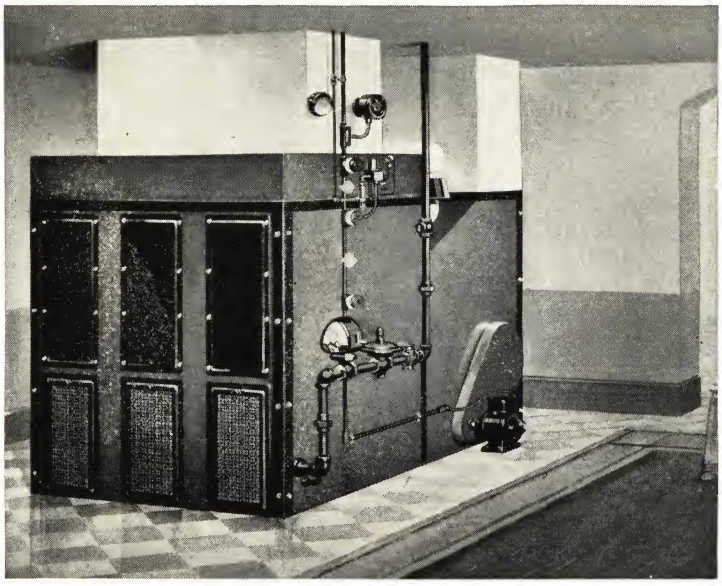
The Gas Automatic Air Conditioning System is more than a heating system. It brings the benefits of *conditioned* air to all types of residences, stores, churches, schools, offices and factories. It burns gas, efficiently and exclusively, and is entirely automatic in operation.

For Oil and Coal—A similar air conditioning unit for the burning of oil and coal is also manufactured — information and data is available on request.

What the System Does

It creates an ideal *custom made* climate in the building by providing the following atmospheric elements:

(a) The correct amount and kind of warmth, automatically regulated; (b) the correct degree of relative humidity automatically maintained and controlled; (c) clean, purified, filtered air; (d) constant air circulation and ventilation, summer and winter.



The Gas Automatic Installed
The flat circulating and recirculating ducts can be concealed by a ceiling in the basement.

Features and Advantages

Clean, Sanitary and Safe—Cast iron heating elements sealed permanently gas tight, elimination of coal, ashes, smoke and soot, and the use of filters which remove dirt, dust and bacteria from the circulating air all combine to make this system amazingly clean and sanitary. Heavy construction, thermostatic pilots and the finest of controls enable it to measure up to the highest standards of safety.

Advantageous Location—The unit, which is attractively finished in red and black crystalline baked enamel, can be installed in the basement or first floor of the building, in an out-of-the-way location.

High Efficiency—The unit operates automatically, burning gas at approximately the highest efficiency below the point of condensation.

Easily Cleaned—Cleaning is simple and easy—each unit has its individual cleanout cover which is removable, without disturbing casing, by loosening a few bolts.

Completely Equipped—Each unit is equipped with all necessary controls, valves, wiring, pipe and conduit for connection to gas, electricity and water lines.

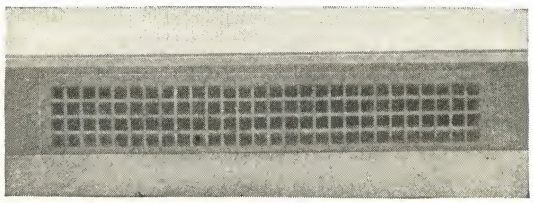
Engineering Service

A complete engineering service is available. From building plans, qualified heating engineers at the factory will lay out the installations for individual requirements, indicating all sizes, locations, specifications. Prints will be provided.

HOW THE GAS AUTOMATIC AIR CONDITIONING SYSTEM OPERATES

Air is driven into the Gas Automatic through the return air intakes and return air duct. The filters through which it passes remove the dirt, dust and germs before the electric blower forces it into the heating chamber where it is warmed. The air, now cleaned and heated, absorbs the proper amount of moisture from the automatic spray humidifiers, located at the top of the heating elements, before it passes into the distributing ducts leading to grilles or registers in the various rooms to be heated.

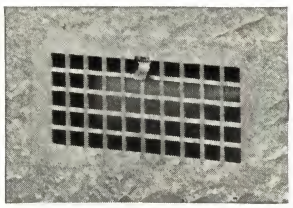
In this system the fresh air which is constantly entering the building by infiltration, is immediately drawn into the system and distributed uniformly and speedily to all rooms.



Return Air Intake

Warming the Air

The air is warmed by passing over the heating elements and the radiant shields, which surround, and absorb the heat, radiated from the heating elements. Temperatures are automatically regulated by a thermostat and electric gas valve. The delivery of heat is constant, not intermittent.



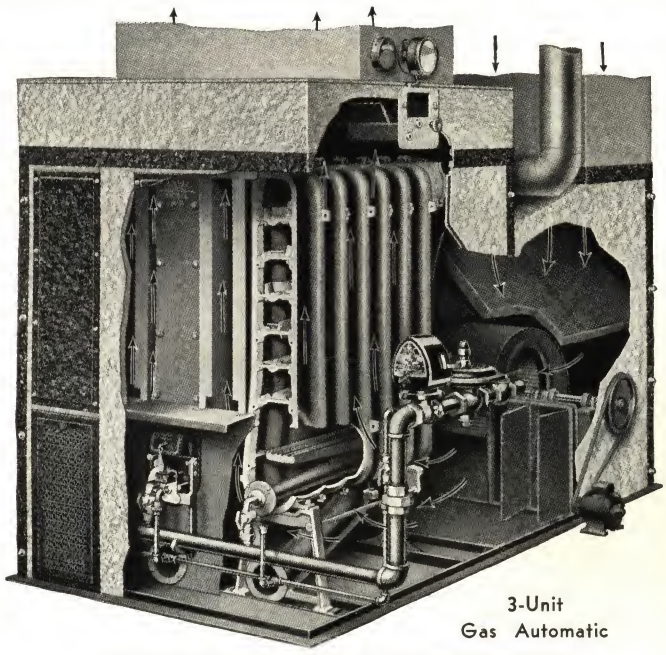
Warm Air Grille

The heating element stores and radiates heat after the gas is turned off and by-pass louvers permit gravity air circulation (30 to 40% of total) when blower is stopped.

The heating element is made of heavy cast iron with scientific baffling and provided with an unusually generous area of heating surface. Even distribution and perfect combustion are features of the gas burners which extend the full length of the heating element. Their special design permits them to light and shut off silently.

Humidifying the Air

Correct relative humidity in any climate during the heating season is maintained by the spray humidifier and control illustrated below. Note how the water is broken into a fine mist which is absorbed by the circulating warm air. Clogging of the humidifier nozzle with foreign matter is prevented by a strainer in the water line. A solenoid valve turning the water on and off is actuated by the Humidity Control Instrument shown.



3-Unit Gas Automatic

Interior view with arrows showing air travel through unit.

Cleaning the Air

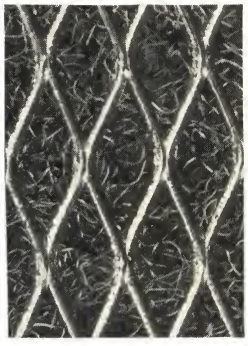
The Gas Automatic efficiently cleans the air in the building as all returning air must pass through filters which remove 85% of dirt contained therein. These filters contain 2 in. of compressed steel wool filling, treated with a special oil. They are substantial, indestructible and are easily cleaned.

Circulating the Air

The silent electric blower is responsible for the air circulation and ventilation features of this system as well for the positive delivery of heat. The blower modifies differences in temperature at floor, breathing level and ceiling by its control of air circulation; it keeps all air constantly moving, providing a large volume of air at low velocities and temperatures; delivers warm air in full volume to all rooms regardless of wind and weather conditions; provides a mechanical breeze of clean, filtered air from every grille on hot, sultry summer days and nights.

Controls

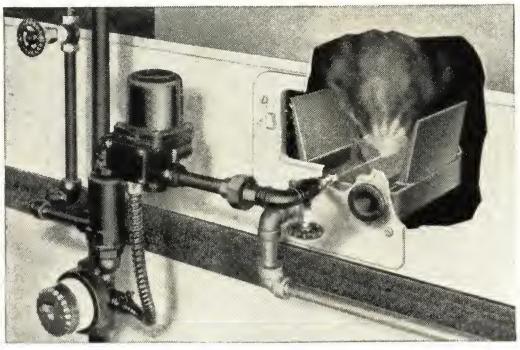
Thermostat—Automatically maintains uniform temperature.
Electric Gas Valve—Turns gas on and off as actuated by thermostat, pilots or limit control.
Safety Pilots—Close electric gas valve when pilot becomes extinguished.
Blower Control—Automatically starts and stops blower.
Limit Control—Prevents overheating.
Gas Pressure Regulator—Insures uniform pressure at burners.



Section before Cleaning

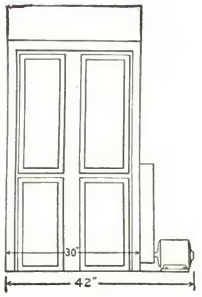
After a Few Months' Use

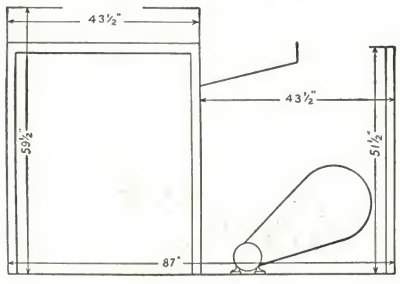
The Filter Removes 85% of Dirt from the Air



Spray Humidifier and Humidity Control Instrument
Maintain correct relative humidity under all conditions

RATINGS—DIMENSIONS—SPECIFICATIONS





RATINGS

No.	A. G. A. B. t. u. input per hr.	Number of burners	Gas supply tapping, in.	Flue vent, diam., in.	Approx. shipping weight, lb.
B-2	140,000	2	1	7	1720
B-3	210,000	3	1	8	2300
B-4	280,000	4	1¼	9	3080
B-5	350,000	5	1¼	10	3730
B-6	420,000	6	1½	11	4400

DIMENSIONS

No.	*Width, in.	†Over-all depth, in.	Height heating compartment, in.	Height blower compartment, in.	Air discharge opening, in.	Air intake opening, in.
B-2	30	87	59½	51½	25 x 18	16 x 30
B-3	45	87	59½	51½	40 x 18	16 x 45
B-4	60	87	59½	51½	55 x 18	16 x 60
B-5	75	87	59½	51½	70 x 18	16 x 75
B-6	90	87	59½	51½	85 x 18	16 x 90

*Motor extends out approximately 12 ins. additional. Base extends out 2½ ins. additional.
†Base extends out 2½ ins. additional. Allow clearance for removal and replacing of filters and baffles.

BLOWER-MOTOR-FILTER SPECIFICATIONS

No.	Blower, c. f. m.	Approx. blower r. p. m.	Number of blowers	*Motor hp.	Motor r. p. m.	†Number filters
B-2	1240-2200	260-487	1	¼	1750	3
B-3	1860-2500	330-487	1	¼	1750	4
B-4	2480-4000	260-447	2	⅓	1750	5
B-5	3100-4400	290-487	2	½	1750	7
B-6	3720-5000	330-487	2	½	1750	8

*Motors: 110-v,60 cycle,a-c., single phase,rubber mounted,are standard equipment.
†Size of each filter is 20 ins. x 20 ins.

SURFACE COMBUSTION CORPORATION

OPERATED BY HENRY L. DOHERTY & COMPANY

TOLEDO, OHIO

WARM AIR GAS FIRED HOUSE HEATING EQUIPMENT

SURFACE COMBUSTION CORPORATION manufactures a complete line of gas fired house heating equipment. In these pages are listed three of these units. All are well known in the gas industry. The Columbus Heatmaster provides cleansed humidified warm air with forced circulation. The Columbus Furnace provides humidified air by natural circulation. Janitrol is a conversion burner. All units are automatic.

Columbus Heat Master—Description, page 1, 2; Heat Distribution, page 3; Relative Humidity, page 3; Installation plans, page 5; Heat Outlets and Grilles, page 5; Formulae for Determining Duct and Register Sizes, page 5; Specifications, page 7.

Columbus Furnace—Description, page 6; Installation Plans, page 6; Capacities and Dimensions, page 7; Specifications, page 7.

Janitrol—Description, page 8; Equipment, page 8; Dimensions, page 8.

THE COLUMBUS HEATMASTER

Each year thousands of new families begin the enjoyment that comes to homes heated by gas-fired, conditioned warm air furnaces. The rich benefits in comfort, health, and convenience have fostered the ever-increasing acceptance of this truly modern method of home heating.

Science has investigated the merits of all forms of heat. The decision is unhesitatingly in favor of automatic warm air—with its health-promoting features.

The public is recognizing it as the only truly modern method of home heating.

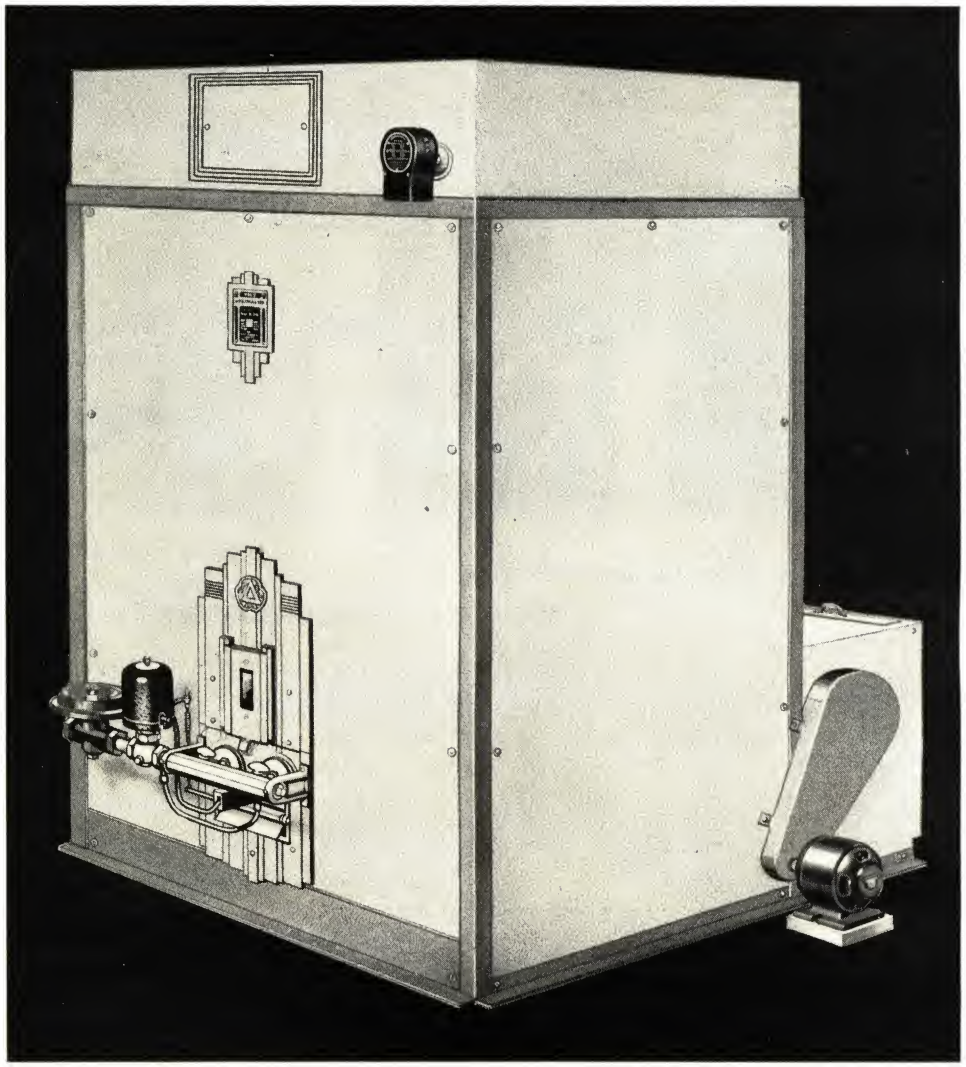
To properly enjoy the fullest benefits of heating with conditioned air a scientifically designed, automatic furnace is a necessity. The SURFACE COMBUSTION CORPORATION designed Heatmaster as the final development in this direction—the Heatmaster incorporates every feature necessary to provide mechanically circulated, cleansed, humidified warm air for the modern home. It is the result of years of persistent research, development, and manufacturing experience, combined with an intimate knowledge of heating problems.

Gas Heat—The Heatmaster is gas-fired. This form of fuel is most adaptable to accurate automatic control . . . and eliminates the dirt, grime and inconvenience that naturally attends the use of solid fuels.

Forced Warm Air Heat—With the Heatmaster moist, tempered, cleansed air is gently circulated to every room in the home . . . held at uniform temperature and humidity day and night by accurate thermostatic regulation.

All of these features combine to make automatic, humidified, cleansed, warm-air heat so desirable and necessary, that they have established a new trend in the heating of comfortable and healthful homes. All are found in Heatmaster.

Technical Description of the various Units of Heatmaster—The Heatmaster consists of the combination cast iron and sheet steel heating elements, the cast iron raised port sectional burner, the double insulating sheet steel casing, the automatic humidifying device, the twin multiblade fan power plant, the air cleaning filters and complete automatic control system.



This Newly Designed Casing Lends Itself to the Beauty of the Most Modern Basement

Available in two-tone green crinkle finish.

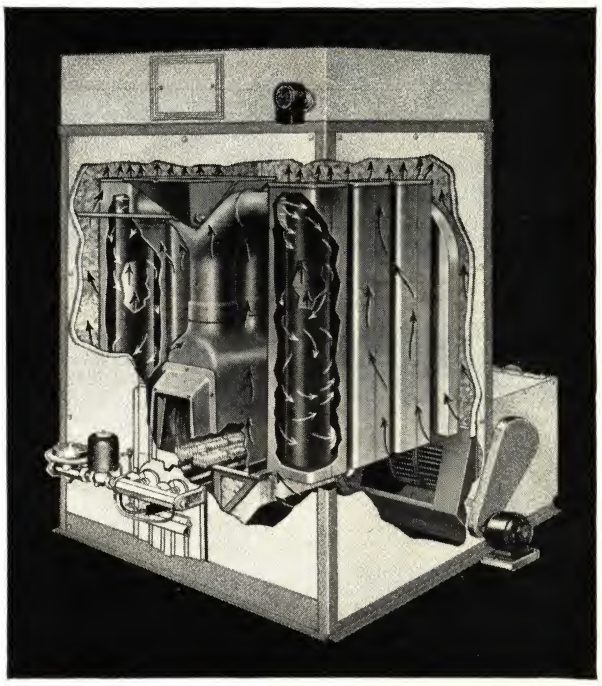
DESCRIPTION OF HEATMASTER

Positive Blowers

The double blower system employed on the Heatmaster is an assurance of positive circulation and thorough distribution. By having two separate blowers of the theatre ventilating type—all noise and air swishing sounds are eliminated and the delivery of warm air to all rooms is instant. No waiting for cast iron to warm up. Smaller individual warm air ducts than are used in a natural circulating system can be utilized with a Heatmaster installation because the air is circulated through these ducts at a much greater speed. The runs may be grouped together and concealed above the basement ceiling and not be noticeable. Location of the furnace is optional.

Air Cleaning Filter

The air cleaning or filtering medium is of the *dry type,* very easily cleaned either by tapping the frame lightly on the floor, with a vacuum cleaner, or by washing in hot soda water. The filter is located so that it can always be readily removed from the Heatmaster. The filter removes practically all pollen, lint, and dirt particles from the air — protecting health and minimizing the necessity of having the furnishings cleaned so often.



Phantom View of Heatmaster

Burners

The burners are cast iron sectional type with ample port area, quiet in operation and designed to give a low uniform flame throughout the combustion chamber. They are easily removed without disconnecting the controls or dismantling any part of the furnace.

The mixers are cast integral with the venturi tube making a simple, compact and efficient unit that complies with the recommendations of the Bureau of Standards. The burners and mixers operate on exceptionally low gas pressures and at the same time entrain the maximum amount of primary air. The burners are very flexible and permit adjustment over a wide range of consumption without replacing the orifices.

Radiating Surfaces

Rust-resisting, tern plated sheet steel is used in the side and flue radiators for *natural gas* Heatmasters and special acid-resisting alloy sheet steel for *manufactured gas* Heatmasters. All joints are formed with double seams through special dies used in their manufacture, insuring no leakage of burned gases to the warm air stream. All radiators are tested under pressure to eliminate any possibility of leaks through which burned gases might escape. This construction will withstand years of service of alternate heating and cooling and will not develop gas leaks.

The Heatmaster is designed to give equal volumes of air and uniform temperature distribution over the entire area available for the attachment of duct connections. This is very important when it is considered that the most desirable factor for comfort in heating is a large volume of uniformly heated air at a relatively low temperature and not a small volume of hot air.

Casing

The artistically proportioned Heatmaster casing is equipped with an inner liner, spaced 1 in. from the casing. This serves as an additional secondary heating surface, as the circulating air passes between it and the outer casing.

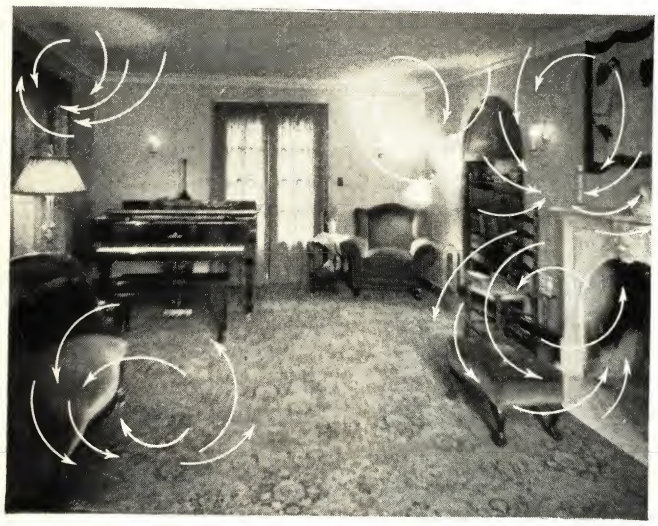
The galvanized steel casing is heavier than that generally used and with the liner offers a more rigid casing with excellent insulating qualities. The front and either side is removable after the Heatmaster is once installed, without disturbing the grouting at the base or removing the hood or disconnecting the heat pipes. The over-all casing height is low to facilitate its installation in low basements. The casing is available with a painted or galvanized finish. It may be painted at the time of installation to harmonize with the color scheme of the basement or may be ordered with a special crinkle finish of two-tone green at a small additional cost.

Humidifying System

A cast iron evaporating, humidifying pan, enameled on the inside, is furnished with each Heatmaster and is located entirely inside of the casing. This evaporating pan is of correct design and of ample capacity to insure proper evaporation of water for the complete humidification of the home. An access door in each Heatmaster hood is located so that the evaporating pan may be filled by hand or removed from the interior for inspection if necessary.

An automatic float tank is mounted on the side of the Heatmaster so that the height of the water in the evaporating pan may be automatically controlled and can be so adjusted that the desired per cent of relative humidity may be obtained at all times.

UNIFORM HEAT DISTRIBUTION WITH HEATMASTER



Unhealthy Heat

Invigorating Heat

Stagnant Air

Science attributes a large share of winter ailments to so called "close" or "stuffy" air, fluctuating temperatures, drafts, and spotty air circulation. These unhealthful conditions are widespread—even in homes where considerable money has been spent on the heating plant alone.

Whole families, often unknowingly, are thus exposing themselves to the dangers of dry, impure, poorly circulated air. Uneven, stale, arid air causes listlessness, headaches, fatigue . . . it breeds colds, encourages sinus infections and other respiratory ailments of the nose and throat—all because the heating system has not been designed with due consideration of the elements of healthful heat—temperature, humidity and air motion.

Revitalized Air

In the home heated by Heatmaster, the three essentials of healthful heat are automatically combined and controlled. No discouraging conditions that make winter so unpleasant and unhealthful. Cleansed, purified, tempered warm air is gently and uniformly forced to every room in the home.

A thermostat regulates temperature in every room. In living room, kitchen, bedrooms . . . everywhere the same healthful, uniform temperature so important to bodily well being. Here the occupants enjoy clean, refreshing air made healthful by scientific cleaning and humidifying, after which it is gently and uniformly circulated throughout the home.

Heatmaster brings these benefits . . . obtainable in no other method of heating, except through a fully conditioned warm air installation.

Relative Humidity

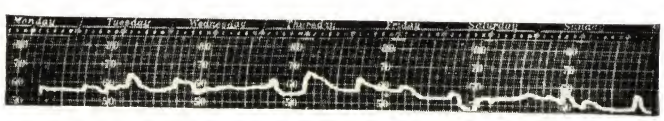
Medical science agrees that many common cold weather diseases of the nasal and oral cavities are due to the dry, under-moistened air in the home. This growing conviction has accelerated the trend to automatic warm air heating, which brings with it scientific humidification.

Atmosphere that is too dry in the home during the winter months breeds dangerous, unpleasant, expensive conditions. Like a thirsty sponge it searches out every available drop of water—from the body, the furniture and the woodwork.

All these evils result when relative humidity drops from a normal 40% to 15% and lower—a condition now existing in thousands of homes.

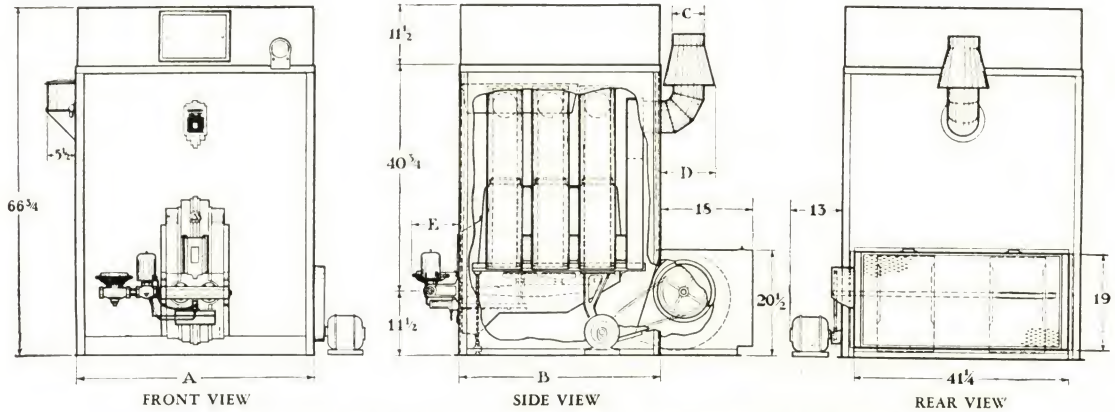
Attempts to supply this lacking moisture by placing pans of water around the room for evaporation is futile, because, in the average small home, approximately 7 gallons of water must be evaporated daily. Larger houses, depending on size, require as much as 40 gallons daily.

Correct humidity can be obtained only with a scientifically constructed, automatic warm air furnace which has the humidifying feature built into it. The Heatmaster provides this feature.



Relative Humidity Chart

HEATMASTER CAPACITIES AND DIMENSIONS



HEATMASTER CAPACITIES AND ENGINEERING DATA

1	2	3	4	5	6	7	
Heatmaster Number	A.G.A. Hourly B.T.U. Input	A.G.A. Hourly B.T.U. Output at Bonnet	Hourly B.T.U. at Heat Register	Cubic Ft. Air per Mi. Against ⅛"StaticPr.	Approx. Temp. Rise of Air at Register	Cubic Feet Gas Demand per Hour	
						Nat. Gas 1000 B.T.U.	Mfg. Gas 540 B.T.U.
F-1031	100,000	75,000	71,250	900	75° F.	100	185
F-1531	150,000	112,500	106,875	1350	75° F.	150	278
F-2031	200,000	150,000	142,500	1800	75° F.	200	370
F-2531	250,000	187,500	178,125	2250	75° F.	250	463
F-3031	300,000	225,000	213,750	2700	75° F.	300	556
F-4031	400,000	300,000	285,000	3600	75° F.	400	740
F-5031	500,000	375,000	356,250	4500	75° F.	500	926

DIMENSIONS IN INCHES AND ADDITIONAL ENGINEERING DATA

1	2	3	4	5	6	7	8		9	10
Heat-master Number	A Overall Width of Casing	B Overall Depth of Casing	C Flue Vent Diam. Inches	D Diverter Projection from Casing	E Regulator Projection from Casing	Gas Supply Connection in Inches	Orifice Size		Motor H.P.	Approx. Shipping Weight, Lbs.
							Nat. Gas	Mfg. Gas		
F-1031	46	30	6	13	10	1	¼	¼	¼	1050
F-1531	46	39	6	13	10	1	¼	¼	¼	1180
F-2031	46	48	7	14	10½	1¼	¼	¼	¼	1330
F-2531	46	52¼	7	14	10½	1¼	¼	⅜	¼	1430
F-3031	92	39	2–6	13	10¾	1½	¼	¼	2–¼	2300
F-4031	92	48	2–7	14	10¾	1½	¼	¼	2–¼	2615
F-5031	92	52¼	2–7	14	12¼	2	¼	⅜	2–¼	2820

Determining Heatmaster Size

The hourly B.t.u. heat loss of the house should not exceed the amounts listed in column 4 in the table on "Ratings and Capacities" above. The hourly B.t.u. heat loss should be figured as outlined in The Surface Combustion Warm Air Hand Book or by the American Gas Association House Heating Hand Book and the American Society of Heating and Ventilating Engineers Guide.

The air volumes are specified in column 5 of this same table which makes a temperature rise of approximately 75° F. at the register. This gives an air temperature of around 145° F. into the rooms. If a lower air temperature is desired a large pulley may be installed on the fan motor shaft so as to increase the volume of air being circulated throughout the house at a lower outlet temperature at the register.

Hourly B.T.U. Heatmaster Ratings

The hourly B.t.u. ratings were tested by the American Gas Association Laboratory and the hourly B.t.u. output at the bonnet, rated at the maximum allowable, is 75% of the hourly B.t.u. input. The A.G.A. laboratory testing requirements allow only this percentage of efficiency to any warm-air central house heating appliance which has their approval.

Column 4 of the table on "Ratings and Capacities" above shows the net available B.t.u. per hour at the heat registers in the rooms to be heated. This figure is 95% of the hourly B.t.u. output at the heater bonnet. It is estimated that 5% of the heat is lost through the distributing sysem by radiation through the ducts.

Location of Heatmaster Units

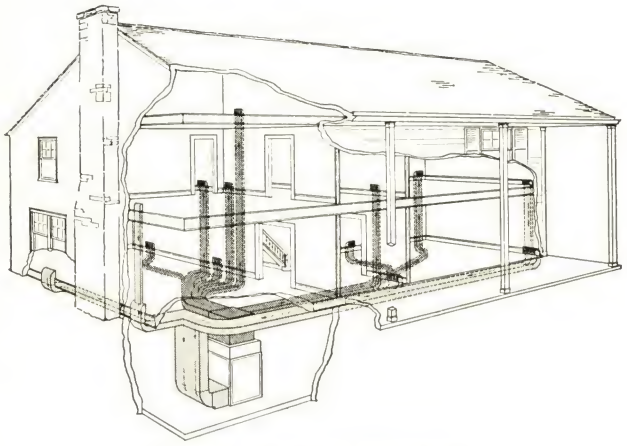
The furnace should be reasonably close to the flue and in all cases the front should be at least 3 ft. from a wall or partition in order to make the removing of burners possible.

It is not as necessary in a forced air installation to have all the ducts about the same length as it is in a gravity installation. The Heatmaster may be located in a corner of the basement or in a room which is not near the center of the basement. The arrangement of the return air grilles and heat registers also governs the location, as the ducts should be connected to the Heatmaster in the simplest manner so as to do away with all right angle turns if possible.

PLANNING HEATMASTER INSTALLATIONS

Heat Outlets and Recirculating Grilles—The Heatmaster system may have the heat registers and recirculating grilles located in the most desirable position conforming to room architecture. Heat registers need not be the same distance from heater—as with a natural circulating warm air installation. Locating heat registers in walls makes a better appearance and helps circulate the warmed air throughout the rooms. These registers may be located in the inside walls nearest the heater with recirculating grilles at outside walls, or vice versa. Recirculating grilles may be placed in walls or floor, but if in walls they should be as near the floor as possible.

Registers and grilles should be located so as to simplify the installation of the duct work and to make the entire system as neat appearing as possible.



Typical Heatmaster Installation

Velocity of air through the free area of the heat registers should not be over 300 f.p.m. and preferably around 200 f.p.m. Recirculating grilles should not have over 300 f.p.m. velocity through the free area of the grille and preferably around 150 f.p.m. The registers and grilles should be large enough to not have over the above velocities.

Heat Distributing and Recirculating Ducts—The ducts in the basement are run in a horizontal position against the basement ceiling, designed so as to minimize the frictional loss of the air passing through, by having easy turns with large radii. As few bends and turns should be used as possible.

Space between studding in partitions may be used for locating stacks running to second floor rooms. Dampers should be installed in each heat and recirculating air duct.

Ducts running in the same general direction may be combined into one larger trunk duct and smaller branch ducts taken from this main duct to connect to individual heat outlets.

When designing a trunk system which has considerable length, it is good practice to gradually reduce the velocity, not only in branch ducts but in main duct. This enables the air to distribute in a uniform way, decreasing friction in the small ducts and also reducing velocity pressure.

Just how to decrease velocity of the air in main trunk depends upon its length, the volume of air being delivered and number of bends and turns in the pipe. For general use it is good practice to decrease the velocity 100 f.p.m. for each 10 ft. of run.

Standard size wall stacks should be used where possible and for this reason it is often necessary to run two stacks to a large second floor room.

The table below gives the velocities to use in most forced warm air heating installations, together with temperatures at the heat outlets.

VELOCITIES IN FEET PER MINUTE AND REGISTER TEMPERATURES

Type of building	In horizontal heat ducts	In heat risers	Through free area of heat register	Through free area of return air grille	In return risers	In horizontal return air ducts	Required temp. at supply registers
Residences	400 to 800	300 to 500	200 to 300	100 to 300	300 to 500	300 to 800	130 to 160
Churches	600 to 800	400 to 600	300 to 500	300 to 500	400 to 600	500 to 700	100 to 130
Auditoriums and convention halls	600 to 1000	300 to 500	300 to 500	300 to 500	500 to 600	600 to 800	140 to 180
Garages and industrial buildings	1000 to 1400	600 to 1000	400 to 800	400 to 800	600 to 1000	800 to 1200	140 to 180

Formulæ for Determining Duct, Register and Grille Sizes

Square inches of duct area equals B.t.u. per hour by 132** divided by temperature rise by velocity in feet per minute.

Cubic feet of air per minute equals B.t.u. per hour by 55* divided by temperature rise by 60.

Square inches of duct area equals c.f.m. by 144 divided by velocity in feet per minute.

Cubic feet of air per minute equals velocity in feet per minute by area in square feet.

Area in square feet equals c.f.m. divided by velocity of feet per minute.

Velocity in feet per minute equals c.f.m. divided by area in square feet.

* 55 is the number of cubic feet of air heated one degree by one B.t.u. or the number of degrees one cubic foot of air is heated by one B.t.u.

**132 equals 55 times number of square inches in one square foot (144) divided by the number of minutes in an hour.

Hand Book and Heating Guide

The Surface Combustion Hand Book and Heating Guide, as applied to gas fired warm air heating equipment, contains useful data taken from the country's leading authorities on air conditioning systems. Included in this booklet is a complete outline on B.t.u. loss estimating—copy of the National Warm Air Heating Association Standard Code method of estimating natural circulating system duct sizes—description of both forced air and natural circulating layout work with useful formulæ and charts—description of method of figuring pressure loss in fan systems—humidity facts—chimney sizes—flue loss data—gas fired unit heater applications—operating costs data and several other important topics on warm air heating.

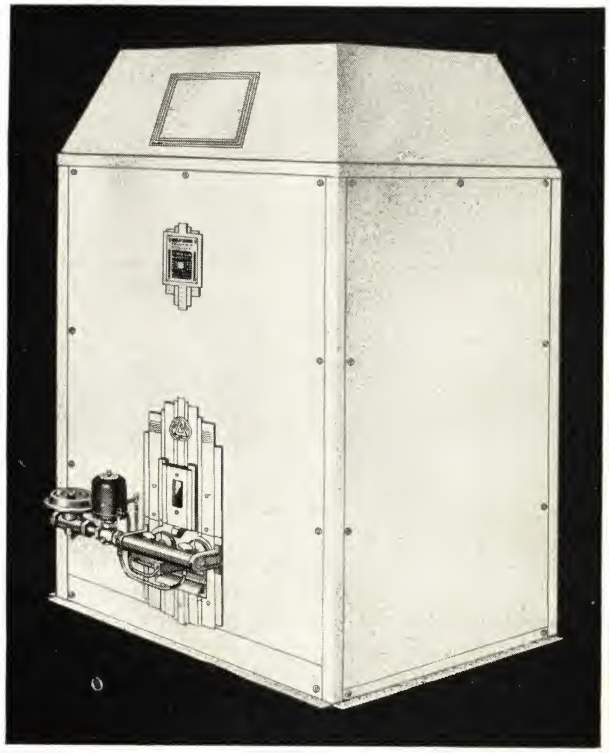
This book is available at no charge.

THE COLUMBUS GAS-FIRED WARM AIR FURNACE

The Columbus Furnace—approved by the A.G.A. Laboratory—combines all of the desirable features and developments that have brought about the acceptance of automatic warm air heating—including a modern appearance that conforms so well to today's demand for livable basements.

It is not the conventional sectional type of furnace requiring several sections for proper heating of the home. Each furnace is designed as a separate unit, with rated heating capacity and heating elements spaced so that air volume and temperature are distributed evenly in the hood area . . . this means uniform distribution of heated air to all parts of the building. One set of controls does all the regulation necessary for full automatic operation. The shape of the furnace is conducive to economical and efficient duct installation.

The Columbus Furnace is particularly adaptable to a modern forced air conditioning system by the installation of blower and filters, manufactured by the SURFACE COMBUSTION CORPORATION. This feature may be added after installation if desired. The heating elements are spaced so that there are no large open areas for the fan air to pass through without coming in contact with radiating surfaces. It is not necessary to alter the shape or construction of the casing to adapt the furnace to a fan installation.



Columbus Gas Fired Furnace

For exceptionally large buildings several standard Columbus Furnaces may be assembled together as one unit with a common hood. A blower may be installed in conjunction with the grouping for circulating heated air over large areas.

Air Circulation—The air entering the furnace passes directly to the heating surfaces and rises upward as it is warmed unrestricted by changes in direction (see black arrows in cut-away illustration). This gives a greater volume of air circulation through the furnace and at a lower temperature resulting in directly lower register temperatures and in more equal heat distribution throughout the home. The furnace is designed to give equal volumes of air and uniform temperature distribution over the entire area available for the attachment of duct connections. This is very important when it is considered that the most desirable factor for comfort in heating is a large volume of uniformly heated air at a relatively low temperature and not a small volume of *hot air*.

The circulating air for heating enters the base of the furnace and comes in contact with the lower part of the side radiators, which are relatively cool as compared to the upper part of the combustion chamber and radiators. As the air travels upward through the furnace it scrubs the increasingly hot surfaces. It continues to conduct the heat from these surfaces at a constant ratio building up a momentum in its travel through the furnace, giving the air the power to circulate more readily through even a poorly designed duct system. This is an important consideration in replacement work in existing systems. The cross sectional free area through the furnace is proportioned according to heating capacity and is considerably in excess of the warm air leader area taken from the furnace hood. This insures an outward flow of air in the heat leaders and prevents any possibility of having a reversal of flow in any of the ducts.

Heating Surfaces—The combination of cast iron for the prime heating surfaces, and sheet steel for the secondary heating surfaces has become the accepted design for perfect performance in gas-fired warm-air furnace equipment. This is a distinct feature of the Columbus Furnace. In addition, these heating elements provide more radiating or heating surface than other warm air furnaces of equal capacities.

The sheet steel construction of the side and flue radiators gives instant heat delivery the moment the burners are lighted. No delay is encountered while the heating elements become sufficiently hot to start a circulation of warm air through the system. This gives instant response to the demands of the room thermostat with no wide temperature fluctuations. The side radiators are so located that they absorb the radiated heat from the combustion chamber, thereby preventing this heat from reaching the casing, causing overheating or excessive losses of heat in the basement.

Columbus Furnace Installations

In natural circulating systems the registers and recirculating grilles should be located so as to make all heat leaders equally distant from the furnace. The heat ducts should pitch upward 1 in. to the foot length to help the circulation. Registers should be placed so as to offer the easiest possible flow of air.

The National Warm Air Heating Association Standard Code is adapatable to natural circulating systems. A copy of this is included in the Surface Combustion Warm Air Hand Book.

The simple formulæ below may be used for determining the duct, register and grille sizes:

Square inches of basement heat leader area:

For first floor rooms equals B.t.u. loss per hour divided by 111.

For second floor rooms equals B.t.u. loss per hour divided by 167.

For third floor rooms equals B.t.u. loss per hour divided by 200.

Wall heat stack areas equals not less than 70% of basement heat leader areas.

Heat register free area equals area of basement heat leader.

Return air grille area equals 110% of heat register area.

Location of Natural Circulating Furnace

The location of the furnace should equalize the length of warm air runs as far as possible, yet give necessary preference to pipes supplying living rooms, dining rooms and main halls.

The furnace should be reasonably close to the flue but do not increase the length of several heat ducts so as to have a very short fume pipe. In gas heating the fume pipe is not as important a factor to consider as in a coal furnace.

The furnace front should be at least 3 ft. from a wall or partition, as the burners may have to be removed at one time or another. The designer should face the furnace so that the return air ducts and drops may be connected to the casing in the most simple manner.

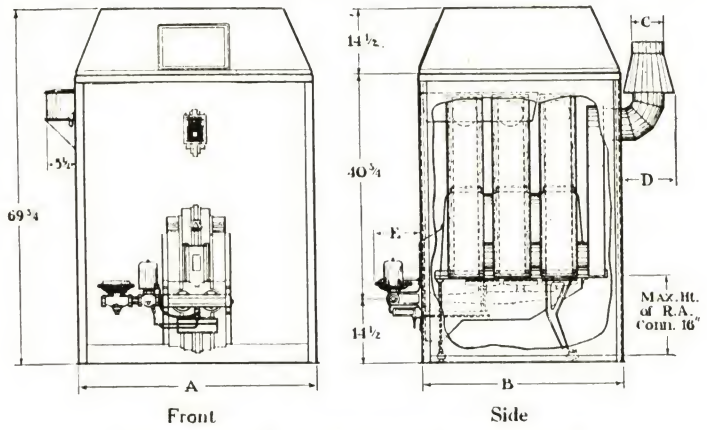
The casing should be fitted so that air from the basement (carrying dust) cannot leak into the furnace. A mixture of portland cement should be built up around the outside of the base of casing angle so no air can leak in. Any portion of the base angle concealed by return air boots or shoes should be made airtight as well as the joints between the casing and bottom of floor. Such air leaks as these, if permitted, will cause dust to flow through warm air pipes and into the rooms above.

RATINGS, CAPACITIES, AND DIMENSIONS OF COLUMBUS FURNACE, DETERMINING FURNACE SIZE

Hourly B.T.U. Heat Loss Method

The hourly B.t.u. heat loss of the house should not exceed the amounts listed in column number 4 in the table above on "Hourly B.t.u. Ratings and Capacities" for natural circulating warm air systems. When a fan is used having capacities equal to or greater than the amounts listed in column 6 of the same table the hourly B.t.u. capacities listed in column 5 may be used in selecting the proper furnace.

The hourly B.t.u heat loss of the house should be figured as outlined in the Surface Combustion Warm Air Hand Book or by the American Gas Association Warm Air Hand Book and the American Society of Heating and Ventilating Engineers' Guide.



HOURLY B.T.U. RATINGS AND CAPACITIES

1	2	3	4	5	6	7	
Furnace Number	A.G.A. Hourly B.T.U. Input	A.G.A. Hourly B.T.U. Output at Bonnet	Hourly B.T.U. at Register Natural Circulation	Hourly B.T.U. at Register Forced Circulation	C.F.M. of Fan for 75° T.R. at Reg. ⅛" S.P.	Cubic Feet Gas Demand per Hour	
						Nat. Gas 1000 B.T.U.	Art. Gas 540 B.T.U.
1031	100,000	75,000	63,750	71,250	900	100	185
1531	150,000	112,500	95,625	106,875	1350	150	278
2031	200,000	150,000	127,500	142,500	1800	200	370
2531	250,000	187,500	159,375	178,125	2250	250	463
3031	300,000	225,000	191,250	213,750	2700	300	556
4031	400,000	300,000	255,000	285,000	3600	400	740
5031	500,000	375,000	318,750	356,250	4500	500	926

Hourly B.T.U. Furnace Rating

The hourly B.t.u. ratings were tested by the American Gas Association Laboratory and the hourly B.t.u. output at the bonnet rated with maximum allowance, is 75% of the hourly B.t.u. input. The A.G.A. laboratory testing requirements allow only this percentage of efficiency to any warm-air central house heating appliance which has their approval.

DIMENSIONS IN INCHES AND ADDITIONAL ENGINEERING DATA

Furnace No.	A Overall Width of Casing	B Overall Depth of Casing	C Flue Vent Diam. Inches	D Diverter Projection from Casing	E Regulator Projection from Casing	Max. Width of R.A. Conn.		Gas Supply Connection	No. of Mixing Tubes	No. of Burner Heads	No. of Side Radiators	Cross Sectional Free Area Through Furnace	Orifice Size		Appx. Shipping Weight in Pounds
						Side	Front						Nat. Gas	Art. Gas	
1031	46	30	6	13	10	25	41	1	2	4	4	650	¼	¼	750
1531	46	39	6	13	10	34	41	1	2	6	6	850	¼	¼	880
2031	46	48	7	14	10½	43	41	1¼	2	8	8	1100	¼	¼	1029
2531	46	52¼	7	14	10½	47	41	1¼	2	10	8	1200	¼	⅜	1132
3031	92	39	2–6	13	10¾	34	85	1½	4	12	12	1700	¼	¼	1722
4031	92	48	2–7	14	10¾	43	85	1½	4	16	16	2200	¼	¼	2016
5031	92	52¼	2–7	14	12¼	47	85	2	4	20	16	2400	¼	⅜	2222

Column 4 of the table "Hourly B.t.u. Ratings and Capacities" shows the net available B.t.u. per hour at the heat registers in the rooms to be heated. This figure is 85% of the hourly B.t.u. output at the bonnet. It is estimated that 15% of the heat is lost through the distributing system by radiation through the ducts.

For forced air installations having fan capacities equal to or greater than amounts listed in column 6 of the same table, only 5% of the heat available at the bonnet is lost by radiation through the ducts (see column 5).

Estimating Cost of Operation

Cubic feet of gas for heating season equals B.t.u. hourly loss by 24 hours by degree days for 65° F. divided by the temperature rise used in figuring heat loss by B.t.u. value of gas by over-all efficiency of system (.80).

This formulæ is for domestic heating having a day temperature of 70° F. and night temperature of 60° F. Yearly consumption in thousands by average cost of gas per thousand cubic feet equals total cost of operation.

SPECIFICATIONS FOR BOTH HEATMASTER AND COLUMBUS FURNACE

Heater

The contractor shall furnish and install the heating appliance in accordance with the instructions furnished by the manufacturer. The heater shall be No. ..... Columbus Heatmaster [Columbus Furnace] as manufactured by the Surface Combustion Corporation, Toledo, Ohio. The heater is to be complete with the controls furnished as standard with the heater.

Installation

Contractor shall install the heater, registers, grilles and duct work as indicated on the plans. All piping shall be airtight and installed in a neat and permanent manner. All bends and turns shall be gradual with a throat radius not less than the width of the pipe. All wall stacks in partitions leading to second or third floor rooms shall be constructed of bright tin, free from rust and other blemishes, carefully insulated with asbestos paper.

Controls

The contractor shall install all automatic devices as instructed by the manufacturer and see that the entire system is functioning satisfactorily at the completion of the installation.

Gas Supply Line

The gas supply line to the heater shall be 1-in. pipe (pipe sizes listed in the catalogue under Engineering data) connected to the gas controls in a neat and workmanlike manner as instructed in the manufacturer's installation manual.

Vent or Flue Connections

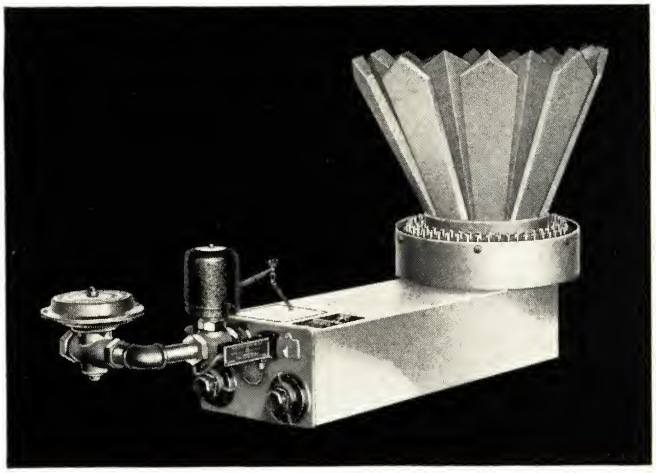
Contractor shall connect a corrosion-resisting metal flue pipe to the heater with the draft diverter in a vertical position near the heater outlet connection. The flue shall have as few bends as possible and shall be pitched upward to the chimney slightly. The pipe size shall be as specified by the manufacturer.

JANITROL-CONVERSION BURNER

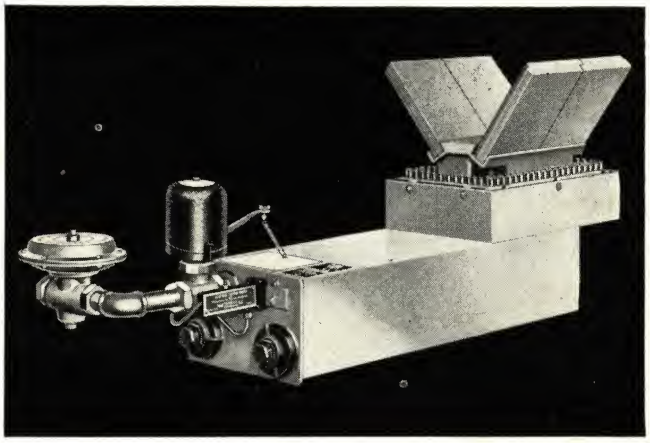
The Janitrol Conversion Burner brings the convenience, cleanliness, and healthful features of automatic gas heating without the necessity of rebuilding or replacing the present heating system. Its wide adaptability and proved efficiency makes Janitrol ideal where an economical installation is desired.

Janitrol is a compact, complete unit that converts the warm air furnace, steam, vapor or hot water boiler into a modern, self-contained, gas-fired unit. Thermostatic control makes it a fully automatic installation. It provides at low installation expense the same conveniences as any gas-fired furnace or boiler.

A complete, illustrated catalogue describing Janitrol in detail, as well as other miscellaneous and interesting Janitrol literature, will be sent by the manufacturer on request, or may be obtained from the local gas company.



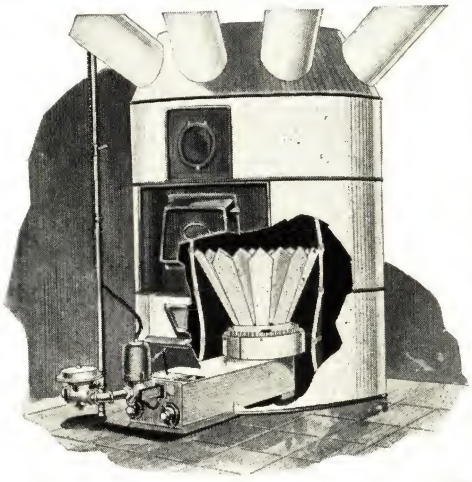
Round Janitrol

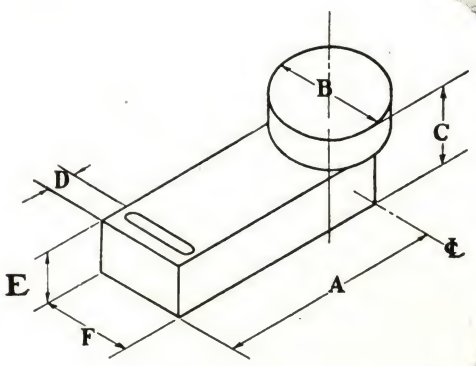


Rectangular Janitrol

Round Janitrol

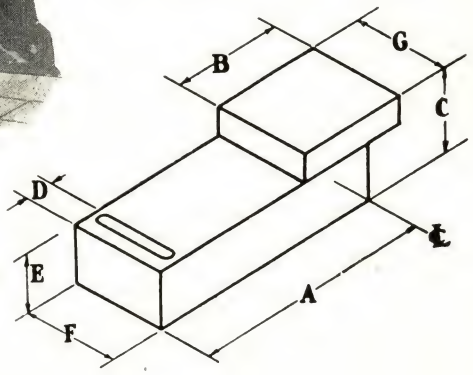
Standard equipment includes burner assembly, Minneapolis-Honeywell electric motor valve and plain room thermostat, Reynolds gas regulator, Surface Combustion Thermostatic Pilot and refractory baffles.

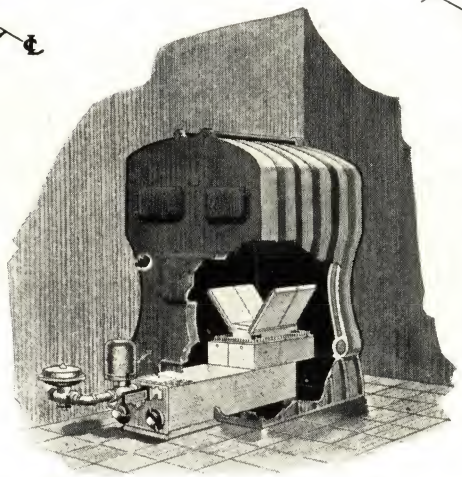




Rectangular Janitrol

Standard equipment includes burner assembly, Minneapolis-Honeywell electric motor valve and plain room thermostat, Reynolds gas regulator, Surface Combustion Thermostatic Pilot and 9-in. refractory baffles. 12-in. and 16-in. baffles will be furnished when specified.





ASSEMBLED DIMENSIONS (INCHES)

BURNER	A	B	C	D	E	F
X-1 & X-11	28¾	15	11	5½	6¾	11⅛
X-2 & X-12	29⅜	16¾	11	5½	6¾	11⅛
X-3 & X-13	31⅜	20½	11	5½	6¾	11⅛
X-3A & X-13A	37⅜	20½	11	5½	6¾	11⅛

ASSEMBLED DIMENSIONS (INCHES)

BURNER	A	B	C	D	E	F	G
X-1-S & X-11-S	28¾	16⅛	11	5½	6¾	11⅛	11⅜
X-2-S & X-12-S	29⅜	17⅞	11	5½	6¾	11⅛	11⅜
X-3-S & X-13-S	31⅜	22⅞	11	5½	6¾	11⅛	15¼
X-3-SA & X-13-S A	37⅜	22⅞	11	5½	6¾	11⅛	15¼
X-3-SL & X-13-SL	31⅜	24⅞	11	5½	6¾	11⅛	13¼

ESTABLISHED 1857

L. J. MUELLER FURNACE CO.

Gas-Fired Warm Air Furnaces

GENERAL OFFICES

337 South Second Street, MILWAUKEE, WIS.

BRANCH OFFICES

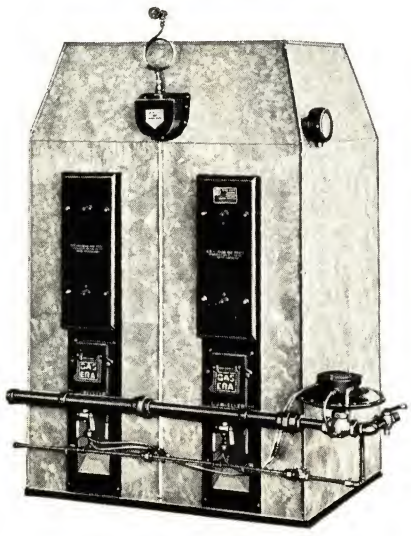
ST. LOUIS, MO., 4246 Forest Park Boulevard
MINNEAPOLIS, MINN., 715 So. Eighth Street
MEMPHIS, TENN., Medical Arts Building
CHICAGO, ILL., 211 W. Wacker Drive
DETROIT, MICH., 1321 Twelfth Street
SEATTLE, WASH., 2401-2405 Utah Street
BALTIMORE, MD., 909 Cathedral Street
SALT LAKE CITY, UTAH, 601 McIntyre Building
LOS ANGELES, CAL., 5450 West Boulevard

Products

GAS-ERA GAS-FIRED WARM AIR FURNACES, all-cast; also pressed steel.

Also all-cast Warm Air Furnaces for any kind of fuel; Horizontal Tubular Furnaces for large schools and churches; Steam and Hot Water Boilers; Residence Garbage Burners; Hot Water Supply Boilers; Hot Water Coils. Complete catalogues on request.

For Mueller pages on Gas-Fired Steam and Hot Water Boilers, Air Conditioning Systems, and Registers, Grilles and Ventilators, see Manufacturers' Index.



No. 2 Gas-Era Furnace

Mueller Gas-Era Gas-Fired Furnaces

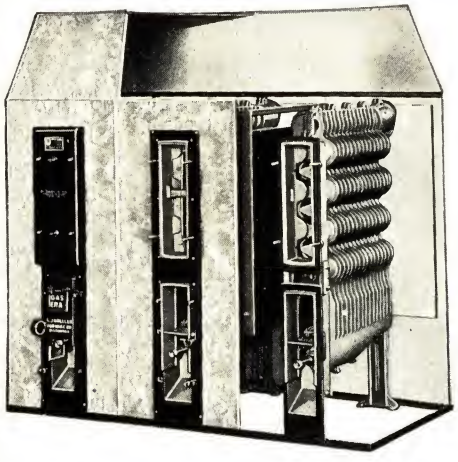
Uses—For heating every type of residence, school, church and store, either by gravity or with fan circulation.

The Mueller Gas-Era Furnace secures a maximum heat utilization from the gas burned. The correctly proportioned free area and ample space beneath sections, with provision for adequate return air connections at ends as well as rear, insure quick, uniform and positive heat delivery. The pitched hood aids proper heat distribution.

Construction—Gas-Era Furnaces are of standardized unit construction. Sections are all cast iron, without packed or puttied joints.

The heat retaining qualities of cast iron insure uniform temperature.

Sections are formed by two half-sections, accurately surface ground and drawn iron-to-iron, forming permanently tight connections. Their exterior surface is heavily ribbed, affording twice the surface presented by a smooth casting of similar design, and strengthening the entire assembly. Triangular baffles, filled with plastic material, are inserted horizontally, holding products of combustion in contact with the surface of the casting and securing maximum heat transfer. They also reduce the volumetric content of the flues, eliminating explosion hazards. The front cleanout extension renders the flue readily accessible.



Operation—All control equipment necessary to make the Gas-Era Furnace completely automatic in operation is provided. Automatic humidifier is regularly supplied. Limit control eliminates possibility of overheating. Electric diaphragm gas valve operated from room control turns gas on or off as required. Can also be furnished without automatic equipment for manual control.

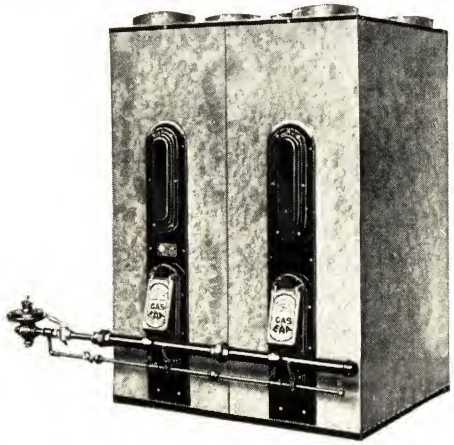
Forced Air Heating—Special casings and controls are supplied for forced circulation. Electric valves, with relays operating in conjunction with reverse-acting limit controls, which start fans when temperature rises and stops them when gas valve is closed, will be supplied where required.

DIMENSIONS AND RATINGS GAS-ERA CAST FURNACES PER SECTION

Width, in.	Depth, in.	Height, in.	A.G.A. input, B.t.u. per hr.	Net load, B.t.u. per hr.
21⅝	31½	66¾	65,000	47,500

Stock sizes up to and including ten sections. Larger units on special order.

Pressed Steel Gas-Era Furnace



DIMENSIONS AND RATINGS GAS-ERA STEEL FURNACES PER SECTION

Width, in.	Depth, in.	Height, in.	A.G.A. input B.t.u. per hr.	Net load, b.t.u. per hr.
20	31½	53	45,000	33,000

Note: Write for literature and complete data on this high-quality, reasonably priced unit.

AMERICAN FOUNDRY & FURNACE COMPANY

Air Controlling Specialties

BLOOMINGTON, ILL.

Products

WIRE GRILLES and GUARDS; ALUMINUM BACK PRESSURE LOUVRE DAMPERS; DIFFUSERS; BY-PASS DAMPERS.

Also Warm Air Heating Apparatus for all services, Mixing and Splitter Dampers, Access Doors, Manhole Doors, Belt Guards, Blow-off Basins, Ventilators, Foot Warmers, Ornamental Grilles and Cast Radiator Brackets.

Finishes

The standard finish on all grilles, dampers and diffusers is black duco, krinkle or prime coat. Any other duco color or krinkle finish can be furnished at slight additional cost.

Sizes

All grilles, diffusers and dampers can be made in any sizes.

When ordering, give the exact size of opening. An allowance of ¼ in. (smaller) will be made for irregularities, unless ordered otherwise.

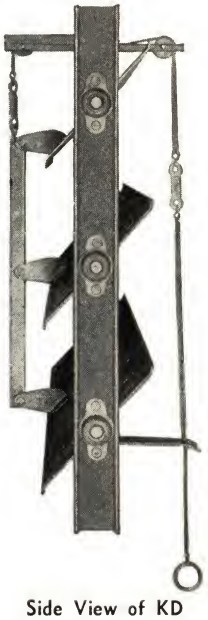
Use this form in ordering: Opening ..... inches wide, by ..... inches high.

Catalogue

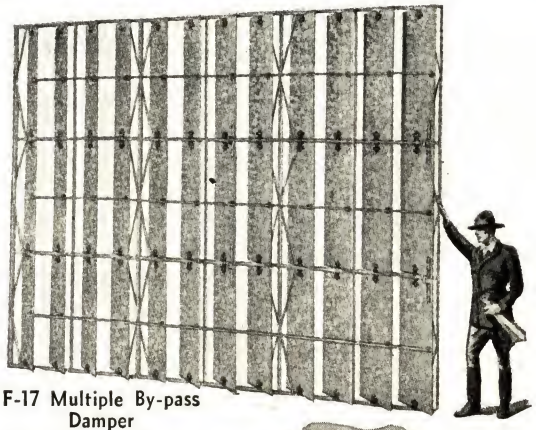
Our catalogue "Ventilating Specialties" will be sent on request.

Plate KD

A grille and border, with louvres at rear, for use in fresh air or vent openings. Dampers are ball-bearing equipped, and operate by a chain working through two pulleys and a claw. Pull chain is equipped with a fusible link, on both the front and rear of the louvres. These links melt at 160°. Thus, in case of fire on either side of the louvres, they close automatically by their own weight

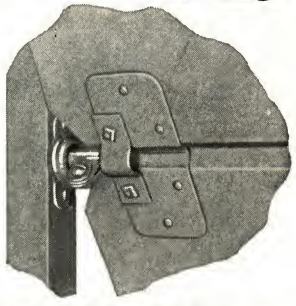


Side View of KD



F-17 Multiple By-pass Damper

Can be made in any width or height to fit any opening. Adaptable to hand or automatic control. For schools, churches, hotels, theatres, powerhouses, etc. Standard finish, black enamel. Made for vertical or horizontal installation



Detail of F-13 and F-17 Louvre

K-88 Diffuser

Used over heat openings in fan blast steam or warm air heating systems. Adjustable vertical blades deflect air to any portion of the room. Felt strips prevent dirt streaks on wall. Smooth finish border; no joints show. Made of auto body steel, duco or krinkle finish, in any sizes

M-2 BPD Back Pressure Metal Screen

Expanded metal screen with back pressure dampers at rear, for base of flues, etc. Dampers made from light, but hard, strong aluminum. Smooth operation and freedom from binding is secured by use of fiber spacers. Silent operation obtained by lining all dampers with felt. These dampers do not clatter

F-13 American Fresh Air Louvre

American fresh air louvre in combination with expanded metal screen. Can be made any size, with any number of dampers, any depth of frame (standard 6 in.) and with or without screen over face. Made for vertical or horizontal installation

THE AUER REGISTER CO.

Registers, Grilles, Ventilators, Radiator Enclosures and Access Panel Doors

TELEPHONE
Henderson 7650

3608 Payne Avenue, CLEVELAND, OHIO

CABLE
"Auer—Cleveland"

Auer Wrought Metal Grilles and Registers

Advantages—Wrought metal grilles can be made in odd sizes and shapes without the expense and delay of pattern making. Wrought grilles are light in weight and easily fastened to walls and ceilings. They can neither be broken in transit nor after installation. The lodging surface for dust is reduced to a minimum, hence sanitary.

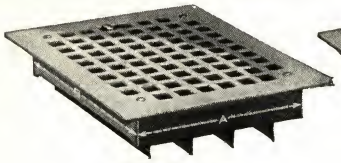


Fig. K
All-steel Register for Wall or Ceiling

Fig. KR
Pole Operating Register
Fitted with ring operating lever so that a window pole can be used to open and close it

Series "K" Louver Registers—Various purpose types.

All-steel register for wall or ceiling use. The face is made extra heavy, of ⅛-in. thick steel, plain lattice design, and having attached thereto multiple louver steel register body. The louvers can be made to run either vertically or horizontally. When ordering give the measurements as indicated on the cut.

"A"—width of register body; or width of opening in the wall.

"B"—length of louvers; or height of opening in the wall.

Depth of body is 1½ in. Louvers when open project ¾ in. Made to order in any required size.

Has the appearance of a cast iron register but is more sanitary as it provides less lodging surface for dust. Steel takes a much nicer finish and is non-breakable, lighter in weight and more easily fastened to walls and ceilings.

All grilles can be made into registers by the addition of operating or stationary louvers; or, can be equipped with aluminum automatic back pressure dampers.

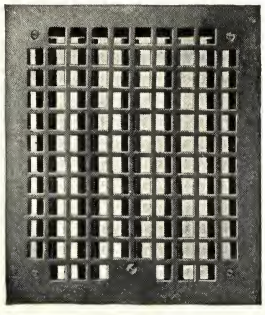


Fig. KL
Lock Register
The louvers are locked in various positions by a key. Patent applied for

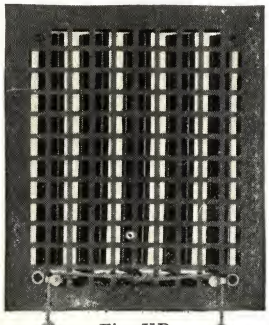
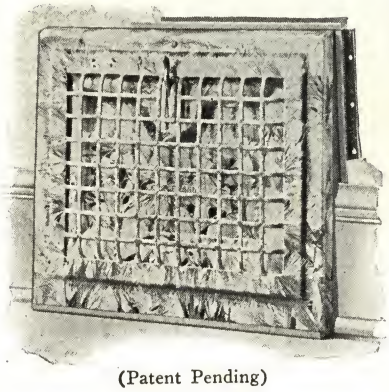


Fig. KP
Lock Register with Pulley

Fig. KP heavy gauge steel register with pulleys. Made in any size. State whether wall or ceiling pulleys are wanted



(Patent Pending)

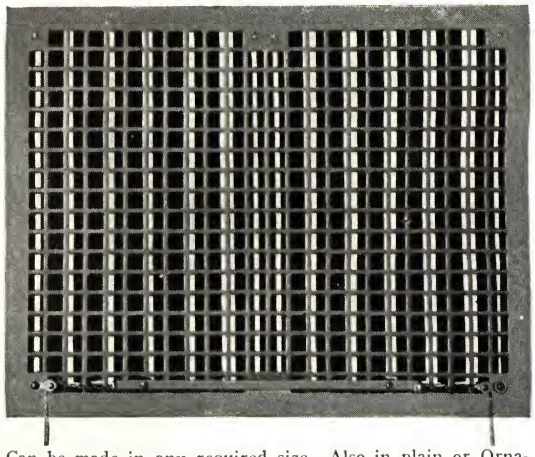
Auer-De-Lux Built-in Wall Register—The built-in frame prevents streaking of walls. Fits standard stackheads. Immune to heat and moisture. Will not tarnish.

Furnished in:

Glorious Mother-of-pearl.
Chromatic plated.
Black Pearl.
Orchid.
Seafoam Green.
Spanish Gold.

Multiple Unit Register—Where all the louvers in one unit would not be practical, large registers are constructed in multiples. The grille is continuous and the register bodies and louvers are in multiple units.

Each unit has an individual operating device so it can be operated independently. When simultaneous operation is desired, a control bar is used. Can be made in panel effect, or in continuous grille.



Can be made in any required size. Also in plain or Ornamental designs shown on the opposite page

Closed

Open

Auer All-steel Clothes Chute Door

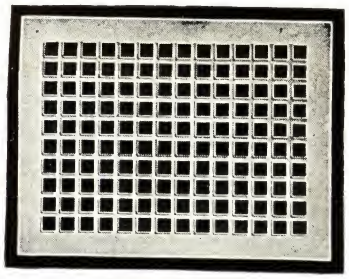
Easy to install, better appearance and finish. Being metal, can not sag or warp; non-breakable; rigid; tight closing. Convex frame hides rough plaster, etc. Spring catch. Also self-closing spring. Deep flanged frame with holes punched for attaching to metal box or furring strip. Made in sizes for opening 7x10 in.; also 9x12 in. Finishes: white, prime and nickelplated. Can be used for many purposes.

Auer Simplified Access Panel

Our rigid and positive bolt feature for removing panel, affording unobstructed entry, is more practical than hinge type.

Types and Dimensions of Auer Grilles

Made in All Commercial Metals, All Standard Finishes and Platings—12 and 10-gauge Standard Thicknesses

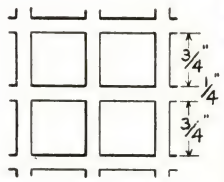


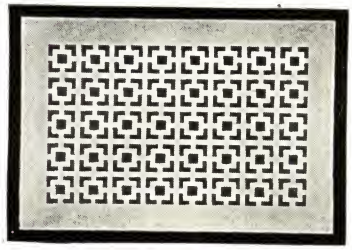
Design No. 5A

SQUARE LATTICE DESIGN

Design No.	Holes, in. sq.	Bars, in.	Opening
8A	½	¼	50%
5A	¾	¼	64%
3A	⅞	¼	72%
9A	1	¼	75%
10A	1¾	¼	85%

Design No. 5A inch multiples work best to all daylight and over-all sizes. Best adapted for louver registers.



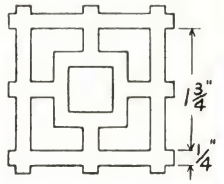


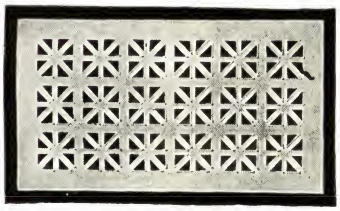
Design No. 35A

SQUARE LINK NO. 35A

Squares, in.	Bars, in.	Multiples, in. sq.	Opening
1¾	¼	2	60%

All grilles are roller level straightened after perforating.



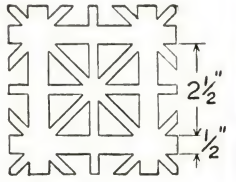


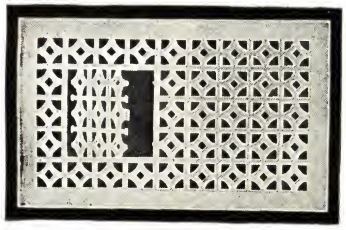
Design No. 12A

UNION JACK DESIGN

No.	Squares, in.	Bars, in.	Multiples, in. sq.	Opening
12A	2½	¼	2¾	50%
12A	2½	½	3	45%
14A	3	⅜	3⅜	55%
14A	3	½	3½	50%
20A	4⅛	⅜	4½	76%

State whether daylight opening or over-all measurement.



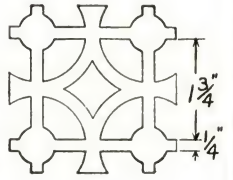


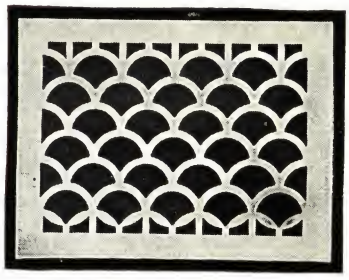
Design No. 4A

MOORISH DESIGN NO. 4A

Squares, in.	Bars, in.	Multiples, in. sq.	Opening
1¾	¼	2	60%

Invisible access to valve doors can be incorporated in all designs.



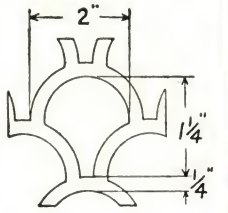


Design No. 33A

Shell Designs No. 13A and No. 33A

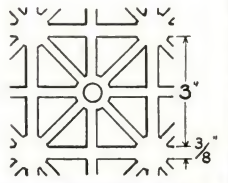
Works in multiples as shown in illustrations.

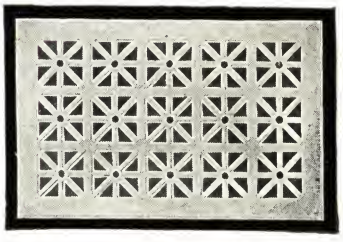
All grilles can be equipped with operating or stationary louvers.



GRECIAN DESIGN NO. 7A

Squares, in.	Bars, in.	Multiples, in. sq.	Opening
3	⅜	3⅜	55%
3	½	3½	53%
3	¾	3¾	50%

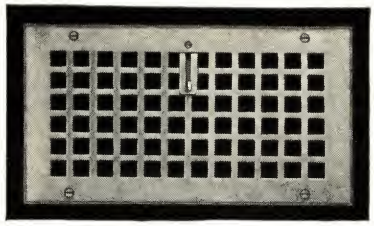




Design No. 7A

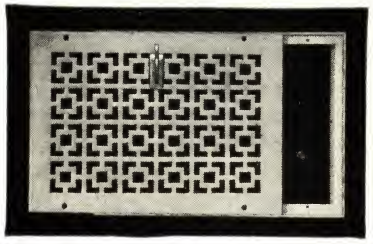
No. 31A Window Stool Grille
Perforations 1½ x 3/16 in. Bars 3/16 in. Made any size

Air Conditioning and Forced Air Heating Registers and Intakes

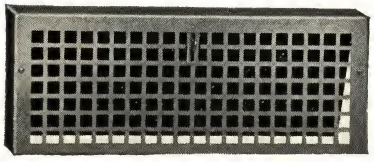


Louver Register in Frame, Patented Operating Adjustment

Can be furnished in any required size, finish, and design, and with or without the metal frame, louver or shut-off valve. Also with or without return flanges.



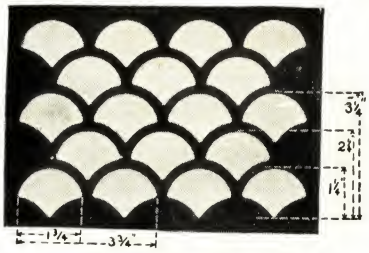
The duct or box is bent back over edge of metal frame, makes a non-streak job. Frame is recessed so face plate finishes flush.



Baseboard Type

Made with or without louver or valve, and in any required size.

Send for details.



Shell Design No. 13A

OBLONG DESIGN

No.	Openings, in.	Bars, in.
15A	1½ x ¾	¼
17A	2¾ x ⅜	¼
31A	1½ x 3/16	3/16

THE BEST REGISTER COMPANY

Registers, Ventilators, Grilles and Screens

2005 West Oklahoma Avenue, MILWAUKEE, WIS.

REPRESENTATIVES

DETROIT, MICH., Wolverine Sales Company, 429 Wayne Street

PHILADELPHIA, PA., R. C. Kratz, 830 Perry Building

Products

REGISTERS, VENTILATORS, GRILLES and SCREENS, of stock or special designs and finishes, in Bronze, Brass, Copper, White Porcelain Enamel, White or Black Japan, etc., made in Cast Iron, Semisteel, Brass or Bronze Metal, and Steel.

MUSHROOM VENTILATORS.

Specialists in SEMISTEEL REGISTERS.

Also manufacturers of Gratings, Wall Frames, Sheet Steel Boxes, Floor Borders, Perforated Steel Grilles, Wire Screens, etc.

Facilities

The factory is equipped throughout with the most improved modern machinery. The capacity is unlimited; and the efficiency of the entire equipment, together with new methods of construction, insure a high quality of workmanship and finish.

"Best" Semisteel Register

The faces are made of cast iron; the boxes, valves, operator, etc., of sheet steel. Each register is coated with heavy rustproof metal coating, and carefully inspected.

Special Designs

Special design goods are made to order only. In all cases, pattern work is necessary to produce. Any design can be produced from architect's drawings or sketches, and can be made to conform to any conditions and be supplied in any finish.

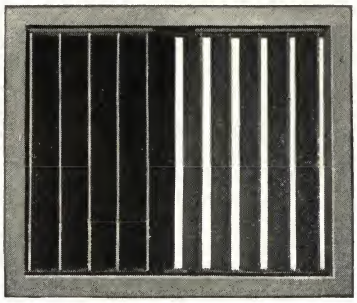
"Best" Mushroom Ventilator

Made in 5 sizes to fit ducts or flues of the following diameters (dimensions being the size of the flue opening of duct): 4, 5, 6, 8 and 10 in.

"Best" Mushroom Ventilator

Adjustable Diffuser

Eliminates friction. Diffuses air in any horizontal direction.



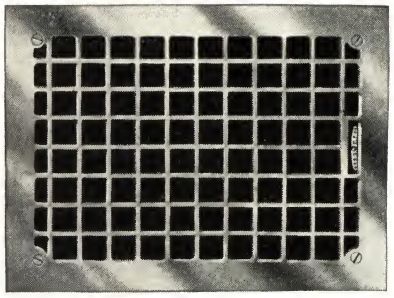
Adjustable Diffuser

References

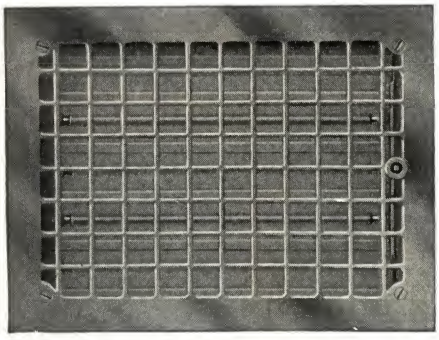
Goods are sold solely on merit. Used and accepted by leading architects and engineers, and installed in many hotels, hospitals, post offices, and other public buildings.

Catalogues and Prices

Illustrated catalogues, showing a large variety of register designs and prices, sizes and finishes, as well as further information concerning "Best" deflecting wall and baseboard registers and other products, will be sent on request.

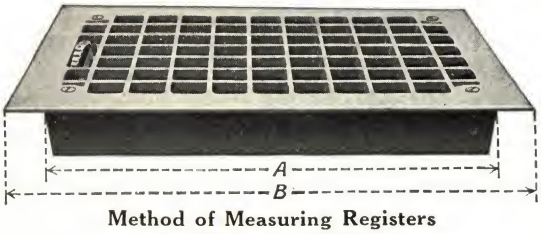


Plain Lattice Design
Made in any style

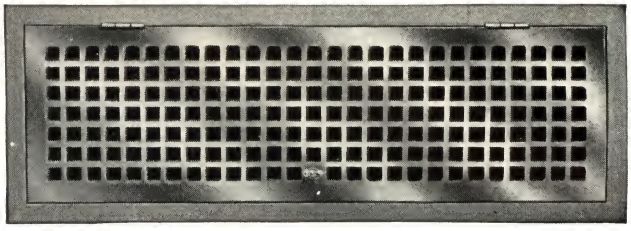


Key-operated Register
Phosphor bronze operator parts. Can not wear or rust out

Plain Lattice Ventilating Face
This design made to order only in any length and width desired

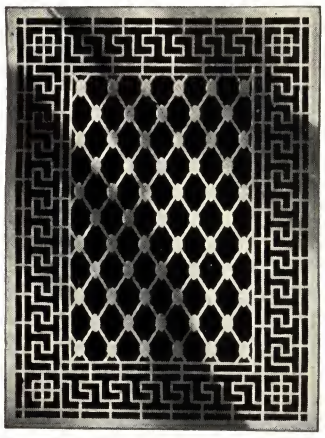


Method of Measuring Registers
A—Flue or opening size
B—Extreme measurement

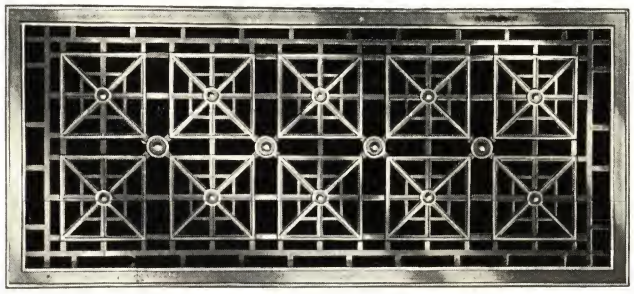


Grille Hinged in Angle Iron Frame

No. 503-B



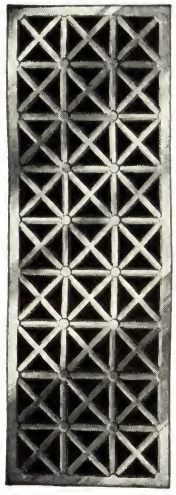
No. 12



No. 119

No. 204

No. 504-A



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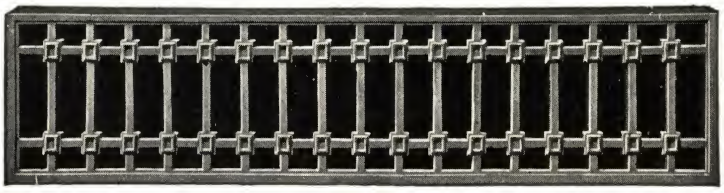

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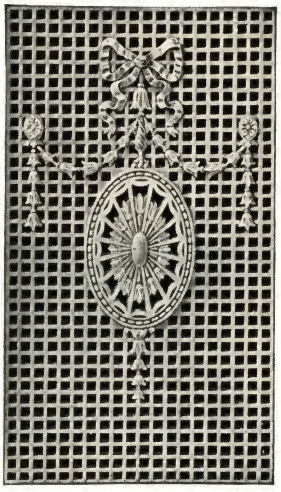

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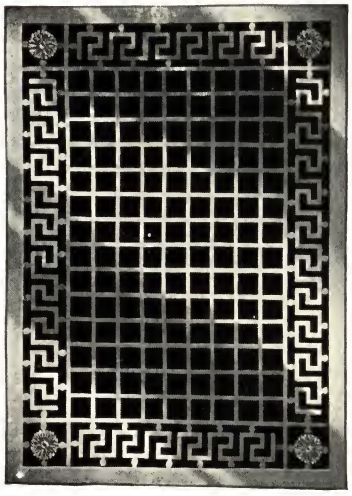
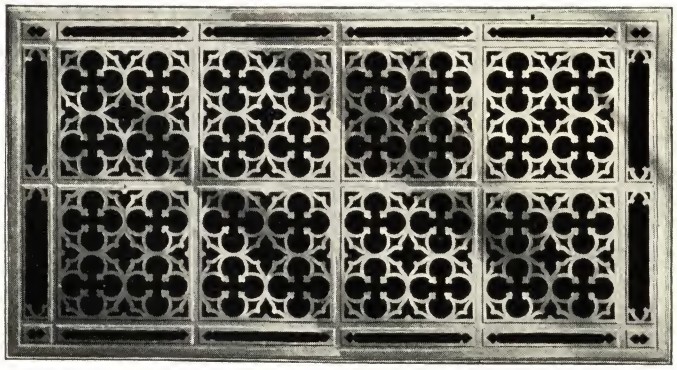
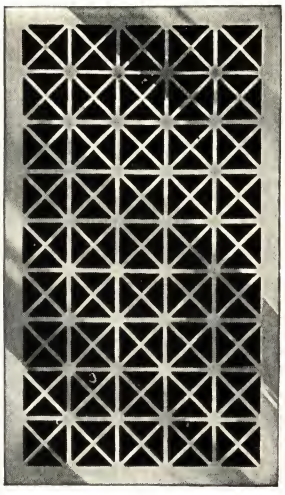


No. 543



No. 14



No. 110

Some of Many Special Designs Produced

This company will make any register. Nothing too small, too large or too complicated

DIAMOND MANUFACTURING COMPANY

Architectural Grilles of Perforated Metal and Perforated Metal Screens

GENERAL OFFICE AND PLANT
WYOMING, PA.

BRANCH OFFICES

ATLANTA, GA., 187 Spring Street, N. W.
BROOKLYN, N. Y., 26 Court Street
CINCINNATI, OHIO, 622 Broadway
DENVER, COLO., 504 Tabor Opera House Building
DETROIT, MICH., 4-230 General Motors Building
HAZLETON, PA., 227 East Broad Street
INDIANAPOLIS, IND., 136 No. Delaware Street
LOS ANGELES, CAL., 4200 Long Beach Avenue
NEW ORLEANS, LA., 2204 Jefferson Avenue
PHILADELPHIA, PA., 1015 Chestnut Street
PITTSBURGH, PA., 405 Penn Avenue
ST. LOUIS, MO., Paul Brown Building
WORCESTER, MASS., 9 May Street

Products

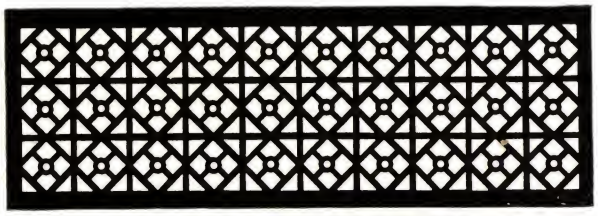
DIAMOND ARCHITECTURAL GRILLES in a completely diversified line of Period, Colonial, Modern and Conventional Designs, for every architectural purpose, and particularly suited for ventilating and recessed radiation.

DIAMOND MANUFACTRING COMPANY produces also a complete line of Perforated Metal Sizing Screens and Perforated Metals for Machinery Guards, Elevator Buckets, Conveyor Troughs, Flights and Light Structural Work.

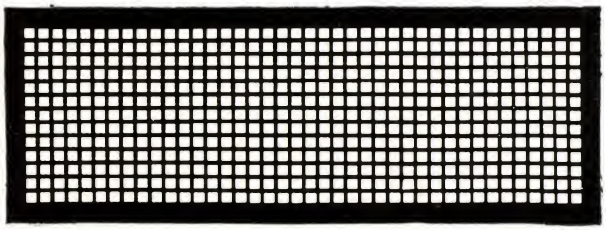
Details and Specifications

Typical examples of the ornamental architectural grilles produced by the DIAMOND MANUFACTURING COMPANY are pictured here. Although they are but a few of the many available designs, they are representative of the variety that can be furnished. All grilles are manufactured to specifications only; of any desired metal in thicknesses up to $\frac{3}{16}$ and $\frac{1}{4}$ in., and may be obtained in one piece up to 50 in. wide by 120 in. long; larger sizes in sections, paneled with stiffeners.

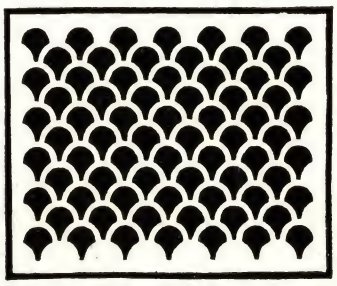
Grilles in combinations of various designs can be furnished, if desired, to meet individual requirements.



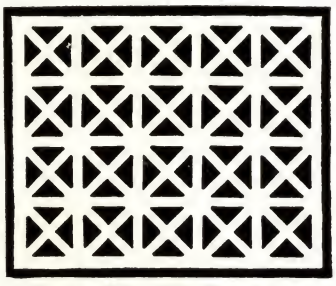
Design K-1—(Two Sizes)—66 and 70% Open Area



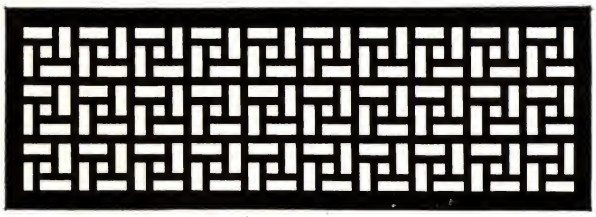
Design A-1—(16 Sizes)—45 to 83% Open Area



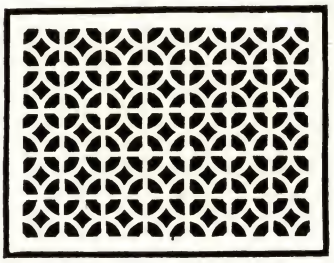
Design F-1—65% Open Area



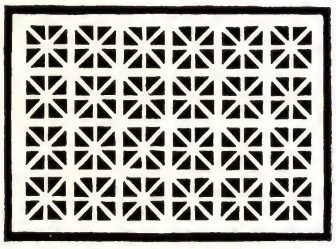
Design E-1—60% Open Area



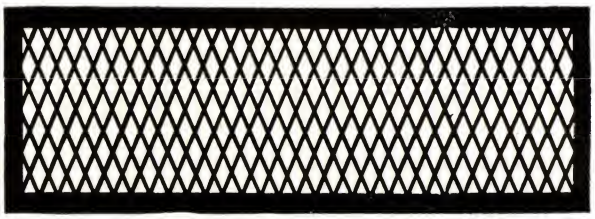
Design S-2—67% Open Area



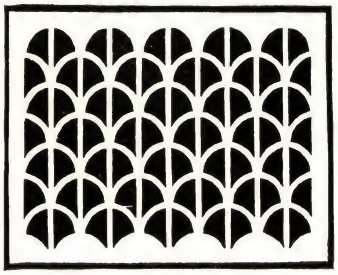
Design G-1—(Two Sizes)—50 and 60% Open Area



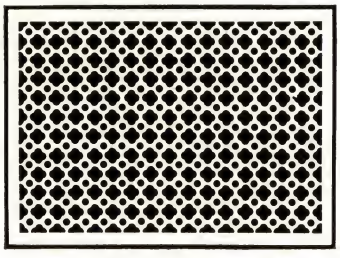
Design B-1—(Six Sizes)—28 to 57% Open Area



Design M-2—55% Open Area



Design H-2—67% Open Area



Design CL-2—60% Open Area

Descriptive Literature

Special bulletins are available on all designs, with open area tables and miniature blue prints to simplify figuring to specifications. These special bulletins will be furnished individually upon request, or the entire series covering all catalogued designs will be mailed, if desired, to provide a complete file of Diamond Architectural Grille designs in loose leaf form.

HART & COOLEY MANUFACTURING CO.

Manufacturers of Warm Air Registers, Ventilating Grilles and Registers

61 West Kinzie Street, CHICAGO, ILL.

FACTORIES: HOLLAND, MICH., NEW BRITAIN, CONN., NASHUA, N. H.

BRANCH OFFICES

NEW YORK, N. Y., 101 Park Avenue
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BOSTON, MASS., 75 Portland Street

PHILADELPHIA, PA., 1600 Arch Street
NEW BRITAIN, CONN.

Products

STEEL, SEMI-STEEL and ALL-CAST REGISTERS; STEEL and CAST REGISTER FACES and REINFORCED COLD AIR FACE PLATES; CEILING and SIDEWALL VENTILATORS; LOCK REGISTERS.

H&C

For our pages on Ventilating Grilles, stamped and cast, all designs, see Manufacturer's Index, Wm. Highton & Sons Division.

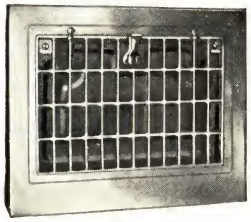
"H & C" Steel Registers—"The Air Capacity Line"

For actual free air opening in square inches of every "H & C" Register see complete catalogue

Registers for Gravity Installations

"H & C" Baseboard Register with Quickly Detachable Face—No. 150 Series—The face is perforated in oblong hole design retaining the conventional lattice fretwork but affording very large free area. Face is removable by quarter turn of locking buttons—no screwdriver required.

For either horizontal or vertical sidewall register for use with No. 150 series specify No. 345. For baseboard intakes for use with No. 150 series specify No. 655 or 605.



No. 150 Series

"H & C" Steel Cold Air Face, Class No. 255—Made in oblong hole design to facilitate the free flow of return air to the furnace. Adequate strength is assured by heavy braces permanently spot-welded to the face.

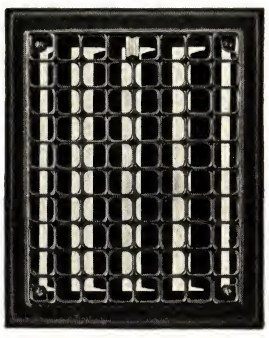
Class 255 Cold Air Face
Patented

Wide margins overlap opening—no countersinking or fastening in place necessary. Stock finishes—oak, black japan, oxidized copper. Low list prices compare favorably with cost of less substantial, less efficient, wood grilles.

"H & C" Floor Register, Class No. 200—Featured by the beautifully rounded pinched-back fretwork of the face. This *patented process* results in maximum openings for the free flow of air, greatly increased strength and striking beauty of design.

Rugged in construction, rigidly reinforced, unbreakable.

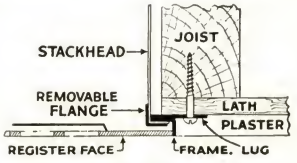
Louvres swinging on solid trunnions assure permanent ease of operation.



Floor Register Class No. 200
Patented

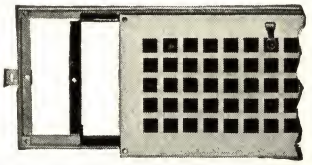
Registers for Forced Air Installations

"H & C" Forced Air Registers are much smaller, require less wall space and consequently are less conspicuous than those of the gravity type. The *three-piece construction* (illustrated), employed on both sidewall and baseboard type registers, is very desirable. Register frame and removable flange are installed when the stackhead is placed, and anytime after plastering the installation may be quickly completed by simply screwing the face in position. The flange automatically smoothes out any irregularities in the tin work and assures a snug installation free from any leaks or valve interference. "H & C" Forced Air Registers have heavy tight-closing valves which are guaranteed to remain in any position at any desired velocity.



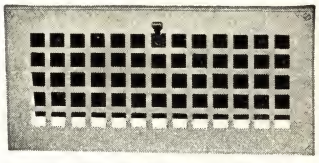
Three-piece Construction

No. 3351 Sidewall Register—This register sets flush with the plaster and may be installed either above the breathing line or just above the baseboard. Frame has a depth of ⅜ in.



No. 3351 Sidewall Register Frame, Flange and Face

No. 3151 Baseboard Register—This register is for use in the baseboard where the top of the register is desired to set flush with or project above the baseboard. Structurally it is similar to the sidewall type illustrated above. The frame depth all around is ⅞ in.



No. 3151 Baseboard Register

Sizes—Both sidewall (No. 3351) and baseboard (No. 3151) types, and also registers of similar design but without removable faces, may be had in any finish in the following flange or stackhead sizes:

10x4, 5 and 6 ins.
12x4, 5, 6, 8 and 10 ins.
14x4, 5, 6, 8 and 10 ins.
30x4, 5, 6 and 8 ins.

Send for complete circular with chart of recommended velocities for all conditions.

THE HARRINGTON & KING PERFORATING CO.

Grilles and Ventilators of Perforated Metal

MAIN OFFICE AND FACTORY
5647 Fillmore Street
CHICAGO, ILL.

TELEPHONE
Mansfield 1800

BRANCH OFFICE: NEW YORK, N. Y., 110 Liberty Street—Telephone, BArclay 7-0203

Products

ARCHITECTURAL GRILLES of PERFORATED WROUGHT METALS:

Grilles of Steel; White, Yellow, and Commercial Bronze; Brass; Monel Metal; Aluminum; and Stainless Steel.

We are also prepared to furnish Registers and Cast Grilles of standard and special designs.

Our Facilities

Fifty years of experience. A new and thoroughly modern shop. Skilled workmen, and a reputation for fine quality which we insist upon maintaining.

Publications Furnished Gratis—on Request

(a) "Grilles of Perforated Metal"—a combination handbook and catalogue. Shows actual size pictures of each design and gives tables of opening sizes for all dimensions. Contains valuable information for architect and engineer.

(b) "Grilframe—the new Grille Construction"—a booklet which tells through word and picture the complete story of Grilframe.

(c) "New Grille Designs"—a new brochure, just off the press, which illustrates new designs of modern motif.

Designs

All of the standard designs, some of which are shown on this and the following pages. Also an increasing selection of designs created in the modern motif especially for production in white metals.

Specificational Data

When writing specifications for our grilles please give the following information:

Dimensions—opening or over all.

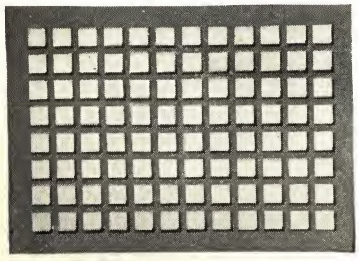
Design.

Metal—kind and gauge (No. 12 USS gauge is usual but we can furnish lighter or heavier).

Finish—Enamel (white, black or tinted), electroplated (to match any sample), prime coat, or natural shop finish. Bronze grilles finished natural either bright or dull or to match sample.

Screwholes, frames, handholes—indicate any special details required.

Grilles made of any of the white metals (aluminum, monel metal, stainless steel, or white bronze) can be furnished with a lustrous polish or a dull (brush) finish.



Plain Lattice Design

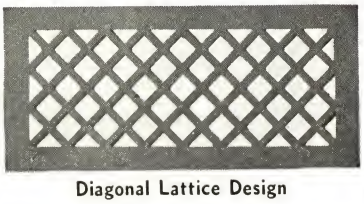
PLAIN LATTICE DESIGN

Size of hole, in.	Width of bridge, in.	Per cent open
½	3/16	53
½	¼	45
¾	¼	57
⅞	¼	60
1	¼	71
1¾	3/16	72

DIAGONAL LATTICE DESIGN

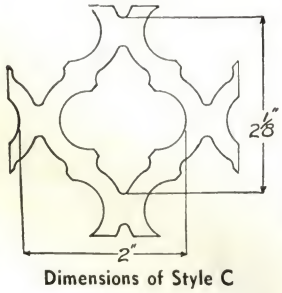
Size of hole, in.	Width of bridge, in.	Per cent open
½	3/16	53
⅞	¼	60

Half holes around the edge only when specified.

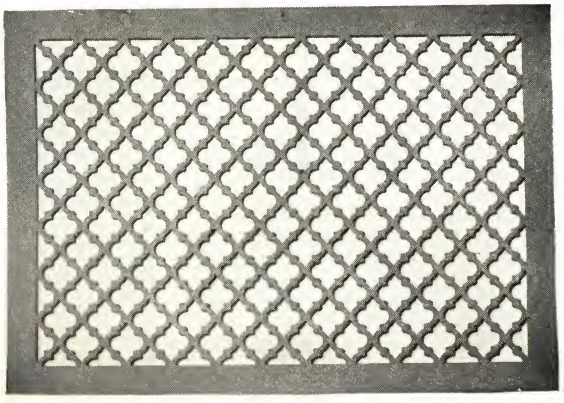


Diagonal Lattice Design

Grille Hinged in a Frame
We make all types of frames

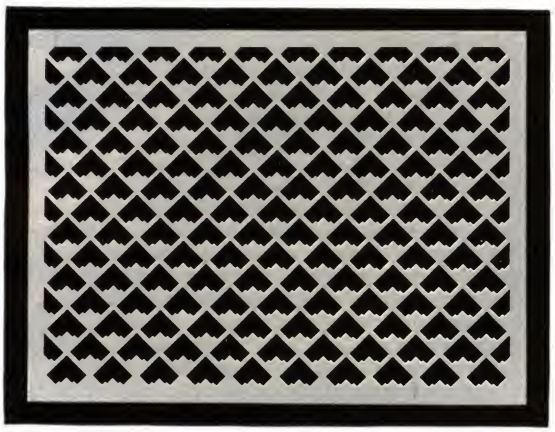


Dimensions of Style C



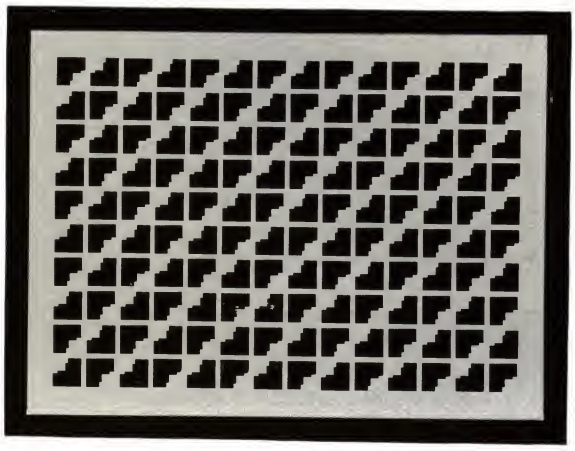
Style C 72% Open
A most attractive design with an unusual amount of open area

MODERN GRILLE DESIGNS



HK705 62% Open

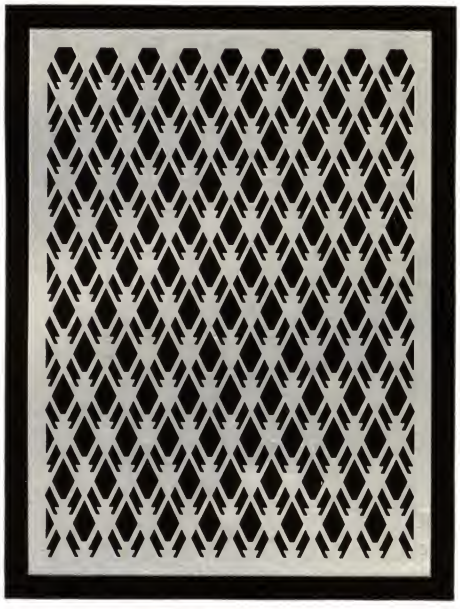
Scale in inches for all designs on this page



HK710 62% Open

The grille designs shown on this page have been created especially for production in the white metals such as Aluminum, Monel Metal, Stainless Steel, and White Bronze (nickel silver) as well as in ordinary steel and bronze.

The white metals are usually finished by a bright or dull polish. When made of common steel or bronze they can be painted, polished or electroplated in nickel or chromium.

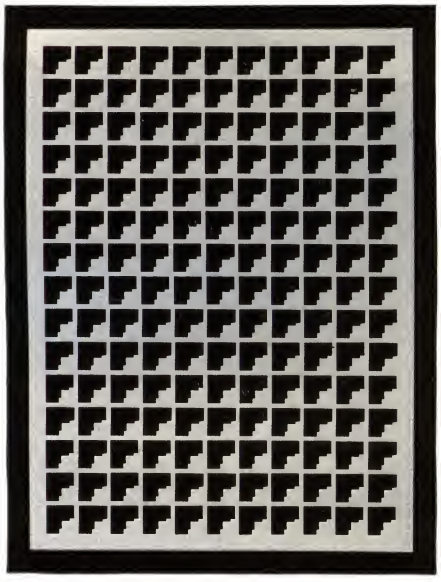


HK725 50% Open

The use of white metals in architectural decoration demanded new and suitable designs in keeping with the modern motifs.

To obtain such designs we sponsored a nation-wide contest among designers and supplemented it by the careful study of our own artists.

Additional designs are shown in our new brochure *New Grille Designs* sent upon request to any architect.



HK715 62% Open

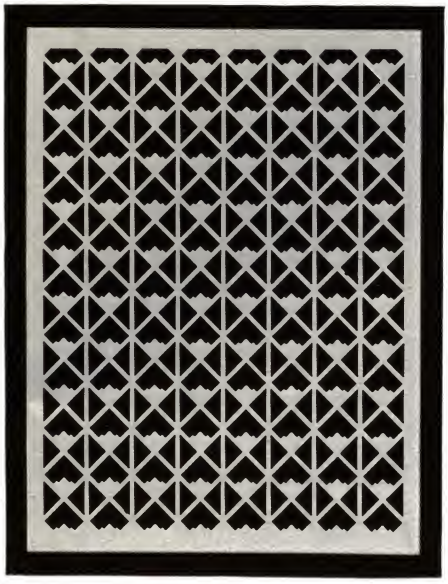
WHITE METALS

White metal is not a specific designation. In alphabetical order the usual so-called white metals are:

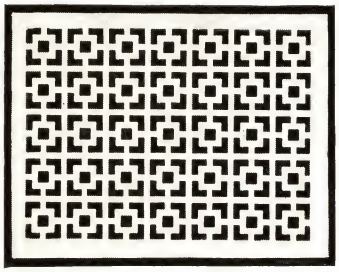
Aluminum
Monel Metal
Stainless Steel (chrome nickel alloys)
White Bronze (nickel silver)

The effect of a white metal can be obtained by nickelplating or what is better, chromium plating on steel, brass or copper—chromium to be enduring should be plated on nickel which should be on a natural or plated base of copper. Make your specifications definite to obtain satisfactory results.

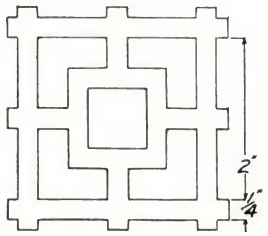
Designs illustrated on this page are covered by design patent applications

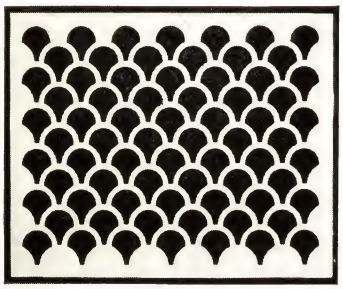


HK720 63% Open

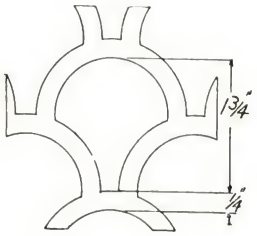


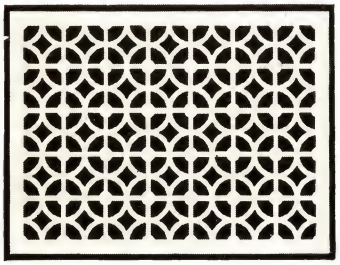
Style A
Square Link
52% Open



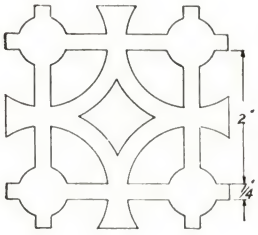


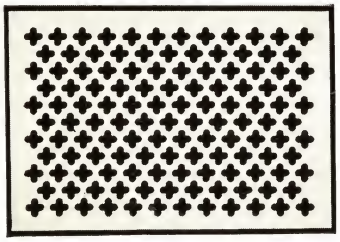
Style J
Fish Scale
65% Open



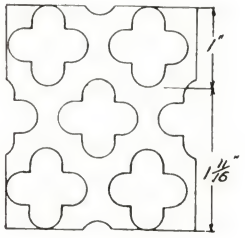


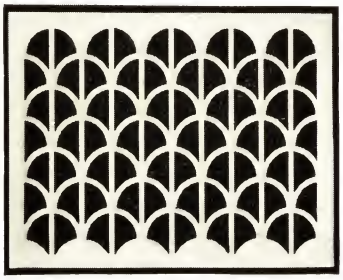
Style M
Moorish
50% Open



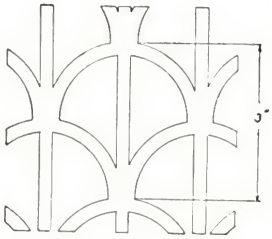


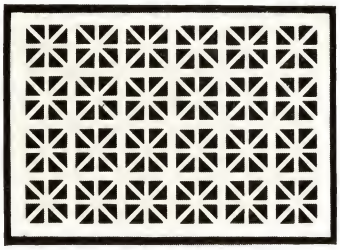
Style F
Clover Leaf
45% Open





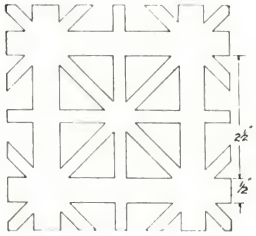
Style Q
Divided
Fish Scale
65% Open

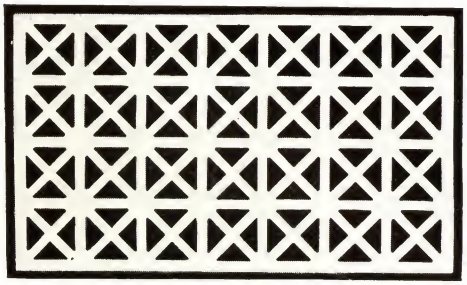




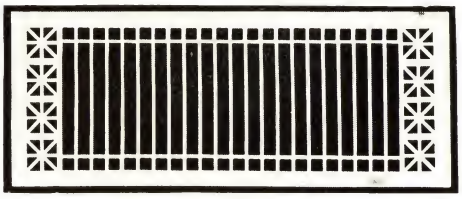
Style L
Union Jack
40% Open

Detail shows Style L design with a unit size of 2½ in. We have two other sizes of this design: L2, unit size 1¾, and L3, unit size 3 in.

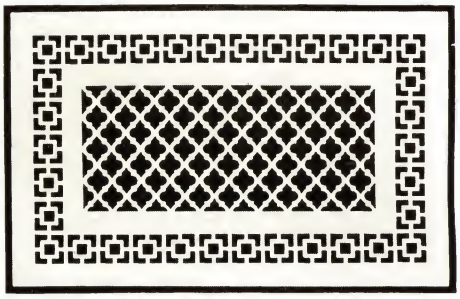




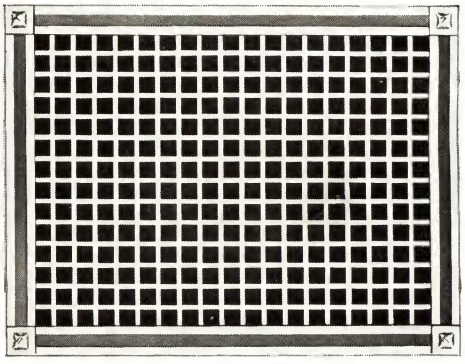
"Perfex" Design, 5/8 Actual Size
A beautiful, new, lacelike design which is extremely popular for radiator enclosures



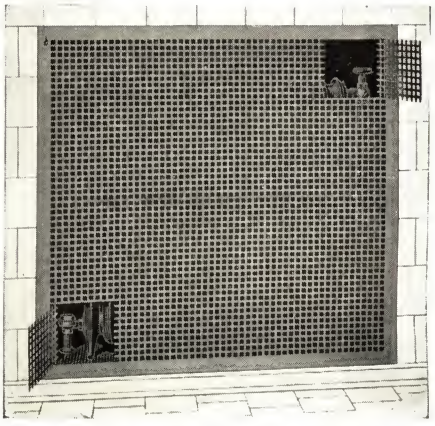
Style LT 71% Open



Style AC 65% Open



"Grilframe"
Any grille can be enhanced in decorative effect by this frame or moulding in place of the ordinary blank edge. Simply specify "Grilframe" construction. A sample corner with any grille design sent upon request.



Showing Handhole Openings Which Are Invisible When Closed

HITONCAST
GRILLES & REGISTERS

H&C
HIGHTON

CATALOGUE
No. 32

WM. HIGHTON & SONS
DIVISION OF
HART & COOLEY MFG. CO.

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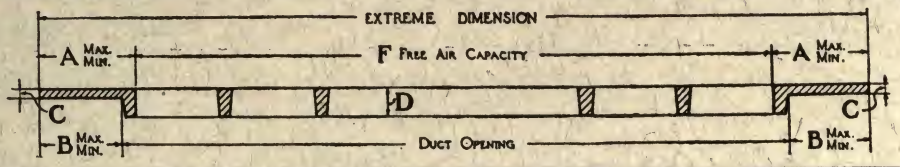
TABLE OF INFORMATION AND DATA ON CAST METAL GRILLES



Design No.	F, Free Air Capacity	Page No.	Approximate Size of Units, Inches		Maximum Size One Piece Cast, Inches		A, Inches (See above)		B, Inches (See above)		C, Inches Approx.	D, Inches	Percentage to be Added to Cost of Plain Lattice
			High	Wide	High	Wide	Max.	Min.	Max.	Min.			
1/2 Plain Lattice	45	14	.....	.....	30	48	1 1/4	1/2	1	1/4	5/32	3/8	20
3/4 Plain Lattice	57	14	.....	.....	60	60	1 1/2	1/2	1 1/4	1/4	5/32	3/8 to 5/8	
1/8 Plain Lattice	60	14	.....	.....	60	60	1 1/2	1/2	1 1/4	1/4	5/32	3/8 to 5/8	
25	58	10	2 1/4	2 1/4	48	40	1 1/4	1/2	1	1/4	5/32	7/16	25
29	58	9	4	4	60	60	1/2	1/2	1 1/4	1/4	5/32	7/16	25
35	54	12	2	2	60	48	1 1/4	1/2	1	1/4	5/32	7/16	25
36	54	12	1 15/16	1 15/16	60	48	1 1/4	1/2	1	1/4	5/32	7/16	75
37	81	11	3 15/16	3 15/16	60	48	1 1/4	1/2	1	1/4	5/32	1/2 to 5/8	50
39	74	11	3 7/8	3 7/8	60	48	1 1/4	1/2	1	1/4	5/32	1/2 to 5/8	25
44	65	6	.....	.....	60	30	1 1/4	1/2	1	1/4	5/32	3/8	50
45	52	9	1 7/8	1 1/2	60	36	1 1/4	1/2	1	1/4	5/32	7/16	50
50	57	13	3/4" Unit	3/4" Unit	50	50	1 1/8	1/2	7/8	1/4	5/32	7/16	25
59	60	10	3 1/4	3 1/4	50	40	1 1/2	1/2	1 1/4	1/4	5/32	7/16	50
62	75	10	4 1/4	4 1/4	60	48	1 1/4	1/2	1	1/4	5/32	7/16	25
62A	50	10	2 1/4	2 1/4	60	40	1 1/4	1/2	1	1/4	5/32	7/16	25
70	47	8	4 1/2	4 1/8	60	50	1 3/4	1/2	1 1/2	1/4	5/32	1/2	50
74	63	9	3 1/2	3	60	50	1 1/4	1/2	1	1/4	5/32	7/16	25
75	76	9	3	4	60	50	1 1/4	1/2	1	1/4	5/32	1/2	25
78	54	8	3	3	60	50	1 1/2	1/2	1 1/4	1/4	5/32	1/2	50
80	61	11	3 1/2	3 1/2	60	50	1 1/2	1/2	1 1/4	1/4	5/32	1/2	25
83	57	8	2 1/2	2 1/8	60	50	1 1/2	1/2	1 1/4	1/4	5/32	7/16	50
91	61	11	2 3/4	2 3/4	60	60	1 1/2	1/2	1 1/4	1/4	5/32	1/2	50
91A	65	11	3 1/4	3 1/4	60	50	1 1/2	1/2	1 1/4	1/4	5/32	1/2	50
93	53	9	2 13/16	2 1/2	60	40	1 1/4	1/2	1	1/4	5/32	7/16	50
98	45	9	1 3/16	1 1/2	48	18	1 1/4	1/2	1	1/4	5/32	7/16	50
105	75	15	Vary	Vary	36	8	1 1/4	1/2	1	1/4	5/32	7/16	25
110	60	12	3 1/2	3 1/8	48	36	1 1/4	1/2	1	1/4	5/32	3/8 to 5/8	50
130	60	9	2	2 1/4	48	36	1 1/4	1/2	1	1/4	5/32	1/2	50
130B	60	9	2	2 1/4	48	40	1 1/4	1/2	1	1/4	5/32	1/2	50
132	60	..	5/8" space 3/8" bar	.....	48	36	2	1/2	1 3/4	1/4	5/32	7/16	25
134	40	12	2 1/2	2 1/8	60	48	1 1/4	1/2	1	1/4	5/32	3/8	50
135	60	..	5/8" space 3/8" bar	.....	48	36	1 1/2	1/2	1 1/4	1/4	5/32	7/16	25
140	57	12	1 1/2	1 1/2	60	40	1 1/4	1/2	1	1/4	5/32	7/16	50
145	62	9	2	2	50	40	1 1/4	1/2	1	1/4	5/32	7/16	50
146	54	8	2 1/2	5	60	50	1	1/2	3/4	1/4	5/32	3/8	50
148	70	11	1 5/8	2 5/8	60	50	1 3/8	1/2	1 1/8	1/4	5/32	3/8 to 5/8	25
149	61	12	4	4	36	24	1 1/4	1/2	1	1/4	5/32	7/16	75
150	77	11	3	4 3/4	60	50	1	1/2	3/4	1/4	5/32	3/8 to 5/8	25
152	50	12	1 7/16	1 7/16	60	40	1	1/2	3/4	1/4	5/32	1/2	50
152A	50	13	1 7/16	1 7/16	60	40	1 1/4	1/2	1	1/4	5/32	7/16	75
155	52	12	2	2 1/16	60	50	1 1/4	1/2	1	1/4	5/32	7/16	50
155A	52	12	1 3/4	1 3/4	60	50	1	1/2	3/4	1/4	5/32	1/2	50
157	50	12	1 3/4	1 3/4	60	40	1	1/2	3/4	1/4	5/32	1/2	50
160	63	12	3	2 1/8	60	50	1 1/4	1/2	1	1/4	5/32	7/16	50
201	63	9	2 1/4	2 1/4	60	40	1 1/4	1/2	1	1/4	5/32	3/8	50
210	45	..	.....	Special Model	18	36	1 1/4	1/2	1	1/4	5/32	3/8 to 5/8	50
215	55	7	.....	Special Model	24	36	1 1/4	1/2	1	1/4	5/32	3/8	50
218	40	13	.....	Special Model	36	18	1 1/4	1/2	1	1/4	5/32	3/8 to 5/8	50
222	50	10	2 7/8	2 7/8	60	50	1 1/2	1/2	1 1/4	1/4	5/32	7/16	25
250	55	..	.....	Special Model	36	24	1	1/2	3/4	1/4	5/32	7/16	25
261	60	8	7 5/8	9	36	48	1 1/2	1/2	1 1/4	1/4	5/32	3/8 to 5/8	50
263	48	12	4 1/2	4 1/2	60	50	1 1/2	1/2	1 1/4	1/4	5/32	7/16	50
303	66	10	2 7/8	2 7/8	60	30	1 1/4	1/2	1	1/4	5/32	3/8	25
321	60	10	2	2	60	48	1 1/4	1/2	1	1/4	5/32	1/2	50
333	47	8	2 1/16	2 11/16	60	30	1 1/8	1/2	7/8	1/4	5/32	3/8	50
391	30	8	3 1/4	6	60	50	1 1/2	1/2	1 1/4	1/4	5/32	7/16	50
399	47	12	2 1/2	2 1/2	60	50	1 1/2	1/2	1 1/4	1/4	5/32	7/16	50
403	54	9	3 3/16	2 3/4	60	50	1 1/4	1/2	1	1/4	5/32	7/16	25
407	60	9	2 7/16	2 7/16	60	30	1	1/2	3/4	1/4	5/32	3/8	50
407A	65	..	3	3	60	30	1	1/2	3/4	1/4	5/32	3/8	50
442	74	8	3	3 1/2	60	50	1 1/4	1/2	1	1/4	5/32	7/16	50
450	62	12	4 1/8	2 13/16	36	24	1 1/4	1/2	1	1/4	5/32	1/2	50
460	72	11	3 1/4	6	60	50	1 3/4	1/2	1 1/2	1/4	5/32	1/2	50
485	60	11	3	6	60	60	1 1/4	1/2	1	1/4	5/32	1/2	50
485B	50	11	2	3 1/4	60	50	1	1/2	3/4	1/4	5/32	3/8	50
486	55	7	3	2 1/2	60	50	1 1/4	1/2	1	1/4	5/32	3/8	50
500	50	8	2 3/4	2 3/4	60	40	1 1/8	1/2	7/8	1/4	5/32	3/8	50
528	48	10	4 1/4	4 1/4	60	30	1 1/2	1/2	1 1/4	1/4	5/32	1/2	50
660	65	7	2	5	18	48	1 1/2	1/2	1 1/4	1/4	5/32	1/2	25
607	66	8	3 1/4	3 7/8	48	18	1 1/4	1/2	1	1/4	5/32	7/16	50
732	64	11	4	5 11/16	60	50	1	1/2	3/4	1/4	5/32	7/16	75
740	59	10	4 3/16	4 3/16	60	48	1 1/4	1/2	1	1/4	5/32	7/16	25
752	42	10	4 1/4	4 1/4	60	48	1 1/2	1/2	1 1/4	1/4	5/32	3/8	50
752A	40	10	3 1/16	3 1/16	60	40	1 1/2	1/2	1 1/4	1/4	5/32	3/8	50
752B	46	10	5 5/8	5 5/8	60	50	1 1/2	1/2	1 1/4	1/4	5/32	3/8	50
760	58	10	5 1/4	5 1/4	60	40	1 1/4	1/2	1	1/4	5/32	7/16	25
810	60	6	.....	Special Model	48	30	1	1/2	3/4	1/4	5/32	7/16	50
815	58	13	.....	Special Model	48	30	1	1/2	3/4	1/4	5/32	7/16	50
820	50	6	.....	Special Model	36	24	1 1/4	1/2	1	1/4	5/32	7/16	50
825	55	7	6	4 1/2	48	30	1 1/4	1/2	1	1/4	5/32	7/16	50
830	55	7	6	4 1/2	48	30	1 1/4	1/2	1	1/4	5/32	7/16	50
900	40	..	.....	Special Model	36	24	1	1/2	3/4	1/4	5/32	7/16	50
902	40	6	.....	Special Model	36	24	1	1/2	3/4	1/4	5/32	7/16	60
905	70	6	.....	Special Model	18	70	1 1/4	1/2	1 1/4	1/4	5/32	1/2	50
906	60	6	.....	Special Model	24	36	1 1/8	1/2	7/8	1/4	5/32	7/16	25
909	38	7	.....	Special Model	12	40	3/4	1/2	1/2	1/4	5/32	3/8	50
910	65	7	2	1 1/2	60	50	1 1/4	1/2	1	1/4	5/32	7/16	50
911	60	7	2	2	60	50	1 1/4	1/2	1	1/4	5/32	7/16	50
912	40	7	2 1/2	2 1/2	60	24	1 1/2	1/2	1 1/4	1/4	5/32	1/2	50
913	35	7	4	4 1/2	60	24	1	1/2	3/4	1/4	5/32	7/16	75
914	50	10	4	4	60	50	1 1/4	1/2	1	1/4	5/32	7/16	50
982	44	11	4 1/2	4 1/2	60	50	1 1/2	1/2	1 1/4	1/4	5/32	1/2	50

WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

SEVENTY-FOUR YEARS OF QUALITY AND SERVICE

PRODUCERS OF

ORNAMENTAL GRILLES IN CAST OR STAMPED METALS, VENTILATING REGISTERS, RADIATOR ENCLOSURES, VENTILATORS OF STOCK OR SPECIAL DESIGNS, FRAMES, ETC.

Completeness of Our Line

In this Catalogue are illustrated, *as far as we know,* the largest and most complete line of Ornamental Grilles and Ventilating Registers in Cast as well as Wrought metals ever obtainable from any single source.

Materials in Which Our Products Are Made

Due to increased facilities, we can now furnish grilles and registers in Cast Iron, Steel, Brass or Bronze, Aluminum Alloys, Monel Metal and Benedict Nickel.

For complete information pertaining to Cast Grilles refer to the table shown on the inside cover of this catalogue. For information pertaining to Stamped Grilles refer to page 18.

A Satisfactory Service to the Architect

Our chief aim is to completely satisfy the Architect or Engineer and their clients. Careful attention is therefore given every order to insure our customers of first-class work in every respect as to design, manufacture and finish—in other words Hitoncast Quality. Special care has been given to the designs illustrated to combine both beauty of decoration with the maximum allowance of free air capacity.

When Specifying or Ordering We Suggest

First.—State that all cast or wrought grilles and registers shall be as manufactured by Highton —H&C, New Britain, Conn.

Second.—State if grille or register (a grille is a flat plate without louvers) (a register consists of the grille with box and movable louvers).

Third.—State material — cast iron, brass, bronze, aluminum, Monel Metal or Benedict Nickel.

Fourth.—State design—using our numbers for "Hitoncast" designs, or to be made to Architect's special details. A specification for "Hitoncast" means hand chased for perfection of lines and clearness of design.

Fifth.—State size, bearing in mind that dimensions given will be considered, "duct or opening sizes" unless otherwise stated, allowing approximately 1 inch margins all around. If extreme sizes are necessary, they must also be specified.

Sixth.—State use—whether floor, wall or ceiling. Extra heavy castings are provided for floor use.

Seventh.—Any type of electroplated, lacquered or paint finish can be furnished but the exact finish required must be specified. Use our list of finishes. See page 14.

Eighth.—State construction and method for fastening, using the number of the detail method as shown on pages 29 or 30.

COMPARATIVE COSTS OF CAST METAL GRILLES
Are Given as an Aid to the Architect and Engineer

For the first time in the history of the grille and register business, Highton H & C are attempting herewith as part of their service to the profession, to give the Architect and Engineer an approximate idea of the comparative cost of various designs of Cast Metal Grilles.

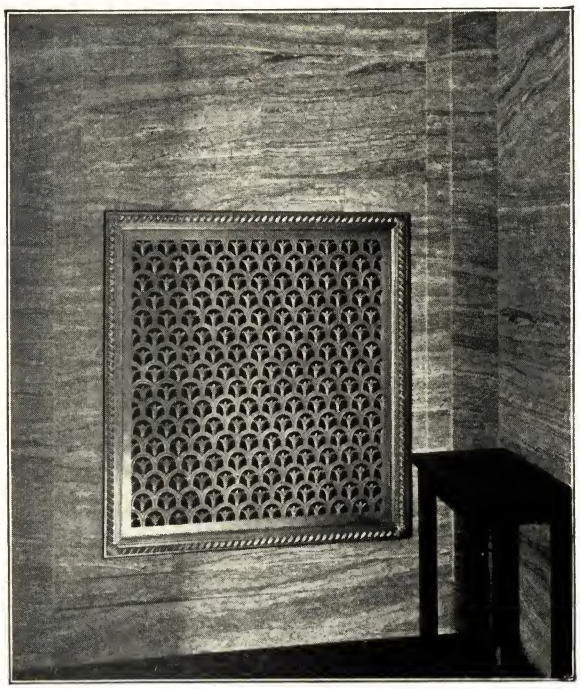
Base Price for Cast Iron Grille—Cast Iron Grilles of a Plain Lattice design is used as a base of comparison for all other cast metal grilles and is priced approximately at $3.00 per square foot. In the table on the inside of the front cover is a column of Comparative Price "Percentage to be added to the cost of plain lattice." This column lists the percentage for each design which is to be added to the per square foot price of plain lattice design. For example, No. 500 design lists 50 per cent, plain lattice at $3.00 plus 50 per cent would value $4.50 per square foot, the approximate cost of this design.

Base Prices for Other Metals—In Cast Bronze or Brass the base price would be $7.50 per square foot for Plain Lattice, for Cast Aluminum, $6.00 per square foot, but the percentage to be added to these prices for special design will be the same as cast iron figured on the base prices given for the different metals used.

It must be distinctly understood that the prices given are but approximate only and are merely given for the convenience of a comparative cost of different designs.

On pages 21 and 22 will be found comparative prices of various sizes of registers in the various finishes. Also on page 23 will be found list prices of the new Straight Flow and Volume Control McKnight Register.

"HITONCAST" INSTALLATIONS



Quincy Mutual Fire Insurance Building, Quincy, Mass.
SHEPHARD & STEARNS, *Architects*

Unusually Large Registers Shown Below

The "Hitoncast" Installation below illustrates plain lattice design registers. Note the very large center register which is twice as big as the two end registers that are in themselves of a large dimension. A special construction was devised whereby two register boxes are attached to a large single face so that a pleasing effect from the front is obtained. Highton—H&C as part of their service offer to assist you in solving any of your grille or register problems.

Hendricks Memorial Chapel, Syracuse University, Syracuse, N. Y.
JOHN RUSSELL POPE & JAMES DWIGHT BAUM, *Architects*

"Hitoncast" Designs in Special Borders

Illustration above shows how a "Hitoncast" design may be worked into a heavy ornamental frame or border. Frames for grilles are often required in a formal setting in order to give a better scale to an exceptionally large grille and to add architectural interest.

Quincy Mutual Fire Insurance Building, Quincy, Mass.
SHEPHARD & STEARNS, *Architects*

"Hitoncast" Grilles in Special Metals

"Hitoncast" Grilles can be made in any design or any metal suitable for construction purposes. "Hitoncast" reputation was not made in a day but has steadily gained ground during the past seventy-four years. A "Hitoncast" specification means therefore Quality both as to design and workmanship, and insures the Architect of the best.

"HITONCAST" INSTALLATIONS

Grilles in a Gothic Design

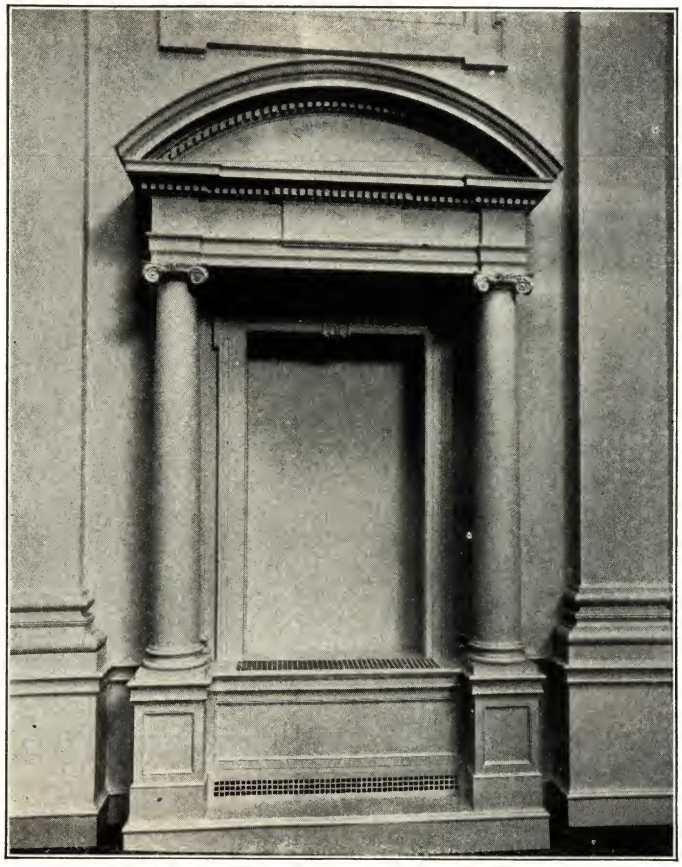
The view at the right is of the interior of St. Paul's Episcopal Church in Philadelphia, showing the special "Hitoncast" Grilles in the high wainscoting which encloses the radiators. A long, narrow plain design grille, of large free air capacity, acts as an efficient intake at the floor level. It will be seen how well the grilles fit in with the character of the architecture of the church.

St. Paul's Episcopal Church, Philadelphia, Pa.
ZANTZINGER, BORIE & NEDARY, *Architects*

"Hitoncast" Grilles Also Used on the High Seas

The photograph at the left shows some of the special design grilles made to the architect's details for the main first class lounge of the S.S. "President Hoover." These larger grilles were cast to follow the face of the coved section of the ceiling above the cornice. The grilles illustrate only one of the many conditions we are prepared to take care of in our fully equipped and modern plant.

We are always glad to confer with architects and engineers in regard to any special problem they may encounter and to help solve them to their satisfaction.



Hendricks Memorial Chapel, Syracuse University, Syracuse, N. Y.
JOHN RUSSELL POPE & JAMES DWIGHT BAUM, *Architects*

"HITONCAST" INSTALLATIONS

Beauty in Simplicity

The extreme simplicity and beauty of the Plain Lattice design "Hitoncast" Grilles in the illustration at the left show how well they tie in with the quietness and dignity of the architecture.

Special designs may be selected to harmonize with various schools of architecture, but there is rarely anything more effective than a plain lattice design with the proper size openings.

The illustration shown is from a photograph of the beautiful Hendricks Memorial Chapel, Syracuse University, Syracuse, N. Y., in which Highton—H&C grilles and registers are installed.

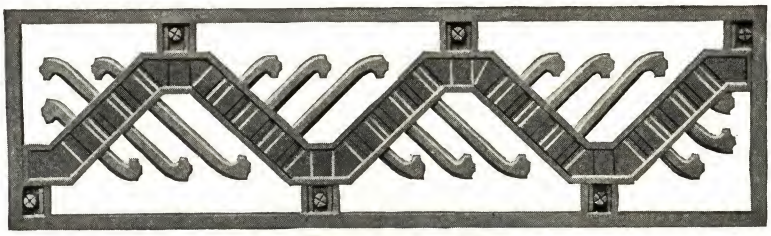
"Hitoncast" Radiator Enclosures

The rigid construction of "Hitoncast" Radiator Enclosures makes them especially appropriate for Schools, Banks, Hotel or Theatre Lobbies, Auditoriums, and such places where many people would be passing, and where stability as well as beauty are the prime requisites. Radiator Enclosures may be made in either Wrought or Cast Metals, and in any design selected. The enclosures shown at the right are installed in the Austin Senior High School, Chicago, Ill.

Austin Senior High School, Chicago, Ill.
CHICAGO BOARD OF EDUCATION, *Architects*

NEWLY CREATED "HITONCAST" GRILLE DESIGNS

Highton - H&C are constantly adding new designs to the already elaborate list, and on this and the following page are shown a number of the newest ones which have been created during the past year. Besides the designs shown, Highton - H&C are now so equipped as to furnish any design made up to Architects' special details.



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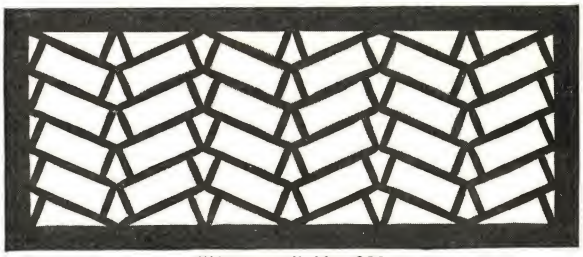

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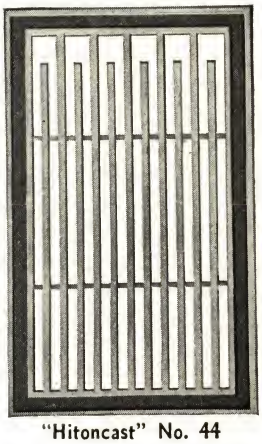

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"Hitoncast" No. 916

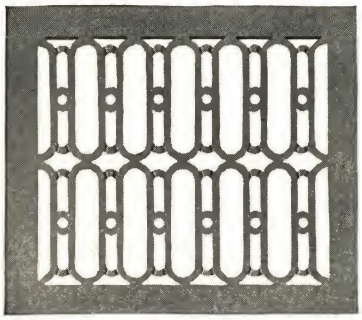
"Hitoncast" No. 906

"Hitoncast" No. 917

"Hitoncast" No. 902

For Full Information Regarding Free Area, Sizes, Comparative Cost, Etc., See Inside Front Cover

NEWLY CREATED "HITONCAST" GRILLE DESIGNS



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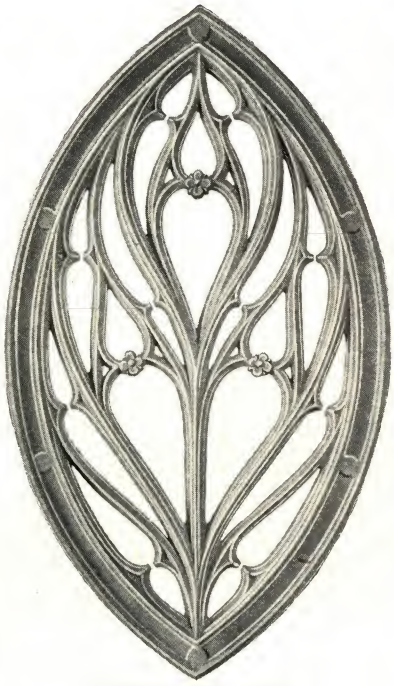

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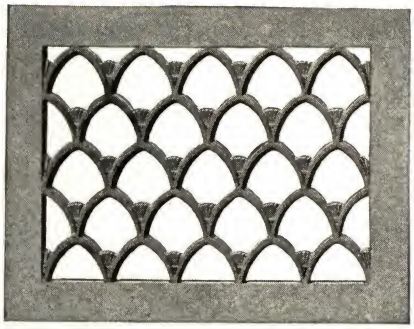

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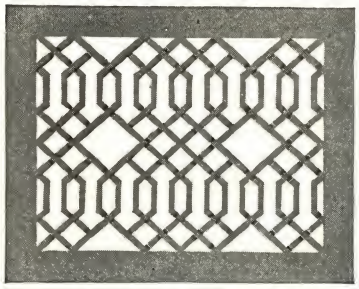

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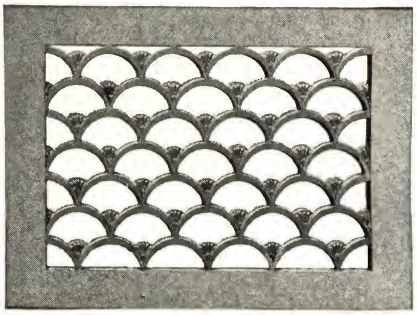

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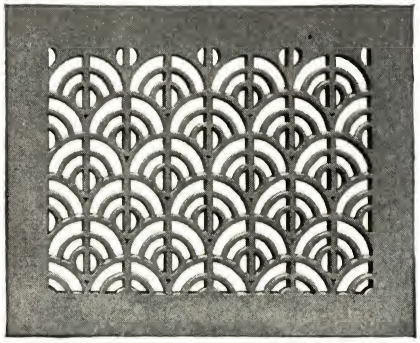

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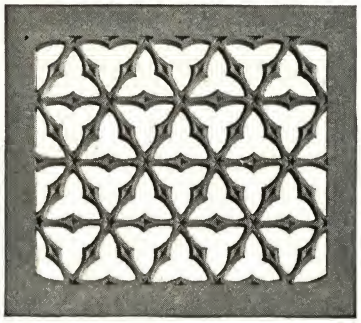

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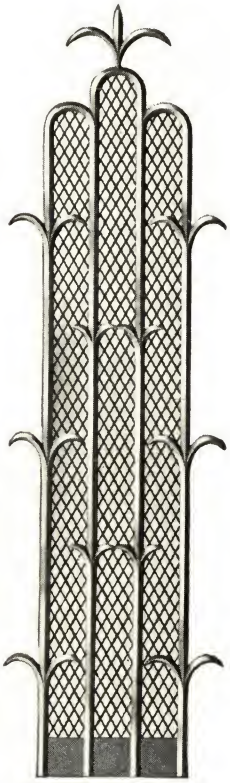

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For Full Information Regarding Free Area, Sizes, Comparative Cost, Etc., See Inside Front Cover

WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

"HITONCAST" QUALITY GRILLES

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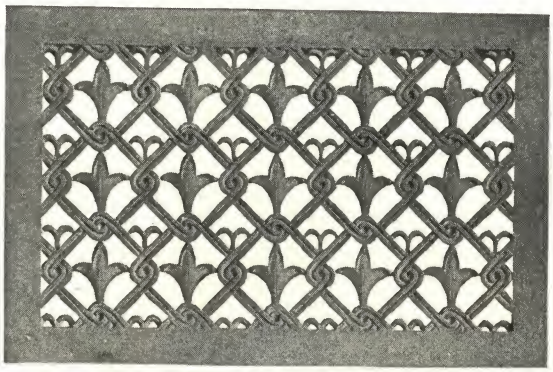

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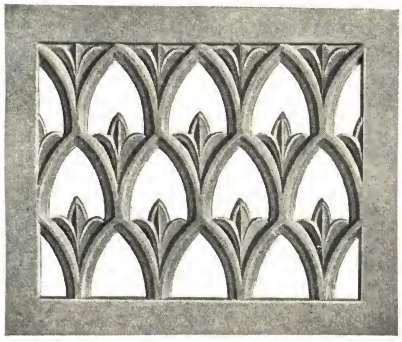

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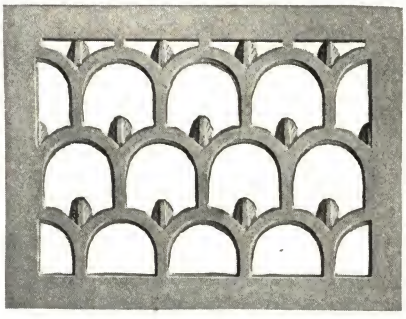

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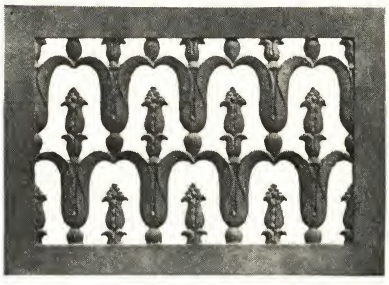

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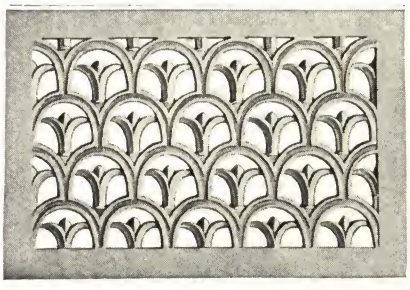

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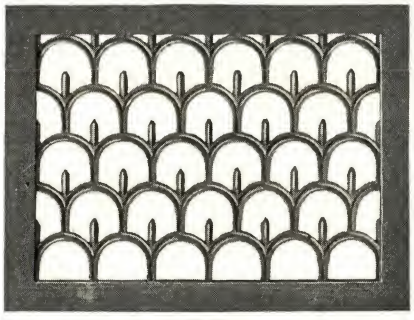

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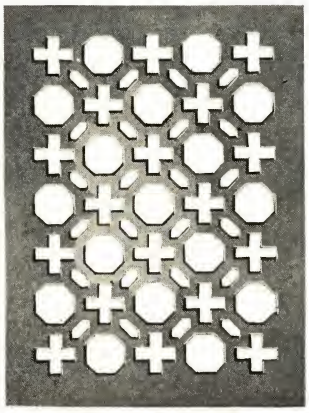
For Full Information Regarding Free Area, Sizes, Comparative Cost, Etc., See Inside Front Cover

WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

"HITONCAST" QUALITY GRILLES



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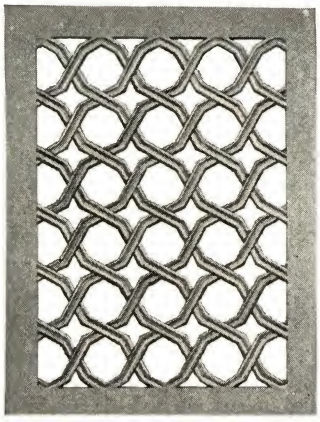

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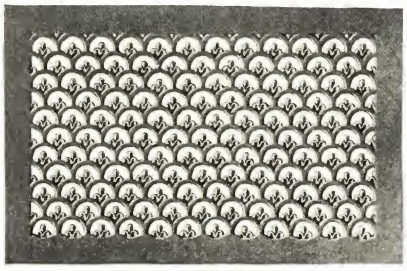

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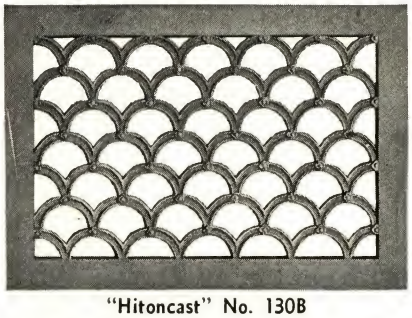

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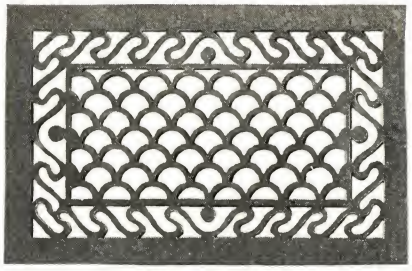

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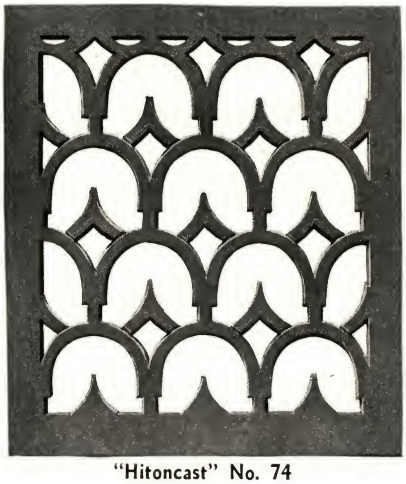

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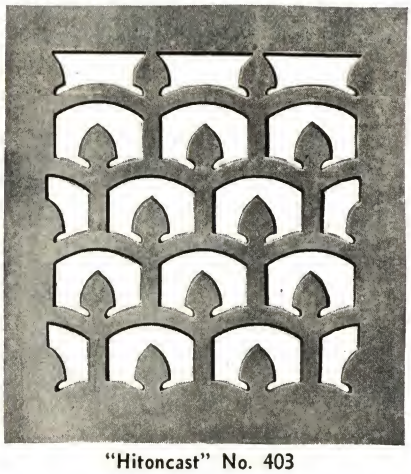

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For Full Information Regarding Free Area, Sizes, Comparative Cost, Etc., See Inside Front Cover

WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

"HITONCAST" QUALITY GRILLS

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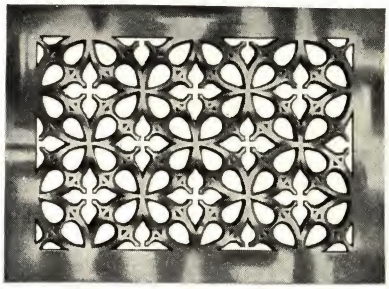

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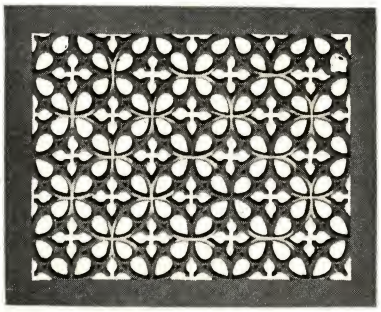

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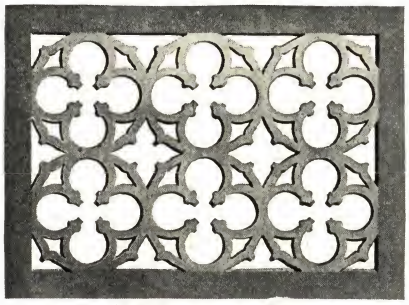

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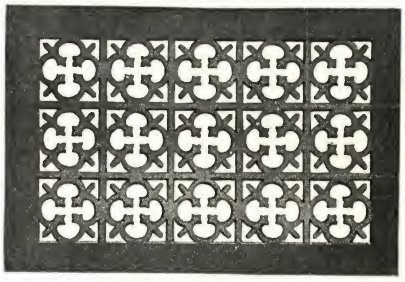

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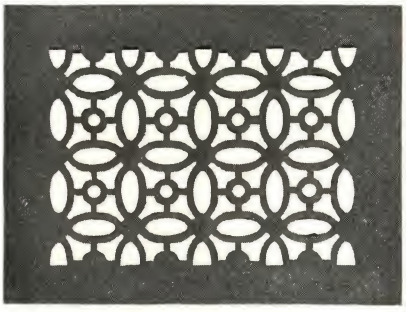

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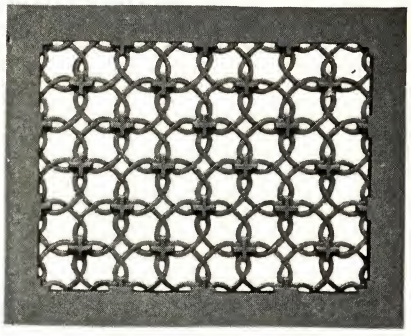

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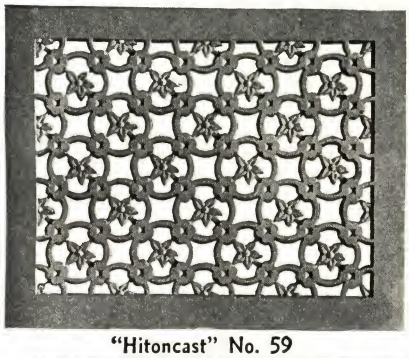

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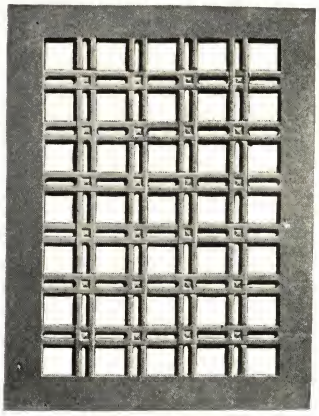

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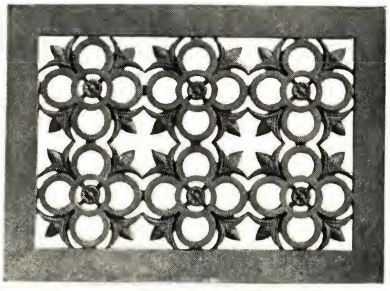

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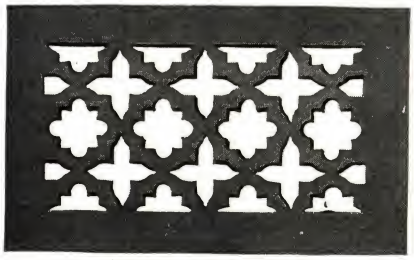
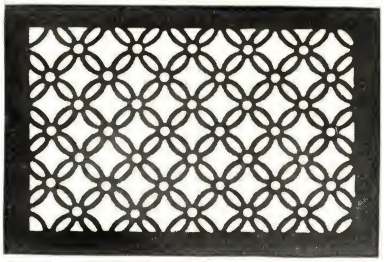


"Hitoncast" No. 222

Highton—H & C have prepared full size blue print details of approximately forty of the most popular designs. A complete set of these details will be gladly sent without charge upon receipt of such request.

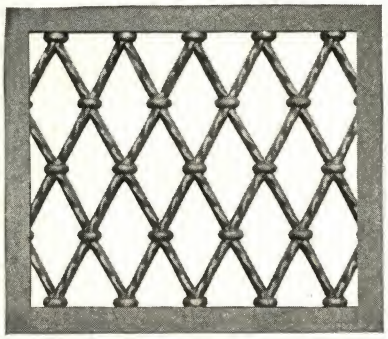


"Hitoncast" No. 25

For Full Information Regarding Free Area, Sizes, Comparative Cost, Etc., See Inside Front Cover

WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

"HITONCAST" QUALITY GRILLES



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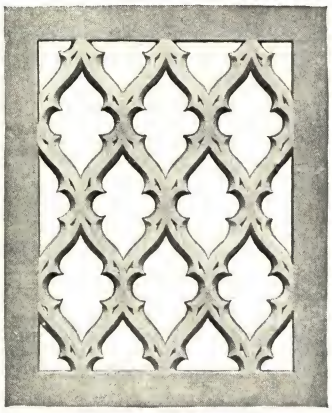

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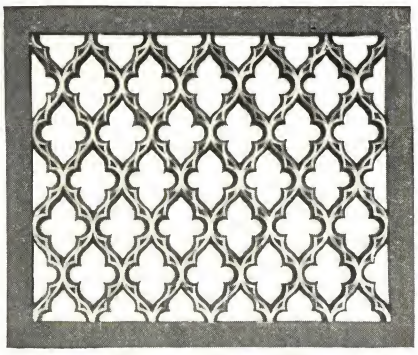

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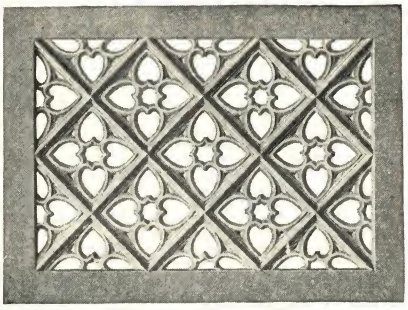

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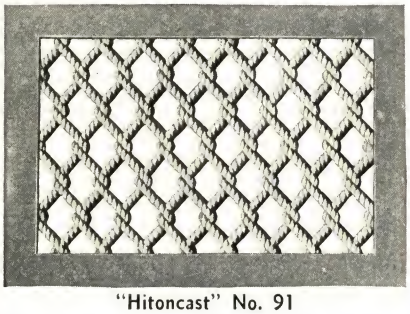

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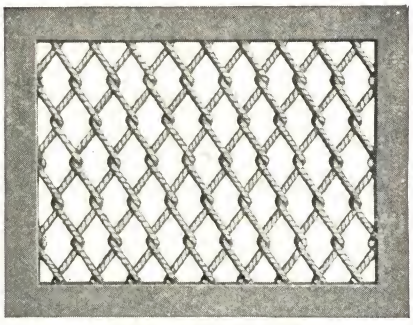

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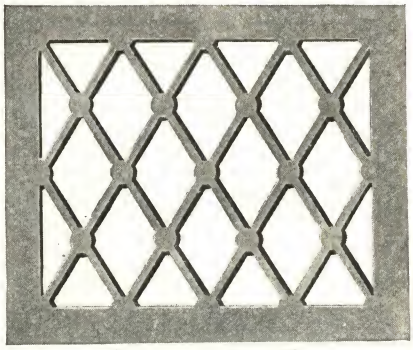

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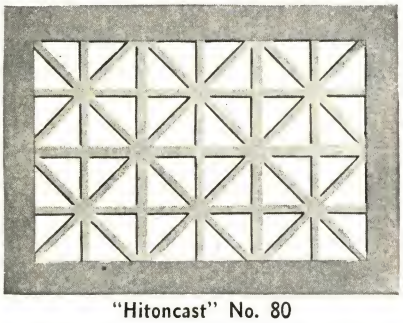

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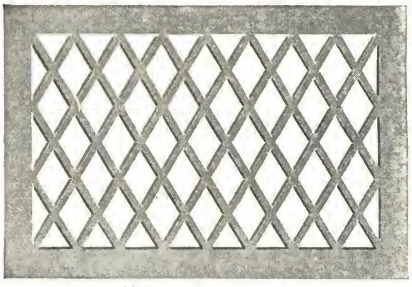

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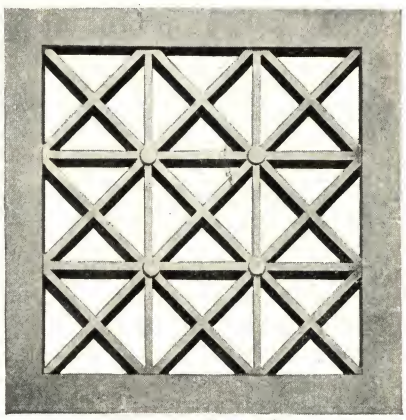

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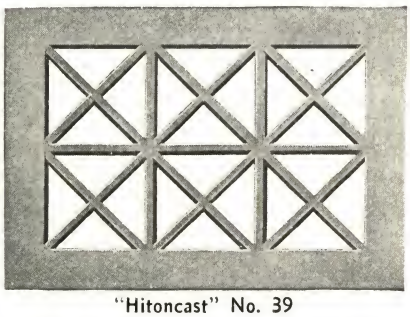

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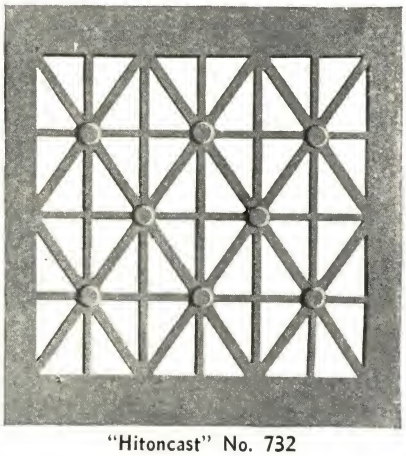
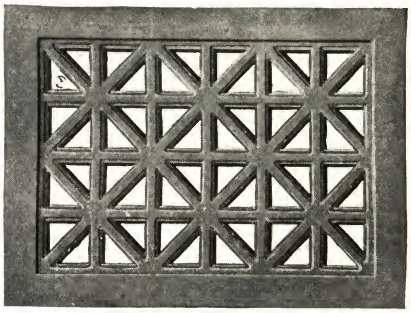


"Hitoncast" No. 732

For Full Information Regarding Free Area, Sizes, Comparative Cost, Etc., See Inside Front Cover

WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

"HITONCAST" QUALITY GRILLES



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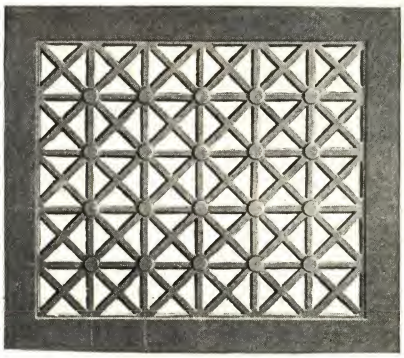

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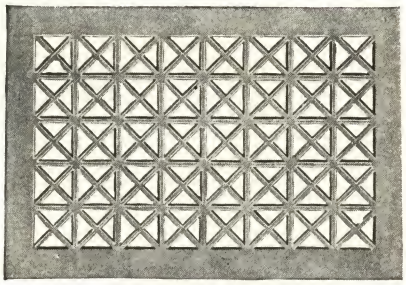

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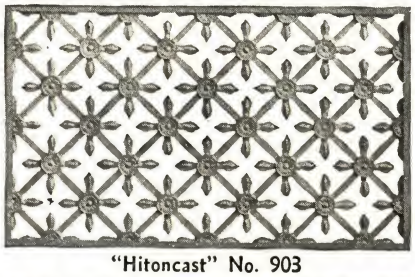

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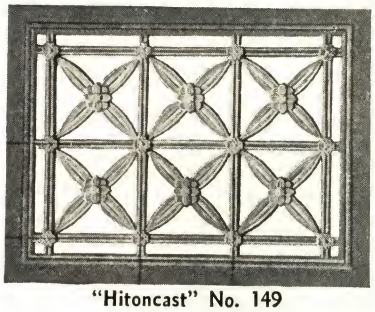

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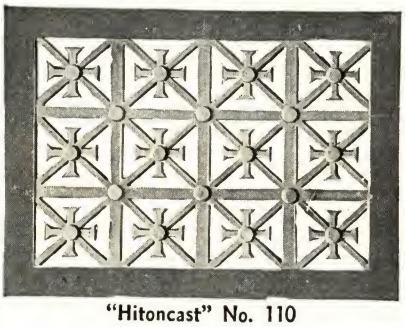

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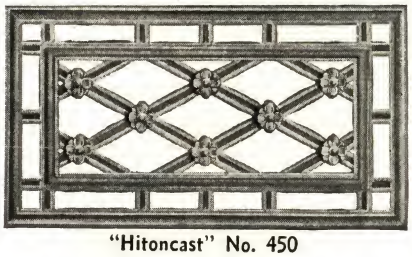

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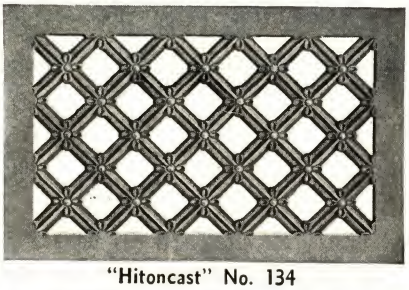

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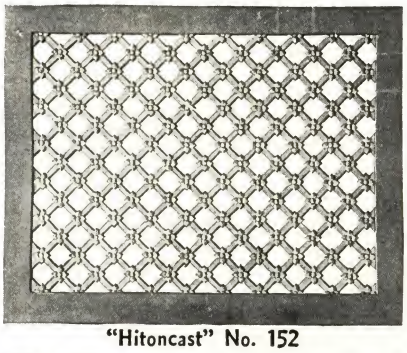

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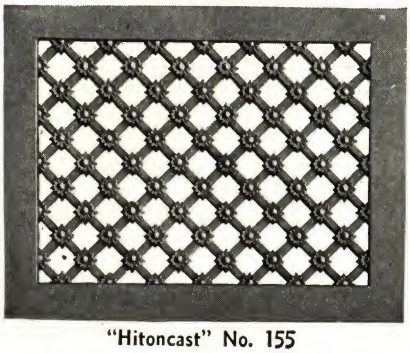

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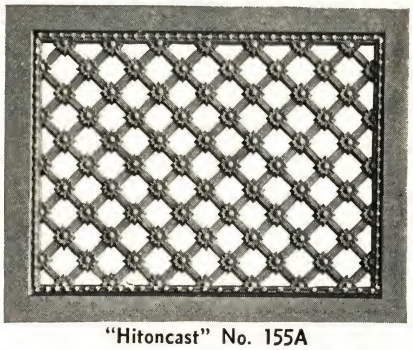
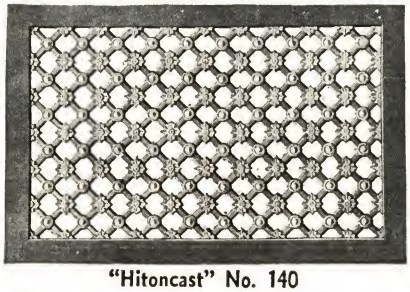


"Hitoncast" No. 155A

"Hitoncast" No. 160



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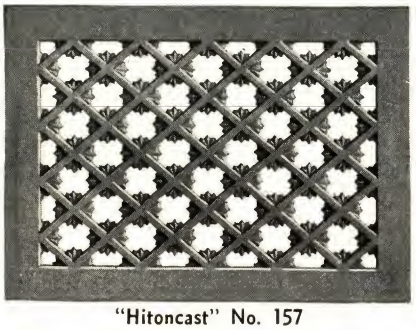
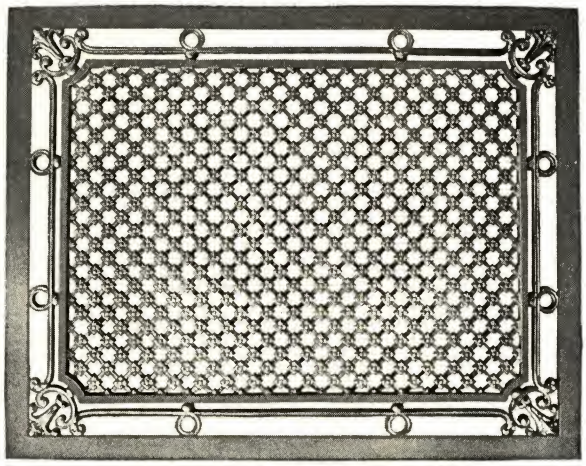


"Hitoncast" No. 157

For Full Information Regarding Free Area, Sizes, Comparative Cost, Etc., See Inside Front Cover



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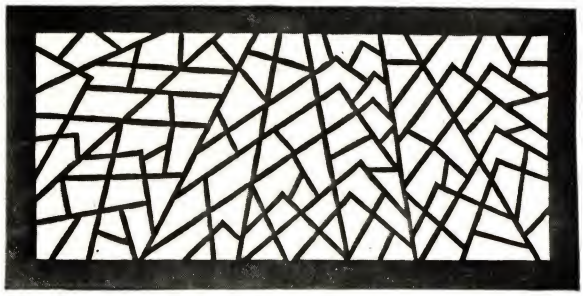
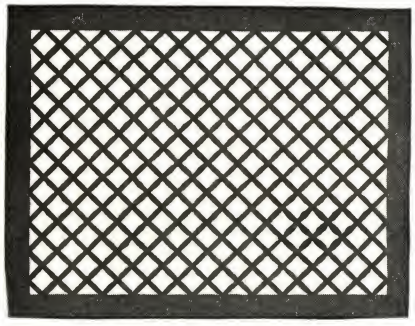


"Hitoncast" No. 815

"Hitoncast" No. 218



"Hitoncast" No. 50

QUALITY IN CAST GRILLES

A Few Helpful Suggestions to Architects Regarding the Factors Determining Quality

A Hitoncast Quality Cast Grille

This illustration shows a grille finished to Highton-H&C specifications for quality grilles. The front and back surfaces are perfectly smooth and flat, and moulded surfaces are all hand-chased. All edges are sharp and clean. Grille is given a priming coat of paint.

A Poor Quality Cast Grille

A type sometimes installed if supervision is not strict. This grille is just as it comes from the sand mould. It is not ground, hand-chased or finished in any way.

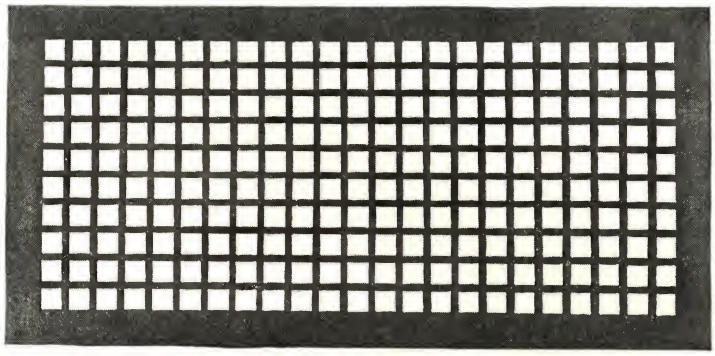
PLAIN LATTICE CAST METAL DESIGNS

Made in Cast Iron, Brass, Bronze, Aluminum, Monel Metal, and Other Metals

Standard Mesh Opening Approximately 7/8 Inch

Patterns are carried in stock in the standard mesh for all sizes listed below. For list price see pages 21 and 22. Standard sizes must have overall dimensions as given in the table.

Plain lattice grilles can also be furnished in ½ inch, ¾ inch, 1½ inch and other meshes to order.



Important

When a grille is specified it is furnished with the full, clear opening as shown in the illustration on this page. A register face has corner quadrants and a cut-out for the wheel slot. The cost of a register face is somewhat less and should not be confused with or substituted for a grille.

TABLE OF STANDARD SIZES OF PLAIN LATTICE GRILLES WITH 7/8-IN. MESH

Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.
4x6	5¼ x 7¼	6x32	7 11/16 x 33 5/8	9x30	10 7/8 x 31 13/16	12x48	14 1/16 x 50	18x27	20 5/16 x 29 5/16	24x42	26 3/8 x 44 3/8
4½x6½	5⅝x7⅝	6x36	7 11/16 x 37 5/8	9x32	10 7/8 x 33 13/16			18x28	20 5/16 x 30 5/16	24x45	26 3/8 x 47 3/8
4x8	5¼ x 9¼			9x36	10 7/8 x 37 13/16	14x14	16¼ x 16¼	18x30	20 5/16 x 32¼	24x48	26 3/8 x 50 3/8
4x10	5¼ x 11¼	7x 7	8 11/16 x 8 11/16			14x15	16¼ x 17 5/16	18x36	20 5/16 x 38¼		
4x12	5¼ x 13¼	7x 9	8 11/16 x 10 11/16	10x10	11 5/16 x 11 5/16	14x16	16¼ x 18 5/16	18x48	20 5/16 x 50¼	26x26	28 3/8 x 28 3/8
4x13	5¼ x 14¼	7x10	8 11/16 x 11 11/16	10x12	11 5/16 x 13 5/16	14x18	16¼ x 20 5/16			26x28	28 3/8 x 30 3/8
4x15	5¼ x 16⅜	7x12	8 11/16 x 13 11/16	10x14	11 5/16 x 15 5/16	14x20	16¼ x 22 5/16	20x20	22 3/8 x 22 3/8	26x30	28 3/8 x 32 3/8
4x18	5¼ x 19¼	7x14	8 11/16 x 15 5/8	10x15	11 5/16 x 16 5/16	14x22	16¼ x 24¼	20x22	22 3/8 x 24 3/8	26x32	28 3/8 x 34 3/8
4x21	5¼ x 22⅜	7x15	8 11/16 x 16⅝	10x16	11 5/16 x 17 7/8	14x24	13¼ x 26¼	20x24	22 3/8 x 26 3/8	26x34	28 3/8 x 36 3/8
4x24	5¼ x 25¼			10x18	11 5/16 x 19 7/8	14x28	13¼ x 30 5/16	20x26	22 3/8 x 28 3/8	26x36	28 3/8 x 38 3/8
4x28	5¼ x 29¼	8x 8	9 3/4 x 9 3/4	10x20	11 5/16 x 21 7/8	14x30	16¼ x 32 5/16	20x28	22 3/8 x 30 3/8		
4x30	5¼ x 31¼	8x10	9 3/4 x 11 3/4	10x22	11 5/16 x 23 7/8	14x36	16¼ x 38 5/16	20x30	22 3/8 x 32 3/8	27x27	29 3/8 x 29 3/8
		8x12	9 3/4 x 13 3/4	10x24	11 5/16 x 25 7/8	14x40	16¼ x 42 5/16	20x32	22 3/8 x 34 3/8	27x38	29 3/8 x 40 3/8
5x 8	6⅜x9⅝	8x13	9 3/4 x 14 11/16	10x30	11 5/16 x 31 7/8	14x48	16¼ x 50 5/16	20x36	22 3/8 x 38 3/8		
5x 9	6 5/16 x 10 5/16	8x14	9 3/4 x 15 5/16	10x36	11 5/16 x 37 7/8			20x48	22 3/8 x 50 3/8	28x28	30 3/8 x 30 3/8
5x10	6 5/16 x 11 5/16	8x15	9 3/4 x 16 11/16	10x40	11 5/16 x 41 7/8	15x15	17¼ x 17¼			28x30	30 3/8 x 32 3/8
5x11	6 5/16 x 12 5/16	8x16	9 3/4 x 17 11/16	10x48	11 5/16 x 49 7/8	15x21	17¼ x 23¼	21x21	23 3/8 x 23 3/8	28x32	30 3/8 x 34 3/8
5x12	6 5/16 x 13 5/16	8x18	9 3/4 x 19 3/4			15x25	17¼ x 27¼	21x25	23 3/8 x 27 3/8	28x34	30 3/8 x 36 3/8
5x13	6 5/16 x 14 5/16	8x20	9 3/4 x 21 3/4	11x17	13 x18 15/16	15x30	17¼ x 32¼	21x29	23 3/8 x 31 3/8	28x36	30 3/8 x 38 3/8
5x14	6 5/16 x 15 5/16	8x21	9 3/4 x 22 3/4	11x18	13 x19 15/16	15x34	17¼ x 36¼			28x40	30 3/8 x 42 3/8
5x15	6 5/16 x 16 5/16	8x24	9 3/4 x 25 3/4	11x20	13 x21 15/16	15x36	17¼ x 38¼	22x22	24 3/8 x 24 3/8		
5x16	6 5/16 x 17 5/16	8x27	9 3/4 x 28 11/16					22x24	24 3/8 x 26 3/8	30x30	32 3/8 x 32 3/8
5x17	6 5/16 x 18 5/16	8x30	9 3/4 x 31 11/16	12x12	14 1/16 x 14 1/16	16x16	18 5/16 x 18 5/16	22x26	24 3/8 x 28 3/8	30x32	32 3/8 x 34 3/8
5x18	6 5/16 x 19 5/16	8x36	9 3/4 x 37 11/16	12x14	14 1/16 x 16 1/16	16x18	18 5/16 x 20 5/16	22x28	24 3/8 x 30 3/8	30x34	32 3/8 x 36 3/8
		8x48	9 3/4 x 49 3/4	12x15	14 1/16 x 17	16x20	18 5/16 x 22 5/16	22x30	24 3/8 x 32 3/8	30x36	32 3/8 x 38 3/8
6x 6	7 11/16 x 7 11/16			12x16	14 1/16 x 18	16x22	18 5/16 x 24 5/16	22x32	24 3/8 x 34 3/8	30x40	32 3/8 x 42 3/8
6x 8	7 11/16 x 9 11/16	9x 9	10 7/8 x 10 7/8	12x17	14 1/16 x 19	16x24	18 5/16 x 26 5/16	22x36	24 3/8 x 38 3/8	30x42	32 3/8 x 44 3/8
6x 9	7 11/16 x 10 11/16	9x12	10 7/8 x 13 7/8	12x18	14 1/16 x 20	16x28	18 5/16 x 30 5/16	22x38	24 3/8 x 40 3/8	30x48	32 3/8 x 50 3/8
6x10	7 11/16 x 11 11/16	9x13	10 7/8 x 14 7/8	12x19	14 1/16 x 21	16x30	18 5/16 x 32 5/16	22x40	24 3/8 x 42 3/8		
6x12	7 11/16 x 13 11/16	9x14	10 7/8 x 15 7/8	12x20	14 1/16 x 22	16x32	18 5/16 x 34 5/16	22x42	24 3/8 x 44 3/8	36x36	38 3/8 x 38 3/8
6x14	7 11/16 x 15 11/16	9x15	10 7/8 x 16 13/16	12x22	14 1/16 x 24	16x36	18 5/16 x 38 5/16			36x40	38 3/8 x 42 3/8
6x16	7 11/16 x 17 11/16	9x16	10 7/8 x 17 13/16	12x24	14 1/16 x 26	16x42	18 5/16 x 44 5/16	24x24	26 3/8 x 26 3/8	36x42	38 3/8 x 44 3/8
6x18	7 11/16 x 19 11/16	9x18	10 7/8 x 19 7/8	12x26	14 1/16 x 28			24x26	26 3/8 x 28 3/8	36x48	38 3/8 x 50 3/8
6x20	7 11/16 x 21 11/16	9x20	10 7/8 x 21 7/8	12x28	14 1/16 x 30	18x18	20 5/16 x 20 5/16	24x27	26 3/8 x 29 3/8		
6x22	7 11/16 x 23 11/16	9x22	10 7/8 x 23 7/8	12x30	14 1/16 x 32	18x20	20 5/16 x 22 5/16	24x30	26 3/8 x 32 3/8	38x38	40 3/8 x 40 3/8
6x24	7 11/16 x 25 11/16	9x24	10 7/8 x 25 7/8	12x32	14 1/16 x 34	18x21	20 5/16 x 23 5/16	24x32	26 3/8 x 34 3/8	38x40	40 3/8 x 42 3/8
6x28	7 11/16 x 29 5/8	9x26	10 7/8 x 27 7/8	12x36	14 1/16 x 38	18x22	20 5/16 x 24 5/16	24x36	26 3/8 x 38 3/8	38x42	40 3/8 x 44 3/8
6x30	7 11/16 x 31 5/8	9x28	10 7/8 x 29 13/16	12x40	14 1/16 x 42	18x24	20 5/16 x 26 5/16	24x40	26 3/8 x 42 3/8		

STANDARD FINISHES FOR ALL GRILLES

The following finishes are standard. Specify by the symbols opposite the finish. Any paint, lacquer, or electroplated finish can be matched to sample submitted.

PAINT, JAPAN AND LACQUER

PC	Prime Coat	O	Oak
J	Black Japan	K	Walnut
J1	Dull Black Japan	M1	Red Mahogany
W	White		
LD2	Lacquered Oxidized Copper	Z1	Gold Bronze Paint
LAB	Lacquered Antique Bronze	Z2	Silver Bronze Paint
LA5	Lacquered Dull Bronze.	Z3	Copper Bronze Paint
LF	Lacquered Dull Brass		

ELECTROPLATED OR NATURAL FINISHES

A	Electroplated Light Polished Bronze
AG	Electroplated Dull Bronze Natural
B	Electroplated Dark Statuary Bronze
B1	Electroplated Medium Statuary Bronze
B2	Electroplated Light Statuary Bronze
C	Electroplated Polished Brass
YC	Polished Yellow Bronze Natural
D	Electroplated Copper, Not Shaded
D2	Electroplated Oxidized Copper
F	Electroplated Dull or Brush Brass
YF	Dull or Brushed Yellow Bronze Natural
H	Electroplated Dead Black (Imitation Bower Barff)
SF	Electroplated Dull Brass Sanded
SF4	Electroplated Dull Brass Slightly Oxidized, Sanded
N	Electroplated Nickel
N1	Electroplated Dull or Satin Nickel

NATURAL POLISH FINISHES

Bronze, Brass, Aluminum Alloys, Benedict Nickel, Monel Metal

(Hot Lead Dipped Finish can also be supplied)

SPECIAL GRILLES FOR FRATERNAL OR COLLEGE BUILDINGS

No. 855

The accompanying illustrations show an interesting and appropriate treatment for grilles in club houses, schools, universities and fraternal organizations. We have patterns for the seals of practically every prominent school and university in the United States as well as insignia of all the prominent fraternal organizations. Any seal can be attached to any design grille, but the insignia can only be cast in bronze whether the grille is iron or bronze, although the bronze can easily be painted.

No. 867

No. 850

No. 866

No. 865

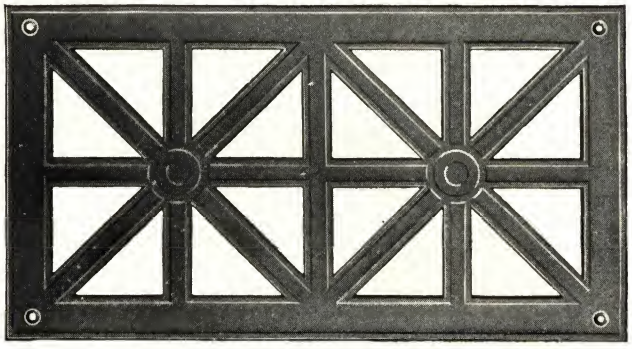
No. 860

No. 864

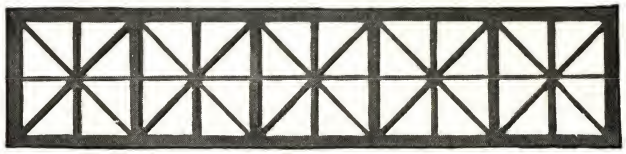
No. 863

STORE FRONT GRILLES

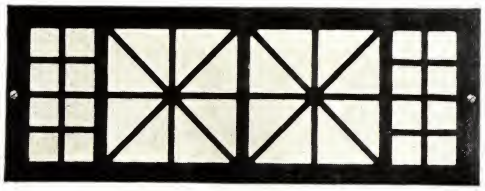
Highton—H&C will not guarantee an electroplated cast-iron or steel store front grille from rusting or weathering. All store front grilles should only be made from rust-resisting metals, such as bronze, aluminum, etc.



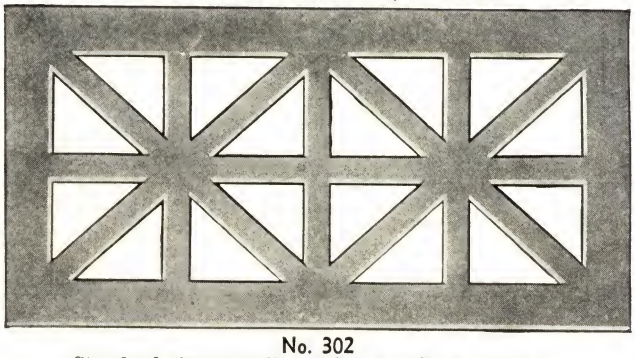
No. 304. Standard Size, 9 x 18 in. Overall.
Usually furnished in light statuary bronze finish.



No. 105. Made to Order Only.
Units varied to suit size.

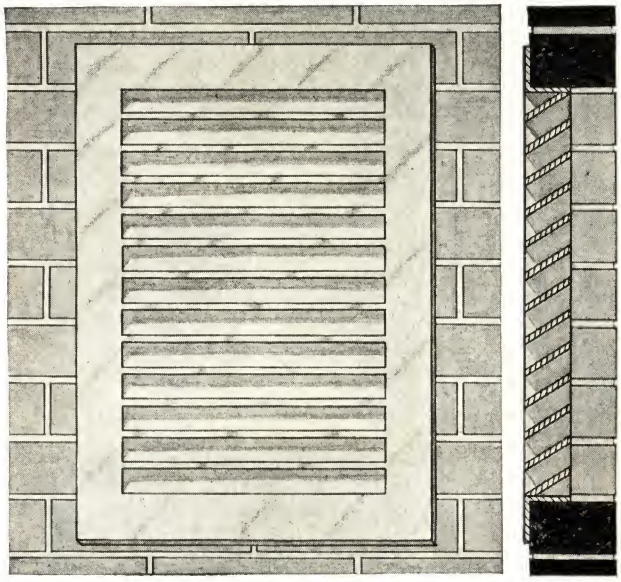


No. 301. Standard Opening.
Sizes 3 x 12, 3 x 18, 4 x 12, 4 x 18 in.



No. 302
Standard size overall, 8 x 8, 8 x 14¾, 8 x 21½ in.

SPECIAL "HITONCAST" SIDE-WALL AIR INLET VENTILATOR

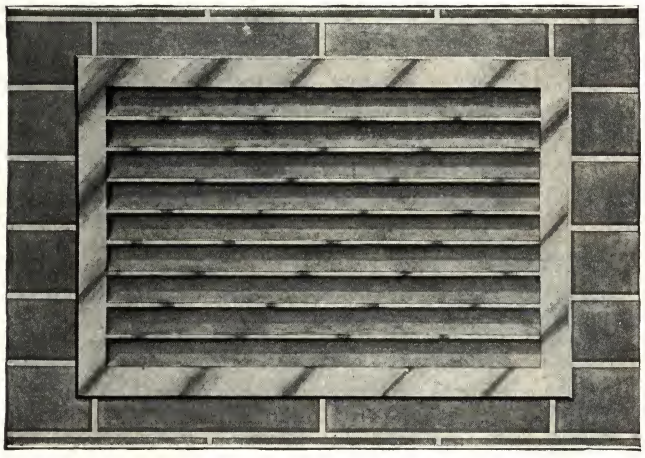


No. 2000

Made in Cast Iron, Brass or Bronze Metal, and in any size. When ordering, it is important to specify the "wide" and "high" dimensions.

This Ventilator is constructed with a heavy angle frame and stationary louvers for use on the outside of a building as a fresh air inlet. This ventilator is so constructed as to exclude rain or snow.

Wire mesh can also be provided, if specified, at the back of Ventilator to exclude insects, etc.



No. 2001, Horizontal Type Inlet Ventilator.
Ventilator illustrated is 18 in. wide by 10 in. high.

LIST OF STANDARD DUCT OPENING SIZES

10x 8	14x12	16x16	20x10	24x12	30x 8	42x 8	6x14	8x30	12x14	12x40	16x30
12x 8	14x14	17x 5	20x12	24x14	30x10	49x11	6x16	9x14	12x16	14x16	20x24
12x 9	15x 8	18x11	20x14	24x15	30x12	50x10	8x10	9x16	12x18	14x20	20x28
12x10	16x 6	18x12	20x16	24x16	30x16	50x12	8x12	10x12	12x20	14x24	24x24
12x12	16x 9	18x16	20x20	24x18	34x11		8x15	10x16	12x22	16x16	
14x 6	16x10	18x18	22x 8	24x20	36x12		8x16	10x20	12x24	16x18	
14x 8	16x12	20x 6	22x12	28x16	40x10		8x20	10x24	12x30	16x20	
14x10	16x14	20x 8	24x10	28x20	40x12		8x24	10x30	12x36	16x24	

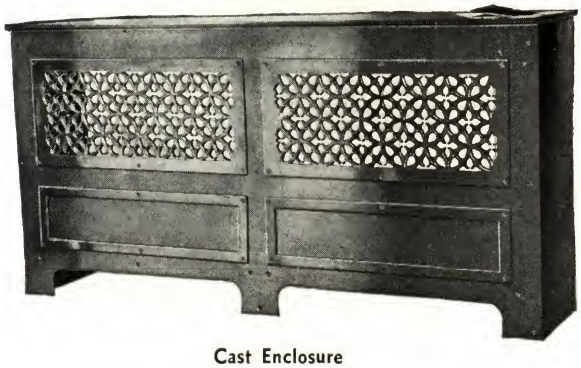
Made up in any special size not listed above at a small pattern charge

RADIATOR ENCLOSURES

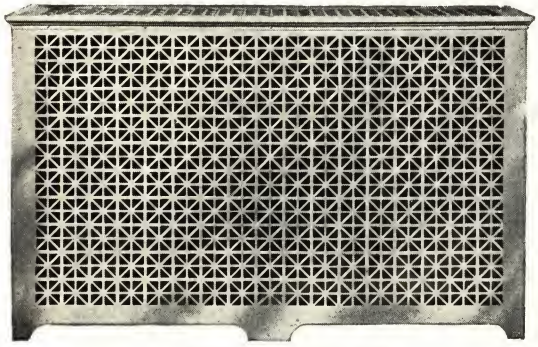
The enclosures illustrated below represent some of the many artistic effects possible to secure by the use of Highton-H & C quality grilles, in either cast or stamped metals. All enclosures are made up to specification. They are constructed with a rigid angle frame and are unusually well built and capable of standing considerable abuse.

Because of the large variety in styles of grilles, from both steel and cast metals, it is possible to design an enclosure which will harmonize with any architectural motif.

We gladly offer the assistance of our engineering department in designing a suitable enclosure for any location and to fit any special conditions.



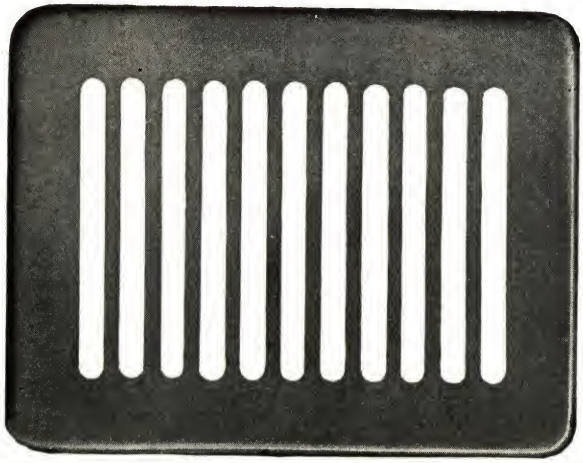
Cast Enclosure



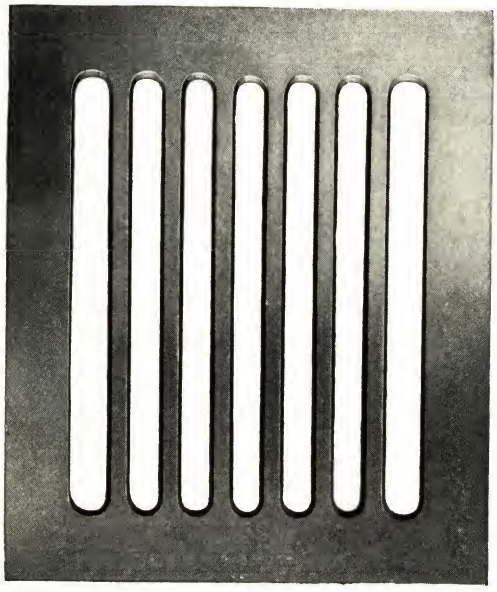
Banker Class No. 373

HIGHTON—H & C SANITARY CAST GRILLES AND REGISTERS

Designed for use where extreme cleanliness is the prime requisite, for such places as hospitals, hotel and restaurant kitchens and other types of buildings of a similar nature. The rounded edge grilles are especially desirable in psychopathic hospitals. Highton-H & C sanitary grilles and registers are especially easy to keep in a clean and sanitary condition.

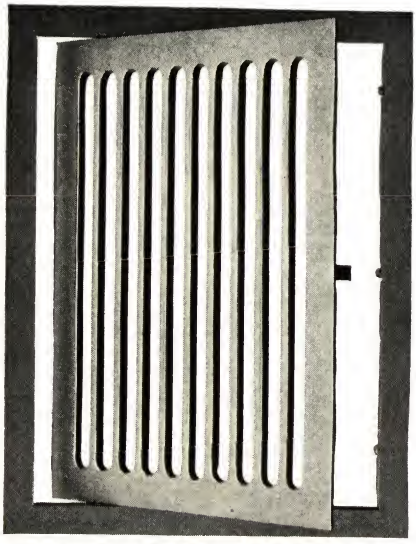


Where the best is required, specify Highton-H & C Round Edge Sanitary Grilles and Registers. Where economy is an important factor, square edge patterns may be used at lower cost. In all cases bars must run vertical. Give width first, height second, and state which dimension is height.

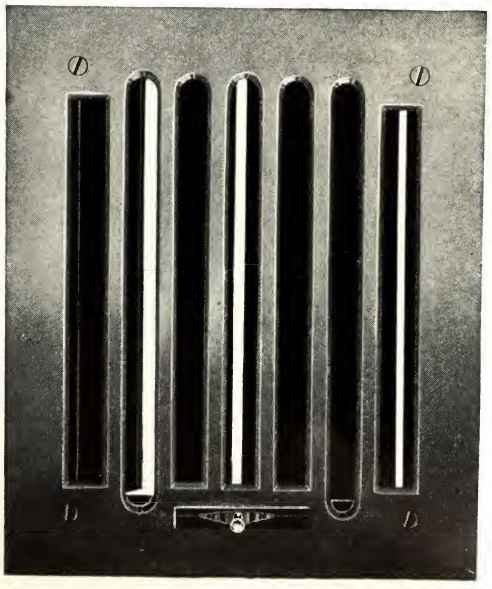


Above
No. 132 Round Edge Sanitary Grille

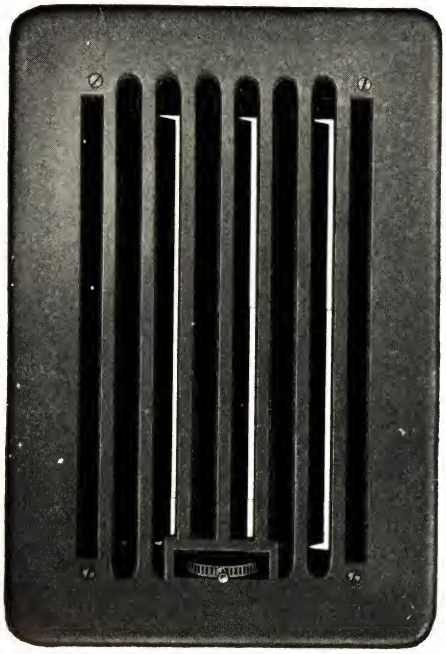
Left
No. 135 Square Edge Sanitary Grille



Right
No. 135A Sanitary Grille Pivot-hinged to Angle Iron Frame



Left
No. 137 Square Edge Sanitary Register



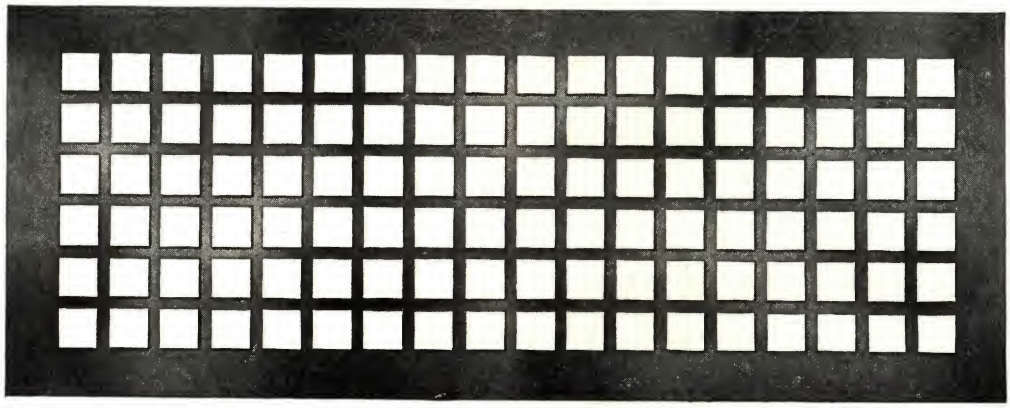
Right
No. 125 Round Edge Sanitary Register

HIGHTON—H&C STAMPED GRILLES

Stamped from Steel, Brass, Aluminum, Monel Metal

Highton—H&C Steel Grilles are made only from cold rolled steel free from scale and surface pits. They have the advantage of being lighter in weight than cast iron, unbreakable, easy to install and economical. They supplement and round out the complete line of "Hitoncast" Grilles shown in another section of this catalogue.

It was formerly the opinion that perforated or stamped grilles could only be furnished in No. 10 or No. 12 Gauge thicknesses. Highton—H&C are now equipped to perforate any of their designs in No. 16 Gauge, No. 12 Gauge, No. 10 Gauge, 1/8-in. and 3/16-in. thick metal. Furthermore, a great many of our perforated designs can be stamped from 1/4-in. thick metal. For complete information pertaining to Stamped designs refer to the table on this page.



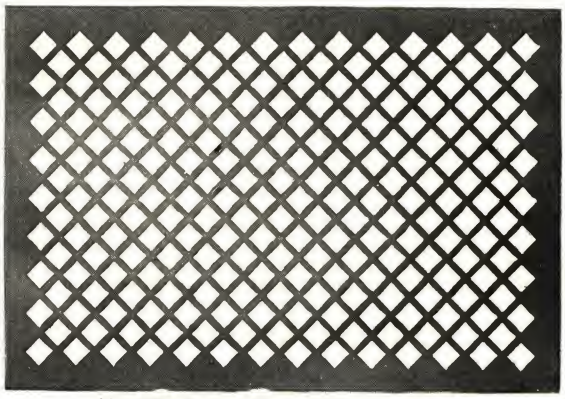
Plain Lattice Designs

Made in ten meshes: 1/4, 1/2, 5/8, 3/4, .762, 27/32, 7/8, 1, 1 3/8, 1 1/2 in.

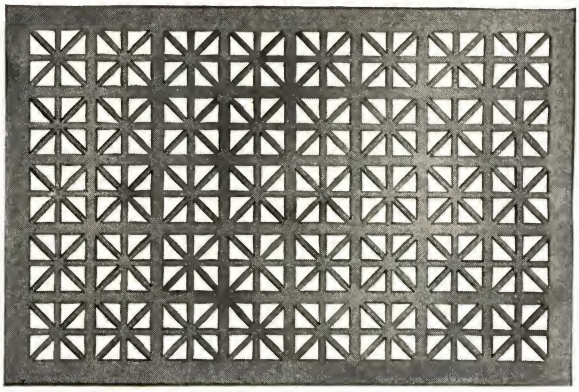
TABLE OF INFORMATION AND DATA ON HIGHTON—H&C STAMPED GRILLES

Design Number	Page No.	Free Area, %	Size of Units, In.	Width of Bars, In.	Unit Dimensions Center to Center: Height, In.	Unit Dimensions Center to Center: Width, In.	Maximum Size One Piece: Height, In.	Maximum Size One Piece: Width, In.	Metal Thicknesses in which Designs Can be Perforated (Marked with X): 16-Gauge	12-Gauge	10-Gauge	1/8"	3/16"	1/4"
569	18	45	1/4	1/8	3/8	3/8	58	120	X	X				
570	18	45	1/2	1/4	3/4	3/4	50	120	X	X	X	X	X	X
570A	18	48	1/2	1/4	11/16	11/16	50	120	X	X	X			
574	18	51	5/8	1/4	7/8	7/8	58	120	X	X	X	X		
575	18	59	.762	.220	.982	.982	65	120	X	X	X		X	X
575 A	18	57	3/4	1/4	1	1	50	120	X	X	X	X	X	X
575 D	18	59	27/32	7/32	1 1/16	1 1/16	50	120	X	X	X	X	X	
575 B	18	60	7/8	1/4	1 1/8	1 1/8	50	120	X	X	X	X	X	X
576	18	65	1	1/4	1 1/4	1 1/4	53	120	X	X	X	X	X	X
576 C	18	67	1	3/16	1 3/16	1 3/16	58	120	X	X	X	X	X	
577	18	65	1 3/8	3/8	1 3/4	1 3/4	58	120	X	X	X	X	X	
577 A	18	72	1 1/2	3/8	1 7/8	1 7/8	58	120	X	X	X	X	X	
571	19	43	1/2	1/4	1 1/16	1 1/16	58	120	X	X	X	X	X	X
572	19	56	3/4	1/4	1 7/16	1 7/16	53	120	X	X	X	X	X	X
572 A	19	62	1	.....	1 25/32	1 25/32	58	120	X	X	X	X	X	X
578	19	67	7/8 Radius	.....	2 1/4	2	53	120	X	X	X	X	X	X
578 A	19	60	7/16 "	.....	1 1/4	1 1/16	58	120	X	X	X	X	X	
579	20	50	2 3/4	3/8	3 1/8	3 1/8	58	120	X	X	X	X	X	X
579 A	20	45	2	1/4	2 1/4	2 1/4	58	120	X	X	X	X	X	X
582	19	60	1 1/2	5/16	2	2	58	120	X	X	X	X	X	
582 A	19	72	1 3/4 x 1 1/2	1/4	2 1/8	2	58	120	X	X	X	X	X	
573 A	19	45	2 1/2	Variable	.....	.....	58	120	X	X	X	X	X	X
573	19	50	3	"	.....	.....	58	120	X	X	X	X	X	X
573 B	19	52	3 1/2	"	.....	.....	58	120	X	X	X	X	X	
583	20	56	3 1/4 x 1 1/8	3/16	1 5/16	2	58	120	X	X	X	X	X	
583 A	20	.....	7/16 x 13/16	3/32	1	9/16	.....	.....	X					
584	20	50	1	1/4	1 1/4	1 1/4	58	120	X	X	X			
585	20	41	5/8 x 3 1/4	Variable	.....	.....	14	120	X	X	X	X	X	X
586	20	50	3/16 x 1 1/2	3/16	.....	.....	58	120	X	X	X	X	X	
587	19	65	1 1/2	1 1/2	3	3	58	120	X	X	X	X	X	
588	19	65	2	1/4	2 1/4	2 1/4	58	120	X	X	X	X	X	X
589	20	50	7/16 x 1 3/4	1/4	.....	.....	8 1/2	6	X	X				
590	20	.....	7 1/2 & 4	.....	.....	.....	84	46	X					

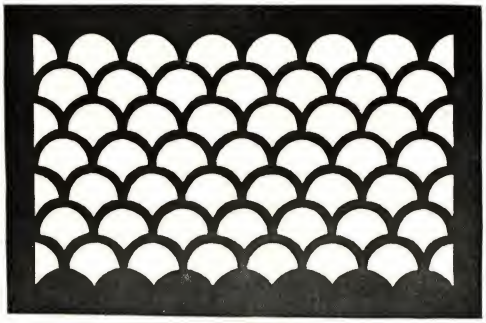
HIGHTON—H&C STAMPED GRILLES—ORNAMENTAL DESIGNS



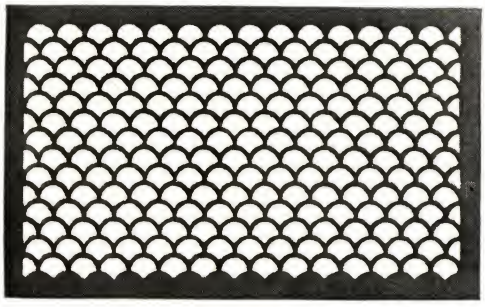
No. 572 Series Diagonal Lattice Design
Made in Three Unit Sizes
For Nos. 571, 572 and 572A, See Table, Page 18



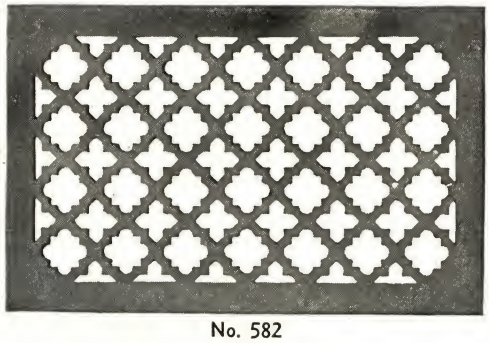
No. 573 Series Grecian Design
Made in Three Unit Sizes
For Nos. 573, 573A and 573B, See Table, Page 18



No. 578

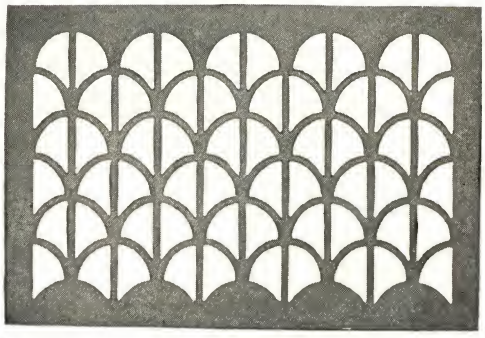


No. 578A

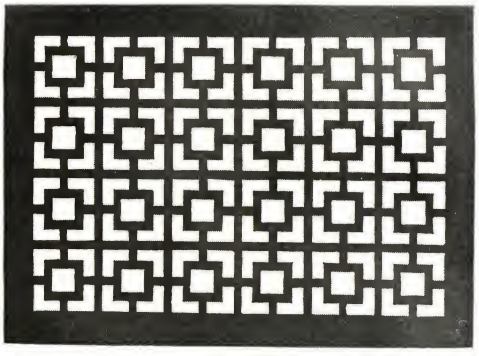


No. 582

No. 582A



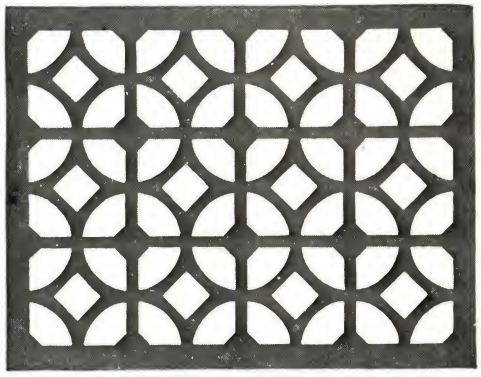
Design No. 587 Divided Shell Pattern



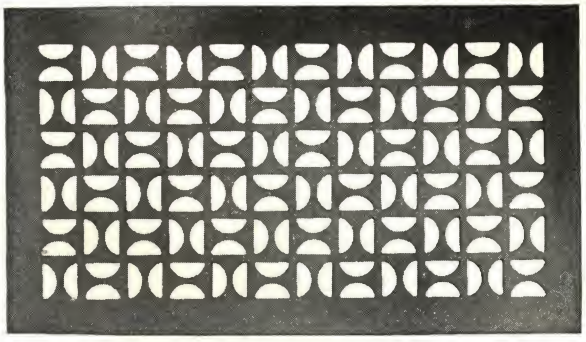
No. 588

For Full Information Regarding Free Area, Unit Sizes, Etc., See Page 18

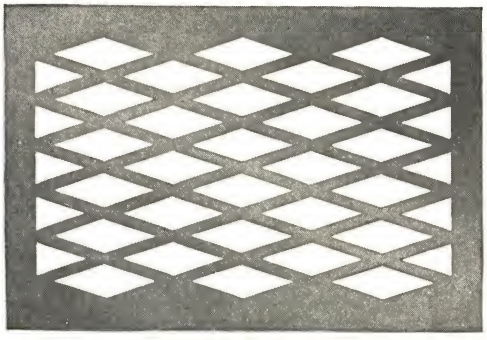
HIGHTON—H&C STAMPED GRILLES—ORNAMENTAL DESIGNS



No. 579—2 Unit Sizes



No. 584



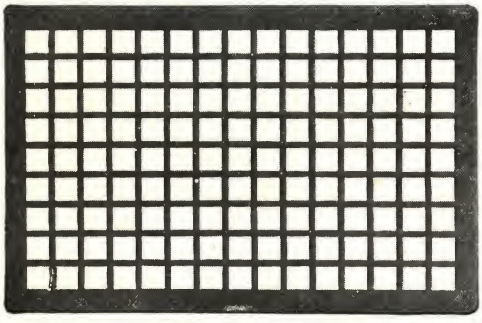
No. 583—2 Unit Sizes

"Psycho-Grille"

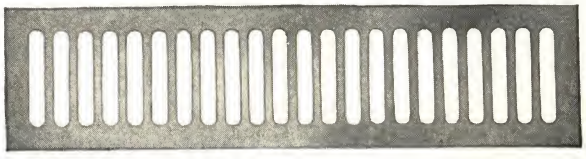
At Right:

All edges are smoothly beveled and corners rounded to fit snugly and evenly against the wall or surface to which grille is fastened.

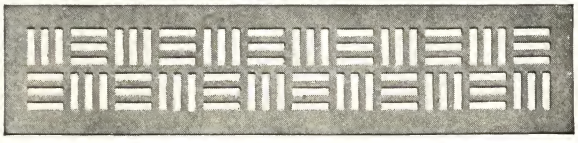
Perforated in any gauge. Can also be furnished in any other stamped design.



No. 580—"Psycho-Grille"

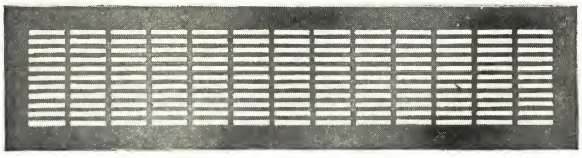


No. 585

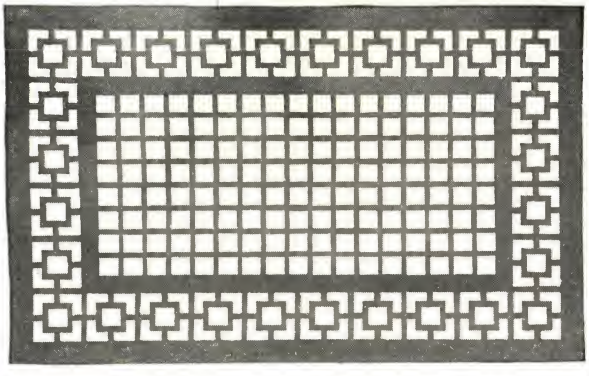


No. 589

No. 590

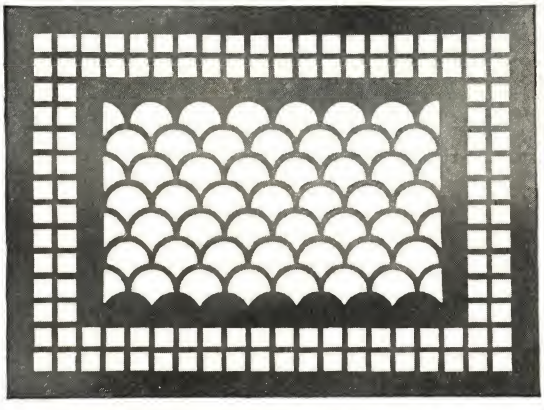


No. 586



No. 575 Border with No. 588 Center

Due to the extra cost of combination designs, we recommend the use of single designs

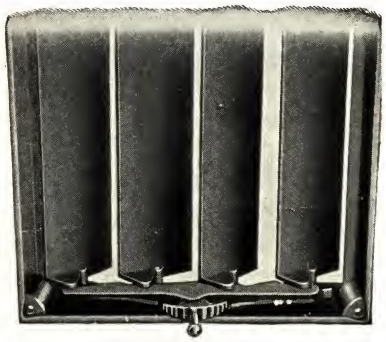


No. 575 Border with No. 578 Center

For Full Information Regarding Free Area, Unit Sizes, Etc., See Page 18

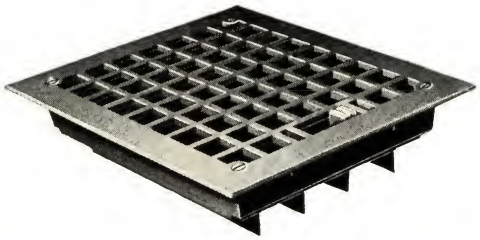
HIGHTON—H & C VENTILATING REGISTERS

Hand Operated Registers



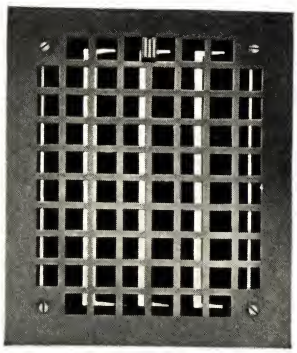
No. 240—All Cast

Body from cast iron with wheel movement as shown. Face also cast iron exactly the same as No. 230. An excellent register for use where resistance to rust is desired. Also made with bronze face or all bronze.



No. 230—Semi-steel

Cast face mounted on unbreakable steel body



No. 800—All Steel

Steel face and steel body

LIST PRICES REGISTERS—SEMI-STEEL No. 230; ALL CAST IRON No. 240; ALL STEEL No. 800; BRONZE No. 430

Duct Opening Size	Approximate Overall of Face	Prime Coat and Black Japan		All Lacquers and White Japan		Electroplated Oxidized Copper Complete Register	Electroplated Brass Bronze Nickel Complete Register	Brass or Bronze	
		Complete Register	Register Face	Complete Register	Register Face			Complete Register	Face Plate Only
4x 6	5¼x 7¼	$1.40	$0.55	$1.70	$0.85	$2.00	$2.20	$2.80	$2.20
4½x6½	5⅝x 7⅝	1.40	.55	1.70	.85	2.00	2.20	.....	.....
4x 8	5¼x 9¼	1.50	.60	1.80	.90	2.20	2.40	2.90	2.35
4x10	5¼x11¼	1.55	.75	1.90	1.10	2.40	2.60	3.75	3.00
4x12	5¼x13¼	1.80	.95	2.20	1.35	2.80	3.10	4.50	3.60
4x13	5¼x14¼	2.50	1.10	3.00	1.50	3.50	3.80	.....	.....
4x15	5¼x16 3/16	3.00	1.20	3.60	1.80	4.00	4.30	5.60	4.35
4x18	5¼x19¼	4.00	1.30	4.65	1.95	5.00	5.40	6.75	5.30
4x21	5¼x22 3/16	5.00	2.25	6.00	3.25	6.50	7.00	.....	.....
4x24	5¼x25¼	6.00	2.75	7.00	3.75	7.50	8.10	.....	.....
4x28	5¼x29¼	7.10	3.40	8.10	4.35	8.75	9.55	.....	.....
4x30	5¼x31¼	8.00	3.60	9.00	4.60	9.50	10.00	.....	.....
4x32	5¼x33¼	8.15	3.90	9.30	5.00	10.00	10.90	.....	.....
5x8	6 5/16x 9 5/16	1.55	.90	1.90	1.25	2.75	3.00	3.55	2.80
5x 9	6 5/16x10 5/16	1.55	1.00	1.90	1.30	2.90	3.15	4.00	3.20
5x10	6 5/16x11 5/16	1.60	1.05	1.95	1.40	2.95	3.25	4.45	3.50
5x11	6 5/16x12 5/16	1.75	1.10	2.15	1.50	3.25	3.50	.....	.....
5x12	6 5/16x13 5/16	1.80	1.20	2.25	1.60	3.45	3.90	5.35	4.25
5x13	6 5/16x14 5/16	2.60	1.35	3.10	1.85	4.25	4.60	5.75	4.55
5x14	6 5/16x15 5/16	2.80	1.50	3.40	2.00	4.80	5.20	6.20	4.95
5x15	6 5/16x16 5/16	3.60	1.65	4.30	2.35	5.60	6.10	6.65	5.25
5x16	6 5/16x17 5/16	3.90	1.80	4.65	2.55	5.90	6.40	7.15	5.65
5x17	6 5/16x18 5/16	4.20	2.00	5.00	2.80	6.20	6.80	.....	.....
5x18	6 5/16x19 5/16	5.25	2.10	6.20	3.15	7.25	7.85	8.00	6.25
6x 6	7 11/16x 7 11/16	1.50	.90	1.80	1.20	2.70	3.00	3.60	2.90
6x 8	7 11/16x 9 11/16	1.55	1.00	1.85	1.30	2.80	3.10	4.10	3.30
6x 9	7 11/16x10 11/16	1.60	1.05	1.90	1.35	2.95	3.40	4.60	3.70
6x10	7 11/16x11 11/16	1.60	1.05	1.95	1.40	3.00	3.50	5.10	4.05
6x12	7 11/16x13 11/16	1.85	1.25	2.25	1.60	3.50	4.20	6.15	4.90
6x14	7 11/16x15 11/16	2.85	1.65	3.45	2.10	4.95	5.75	7.15	5.65
6x16	7 11/16x17 11/16	4.00	2.00	4.80	2.80	6.00	6.90	8.20	6.50
6x18	7 11/16x19 11/16	5.20	2.25	6.25	3.30	7.00	8.00	9.30	7.35
6x20	7 11/16x21 11/16	6.00	2.50	7.20	3.70	8.20	9.30	10.25	8.15
6x22	7 11/16x23 11/16	7.00	3.00	8.40	4.40	10.00	11.25	.....	.....
6x24	7 11/16x25 11/16	8.00	3.70	9.60	5.30	12.00	13.30	14.00	12.00
6x28	7 11/16x29 5/8	9.50	4.25	11.00	5.75	14.50	16.00	.....	.....
6x30	7 11/16x31 5/8	11.50	4.75	13.00	6.25	16.50	18.25	19.00	16.00
6x32	7 11/16x33 5/8	13.00	5.25	14.25	6.50	18.00	21.00	.....	.....
6x36	7 11/16x37 5/8	19.00	7.50	21.00	9.50	26.25	29.50	.....	.....
7x 7	8 11/16x 8 11/16	1.55	1.00	1.90	1.35	2.90	3.50	4.25	3.40
7x 9	8 11/16x10 11/16	1.60	1.10	2.00	1.40	3.00	3.65	5.50	4.20
7x10	8 11/16x11 11/16	1.65	1.10	2.00	1.40	3.10	3.80	6.05	4.85
7x12	8 11/16x13 11/16	1.90	1.25	2.30	1.65	3.60	4.35	7.35	6.00
7x14	8 11/16x15 5/8	2.95	1.90	3.55	2.50	5.00	6.10	.....	.....
7x15	8 11/16x16 5/8	3.75	2.55	4.50	3.30	5.90	6.90	.....	.....
8x 8	9¾x 9¾	1.60	1.05	1.95	1.40	3.00	3.70	5.60	4.35
8x10	9¾x11¾	1.65	1.10	2.00	1.45	3.15	3.85	7.00	5.55
8x12	9¾x13¾	1.90	1.30	2.30	1.70	3.65	4.40	8.60	6.90
8x13	9¾x14 11/16	2.75	1.85	3.30	2.40	4.75	5.75	.....	.....
8x14	9¾x15 11/16	3.00	2.00	3.60	2.60	5.10	6.20	9.80	8.10
8x15	9¾x16 11/16	3.80	2.60	4.55	3.35	6.00	7.00	10.60	8.65
8x16	9¾x17 11/16	4.50	2.70	5.40	3.60	6.75	8.00	11.20	9.25
8x18	9¾x19¾	6.60	3.50	7.90	4.80	9.40	10.70	12.80	10.60
8x20	9¾x21¾	8.70	3.90	10.40	5.60	11.70	13.00	14.00	12.00
8x21	9¾x22¾	9.00	4.00	10.80	5.80	12.50	14.00	.....	.....
8x24	9¾x25¾	11.25	4.70	12.40	6.00	15.25	17.00	18.00	15.60

Duct Opening Size	Approximate Overall of Face	Prime Coat and Black Japan		All Lacquers and White Japan		Electroplated Oxidized Copper Complete Register	Electroplated Brass Bronze Nickel Complete Register	Brass or Bronze	
		Complete Register	Register Face	Complete Register	Register Face			Complete Register	Face Plate Only
8x27	9¾x28 11/16	$13.60	$ 5.40	$15.00	$ 6.80	$17.75	$19.75	.....	.....
8x30	9¾x31 11/16	14.70	6.30	16.30	7.90	19.50	21.60	$22.25	$18.65
8x32	9¾x33 11/16	19.50	8.00	21.25	9.75	25.50	28.00	.....	.....
8x36	9¾x37 11/16	22.50	9.25	25.95	11.20	29.50	32.50	35.90	30.00
8x48	9¾x49¾	31.50	14.00	34.75	17.00	40.50	41.00	.....	.....
9x 9	10⅞x10⅞	2.00	1.40	2.40	1.80	3.90	4.90	7.20	5.95
9x12	10⅞x13⅞	2.10	1.45	2.55	1.90	4.00	5.10	9.60	8.00
9x13	10⅞x14⅞	2.95	2.00	3.55	2.55	4.95	6.15	.....	.....
9x14	10⅞x15⅞	3.10	2.15	3.70	2.75	5.20	6.50	11.20	9.25
9x15	10⅞x16 13/16	3.95	2.65	4.75	3.45	6.50	7.80	.....	.....
9x16	10⅞x17 13/16	4.70	2.70	5.65	3.65	7.15	8.55	.....	.....
9x18	10⅞x19⅞	6.65	3.60	8.00	4.95	9.35	11.00	.....	.....
9x20	10⅞x21⅞	8.75	4.30	10.25	5.65	11.85	13.65	16.10	14.00
9x22	10⅞x23⅞	10.35	4.50	11.50	6.15	13.95	16.00	17.65	14.65
9x24	10⅞x25⅞	12.00	5.30	13.20	6.50	16.00	18.10	19.25	16.10
9x26	10⅞x27⅞	15.25	6.35	16.75	7.85	19.25	21.65	.....	.....
9x28	10⅞x29 13/16	16.35	6.80	18.00	8.45	21.75	24.25	.....	.....
9x30	10⅞x31 13/16	17.50	7.10	19.25	8.85	22.50	25.25	26.20	22.50
9x32	10⅞x33 13/16	22.50	8.75	24.95	11.20	29.50	32.50	33.90	28.40
9x36	10⅞x37 13/16	24.75	9.75	27.40	11.90	31.75	34.25	38.40	32.25
10x10	11 15/16x11 15/16	2.35	1.65	2.85	2.15	4.35	5.35	9.50	7.50
10x12	11 15/16x13 15/16	2.40	1.70	2.90	2.20	4.40	5.50	11.00	9.15
10x14	11 15/16x15 15/16	3.15	2.20	3.80	2.85	5.25	6.55	12.65	10.55
10x15	11 15/16x16 15/16	4.40	2.65	5.00	3.45	6.50	8.00	13.50	11.60
10x16	11 15/16x17⅞	4.85	2.95	5.85	3.95	7.20	8.60	14.45	12.45
10x18	11 15/16x19⅞	6.70	3.70	8.05	5.05	9.45	11.00	16.10	14.00
10x20	11 15/16x21⅞	8.90	4.35	10.50	5.75	12.00	13.80	18.00	15.60
10x22	11 15/16x23⅞	10.40	4.90	12.00	6.25	14.50	16.50	20.50	17.30
10x24	11 15/16x25⅞	12.15	5.35	13.40	6.60	16.25	18.50	21.70	18.25
10x30	11 15/16x31⅞	19.50	8.00	21.45	9.95	25.50	28.00	29.00	24.80
10x36	11 15/16x37⅞	25.75	10.00	28.40	12.40	32.75	35.25	39.40	33.25
10x40	11 15/16x41⅞	35.00	15.50	38.50	19.00	45.00	48.00	45.50	37.40
10x48	11 15/16x49⅞	42.00	19.25	50.00	24.00	52.00	60.00	.....	.....
11x17	13 x18 15/16	6.30	3.70	7.55	4.95	8.95	10.50	.....	.....
11x18	13 x19 15/16	6.75	3.95	8.10	5.30	9.50	11.15	.....	.....
11x20	13 x21 15/16	8.95	4.45	10.75	6.25	12.00	14.00	.....	.....
12x12	14 1/16x14 1/16	4.00	2.70	4.80	3.50	6.35	7.90	13.75	11.45
12x14	14 1/16x16 1/16	4.35	2.80	5.25	3.65	6.85	8.25	16.10	14.00
12x15	14 1/16x17	4.50	2.90	5.40	3.80	7.00	8.50	16.80	14.25
12x16	14 1/16x18	5.60	3.50	6.70	4.60	8.25	9.75	18.00	15.60
12x17	14 1/16x19	6.35	3.80	7.60	5.05	9.00	10.60	19.10	16.05
12x18	14 1/16x20	6.80	3.90	8.15	5.25	9.55	11.25	20.50	17.30
12x19	14 1/16x21	7.50	4.00	9.00	5.50	10.35	12.25	21.35	18.10
12x20	14 1/16x22	9.00	4.50	10.80	6.30	12.20	14.10	22.40	19.00
12x22	14 1/16x24	10.50	5.00	12.00	6.50	14.50	17.05	25.75	20.00
12x24	14 1/16x26	12.25	5.50	13.50	6.75	16.30	18.60	26.95	22.80
12x26	14 1/16x28	16.50	7.00	18.50	8.75	22.50	26.30	.....	.....
12x28	14 1/16x30	19.00	8.00	21.00	10.00	25.00	28.80	.....	.....
12x30	14 1/16x32	20.00	8.20	22.00	10.20	26.00	29.00	33.65	28.50
12x32	14 1/16x34	24.50	9.75	26.95	12.20	31.50	34.50	.....	.....
12x36	14 1/16x38	23.75	10.25	29.40	12.90	33.75	36.25	40.40	34.25
12x40	14 1/16x42	35.00	15.50	38.50	19.00	45.00	50.00	45.50	37.40
12x48	14 1/16x50	45.00	20.00	50.60	24.60	60.00	69.50	71.00	59.00
14x14	13¼x16¼	7.90	4.05	9.45	5.60	11.00	14.30	19.00	16.00
14x15	16¼x17 5/16	8.25	4.20	9.90	5.85	11.25	15.30	.....	.....

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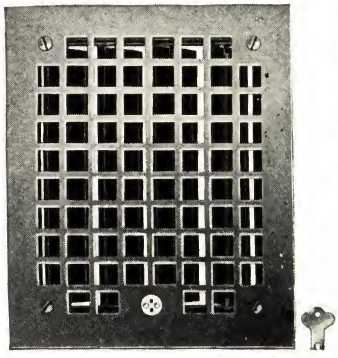
WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

LIST PRICES REGISTERS—SEMI-STEEL No. 230; ALL CAST IRON No. 240; ALL STEEL No. 800; BRONZE No. 430 (Cont'd)

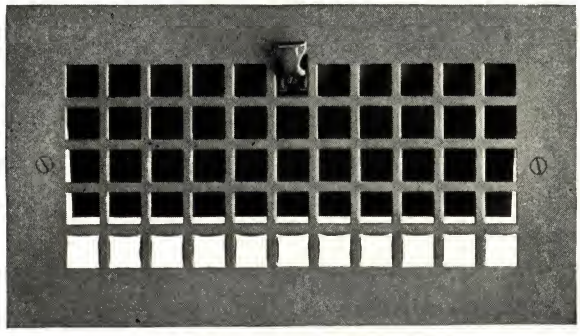
Duct Opening Size	Approximate Overall of Face	Prime Coat and Black Japan		All Lacquers and White Japan		Electroplated Oxidized Copper Complete Register	Electroplated Brass Bronze Nickel Complete Register	Brass or Bronze	
		Complete Register	Register Face	Complete Register	Register Face			Complete Register	Face Plate Only
14x16	16¼x18 5/16	$ 8.50	$ 4.30	$10.20	$ 6.00	$11.50	$16.50	$21.70	$18.25
14x18	16¼x20 5/16	9.00	4.50	10.80	6.30	12.00	18.50	24.50	20.50
14x20	16¼x22 5/16	9.50	4.80	11.25	6.40	13.00	20.50	27.10	23.10
14x22	16¼x24¼	10.50	5.00	12.00	6.50	14.50	22.50	29.85	25.45
14x24	16¼x26¼	14.90	6.90	16.40	8.40	19.50	26.00	32.50	27.50
14x28	16¼x30 5/16	23.00	9.50	25.50	12.00	30.25	35.00	.....	.....
14x30	16¼x32 5/16	27.50	10.75	30.25	13.20	33.00	37.50	46.35	39.90
14x36	16¼x38 5/16	36.00	16.00	39.60	19.60	45.00	50.00	57.00	48.00
14x40	16¼x42 5/16	41.00	18.00	45.60	22.60	54.00	60.00	64.00	55.00
14x48	16¼x50 5/16	46.00	20.00	50.60	24.60	60.00	69.50	71.00	59.00
15x15	17¼x17¼	10.00	4.90	11.25	6.15	14.00	17.00	.....	.....
15x21	17¼x23¼	12.50	6.20	13.75	7.45	16.85	25.00	.....	.....
15x25	17¼x27¼	17.50	7.10	19.25	8.85	23.00	31.00	.....	.....
15x30	17¼x32¼	27.50	10.75	30.25	13.20	33.00	37.50	.....	.....
15x34	17¼x36¼	31.75	13.75	34.90	16.90	41.25	46.00	.....	.....
15x36	17¼x38¼	35.00	18.00	38.00	21.00	42.00	50.00	.....	.....
16x16	18 5/16x18 5/16	11.00	5.10	12.20	6.20	15.00	19.75	25.15	21.00
16x18	18 5/16x20 5/16	12.00	5.30	13.20	6.50	16.20	22.25	29.00	24.80
16x20	18 5/16x22 5/16	12.35	6.10	13.60	7.35	16.55	24.60	32.75	29.00
16x22	18 5/16x24 5/16	14.75	6.70	16.20	8.15	19.50	28.00	35.40	30.20
16x24	18 5/16x26 5/16	15.00	7.00	16.50	8.50	20.00	29.60	38.65	33.00
16x28	18 5/16x30 5/16	24.60	10.00	27.05	12.45	30.80	35.00	45.10	37.20
16x30	18 5/16x32 5/16	27.90	11.00	30.70	13.80	35.00	37.50	48.30	41.15
16x32	18 5/16x34 5/16	31.00	13.10	34.10	16.20	38.25	42.00	51.00	43.40
16x36	18 5/16x38 5/16	36.00	16.00	39.60	19.60	45.00	50.00	57.00	48.00
16x42	18 5/16x44 5/16	45.00	21.00	50.00	24.60	57.00	61.00	79.20	69.t5
18x18	20 5/16x20 5/16	18.50	7.20	20.35	9.05	23.75	26.00	33.65	28.50
18x20	20 5/16x22 5/16	19.50	7.60	21.45	9.55	24.75	29.00	36.00	30.50
18x21	20 5/16x23 5/16	20.50	7.75	22.55	9.80	26.00	30.00	39.30	33.70
18x22	20 5/16x24 5/16	21.00	8.00	23.00	10.00	26.70	32.50	42.50	35.00
18x24	20 5/16x26 5/16	21.50	8.35	23.65	10.50	27.75	34.25	44.95	37.00
18x27	20 5/16x29 5/16	27.50	10.75	30.25	13.50	35.00	39.00	50.20	42.90
18x28	20 5/16x30 5/16	28.90	11.50	31.80	14.40	36.50	41.50	54.00	46.00
18x30	20 5/16x32¼	31.25	13.25	34.35	16.35	38.00	43.00	56.15	47.75
18x36	20 5/16x38¼	38.00	17.25	41.80	21.05	48.50	54.00	67.35	57.75
18x48	20 5/16x50¼	52.00	26.00	56.00	30.00	60.00	75.00	.....	.....
20x20	22 3/8x22 3/8	19.75	8.00	21.75	10.00	24.75	32.40	43.90	36.75
20x22	22 3/8x24 3/8	21.60	8.40	23.75	10.55	27.60	35.70	48.30	41.15
20x24	22 3/8x26 3/8	22.00	8.60	24.20	10.80	28.20	39.00	51.50	44.00
20x26	22 3/8x28 3/8	23.50	9.50	25.85	11.85	32.00	42.00	55.75	47.00
20x28	22 3/8x30 3/8	28.90	11.50	31.80	14.40	37.40	45.50	60.00	49.75
20x30	22 3/8x32 3/8	33.50	13.50	36.85	16.85	43.00	49.00	64.35	55.10
20x32	22 3/8x34 3/8	37.50	17.10	41.25	20.85	48.50	52.00	68.65	58.00
20x36	22 3/8x38 3/8	43.00	18.50	47.30	22.80	54.00	59.00	77.20	66.15
20x48	22 3/8x50 3/8	62.50	26.00	69.50	33.00	78.50	78.00	.....	.....
21x21	23 3/8x23 3/8	24.50	9.75	26.95	12.20	31.00	37.00	.....	.....
21x25	23 3/8x27 3/8	28.00	11.10	30.80	13.90	35.50	44.00	.....	.....
21x29	23 3/8x31 3/8	29.00	11.60	31.90	14.50	40.50	52.00	.....	.....
22x22	24 3/8x24 3/8	28.50	11.40	31.35	14.25	36.50	41.00	52.70	45.00
22x24	24 3/8x26 3/8	29.50	11.80	32.45	14.75	37.90	44.00	57.00	48.00
22x26	24 3/8x28 3/8	31.00	13.10	34.10	16.20	41.00	48.00	62.70	50.00
22x28	24 3/8x30 3/8	$33.90	$13.90	$37.30	$17.30	$44.00	$52.00	$67.10	$57.50
22x30	24 3/8x32 3/8	36.00	16.00	39.60	19.60	46.50	55.00	71.90	61.70
22x32	24 3/8x34 3/8	42.00	17.50	46.20	21.70	54.00	59.00	76.65	66.00
22x36	24 3/8x38 3/8	47.50	20.50	52.25	25.25	60.50	66.00	86.25	75.00
22x38	24 3/8x40 3/8	52.00	22.50	57.20	27.70	65.50	70.00	91.00	78.00
22x40	24 3/8x42 3/8	61.00	25.00	68.00	31.00	70.00	76.00	100.00	83.50
22x42	24 3/8x44 3/8	64.00	27.00	70.40	33.40	75.00	82.50	105.00	86.40
24x24	26 3/8x26 3/8	30.00	12.00	33.00	15.00	40.00	49.00	66.35	56.75
24x26	26 3/8x28 3/8	32.00	14.00	36.50	17.00	44.00	54.00	70.00	60.50
24x27	26 3/8x29 3/8	33.95	14.00	37.35	17.40	45.00	56.00	74.00	64.00
24x30	2 3/8x32 3/8	38.00	17.25	41.80	21.05	50.00	62.00	82.00	70.00
24x32	26 3/8x34 3/8	42.50	18.00	46.75	22.25	55.50	66.00	86.25	75.00
24x36	25 3/8x38 3/8	50.00	22.00	55.00	27.00	65.50	74.00	98.40	85.10
24x40	26 3/8x42 3/8	61.00	25.00	68.00	31.00	79.00	86.00	112.50	96.00
24x42	26 3/8x44 3/8	64.00	27.00	73.00	33.40	86.00	90.00	120.00	101.00
24x45	26 3/8x47 3/8	67.50	28.50	74.25	35.25	89.50	92.00	123.00	106.00
24x48	26 3/8x50 3/8	80.00	33.00	95.00	48.00	104.00	118.00	150.00	130.00
26x26	28 3/8x28 3/8	37.00	16.50	40.00	20.00	48.00	64.00	80.00	67.00
26x28	28 3/8x30 3/8	37.25	17.00	40.95	20.70	49.25	66.00	86.25	75.00
26x30	28 3/8x32 3/8	43.00	19.50	48.00	21.00	56.00	70.00	92.00	81.00
26x32	28 3/8x34 3/8	46.00	20.80	50.00	22.50	59.00	74.50	98.00	87.50
26x34	28 3/8x36 3/8	49.00	22.10	54.00	25.00	63.00	79.00	105.00	92.00
26x36	28 3/8x38 3/8	53.00	25.00	61.60	30.60	76.00	92.00	119.75	102.00
27x27	29 3/8x29 3/8	37.25	17.00	40.95	20.70	49.25	66.00	.....	.....
27x38	29 3/8x40 3/8	53.00	25.00	61.60	30.60	76.00	94.00	.....	.....
28x28	30 3/8x30 3/8	44.00	19.00	48.40	23.40	57.50	72.00	93.15	80.00
28x30	30 3/8x32 3/8	48.50	21.00	53.35	25.85	61.50	76.00	94.30	81.00
28x32	30 3/8x34 3/8	53.00	24.50	58.30	29.80	68.00	84.00	106.40	92.00
28x34	30 3/8x36 3/8	58.00	25.80	64.20	31.70	77.00	88.00	112.50	96.50
28x36	30 3/8x38 3/8	64.00	27.00	70.40	33.40	86.00	92.00	119.75	102.00
28x40	30 3/8x42 3/8	68.00	30.00	74.50	37.50	96.00	100.00	135.00	114.00
30x30	32 3/8x32 3/8	49.00	21.50	53.90	26.40	65.00	85.00	111.35	97.00
30x32	32 3/8x34 3/8	54.50	25.00	59.00	30.50	73.00	90.00	115.25	101.00
30x34	32 3/8x36 3/8	62.00	25.00	69.50	33.75	85.00	97.00	123.50	108.00
30x36	32 3/8x38 3/8	67.50	28.50	74.25	35.25	90.00	102.00	128.15	110.00
30x40	32 3/8x42 3/8	72.50	31.00	80.00	39.00	100.00	110.00	143.00	124.00
30x42	32 3/8x44 3/8	77.50	33.00	85.25	40.75	102.00	119.00	156.00	125.15
30x48	32 3/8x50 3/8	95.00	39.00	104.50	48.50	124.00	136.00	178.20	155.00
36x36	38 3/8x38 3/8	80.00	35.00	88.00	43.00	105.00	127.00	156.00	125.15
36x40	38 3/8x42 3/8	105.00	44.00	115.50	54.50	135.00	142.00	178.20	155.00
36x42	38 3/8x44 3/8	112.00	46.00	123.20	57.20	143.00	150.00	184.00	160.00
36x48	38 3/8x50 3/8	132.00	54.00	145.20	67.20	168.00	173.00	207.40	178.00
38x38	40 3/8x40 3/8	100.00	43.50	110.00	53.50	130.00	145.00	.....	.....
38x40	40 3/8x42 3/8	112.00	46.00	123.20	57.20	142.00	153.00	.....	.....
38x42	40 3/8x44 3/8	120.00	50.00	132.00	62.00	155.00	160.00	192.50	165.00



No. 6800

No. 6800 All Steel Key Operated Wall Register

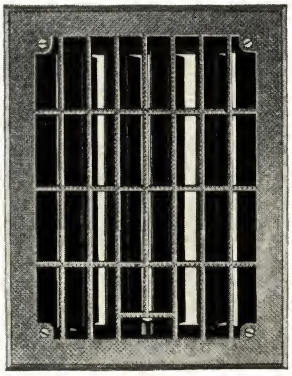
Can be operated only by use of key. Steel face and steel body. No. 6240 is similar but has a cast face and cast body. To secure list prices, add $2.00 to the list given in the table above.



Forced Air Register (Single Valve)

No. 870 All Steel—For Semi-Steel Specify No. 875

This register was designed by us to meet requirements for forced air or air conditioned heating and ventilating systems. This register is made with a single valve (or fan) and is so constructed that the tension of the valve *may be adjusted from the front* without the necessity of removing the register face. Also furnished with felt lined valve as well as worm screw operating device.



No. 270

No. 270 Pebble Floor Register

Having beveled edge and narrow rim, register or face can be set without recessing. Metal is of sufficient weight to insure adequate strength. The pebbles prevent foot from slipping.

For pebble faces only specify No. 272.

FLOOR OPENING

8 x 10	9 x 12	10 x 13	12 x 15
8 x 12	10 x 12	12 x 14	14 x 16

A NEW TYPE OF VENTILATING REGISTER

HIGHTON—H & C STRAIGHT FLOW AND VOLUME CONTROL REGISTER

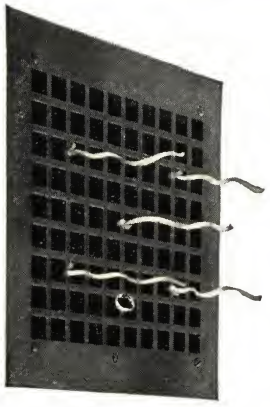
(McKnight Patent Pending)

A Register Which Allows Straight Flow as Well as Volume Control

With this register it is possible to accurately adjust the delivered velocity of air at each duct opening. This is accomplished at the register face by means of a setting key. It eliminates the necessity of using any damper or deflector in the duct system as well as practically all diffusers.

If it is desired to increase or decrease the volume of air issuing at any particular register, at any time this is easily and quickly done at the register face. An engineer, by testing with an anemometer and adjusting the louvre, can easily regulate the volume of air, and this without the aid of assistants.

By means of this method of easy adjustment of volume at the register, the testing and balancing of the entire system is more conveniently and accurately accomplished than by the old system of dampers and deflectors, usually placed in out of the way places.



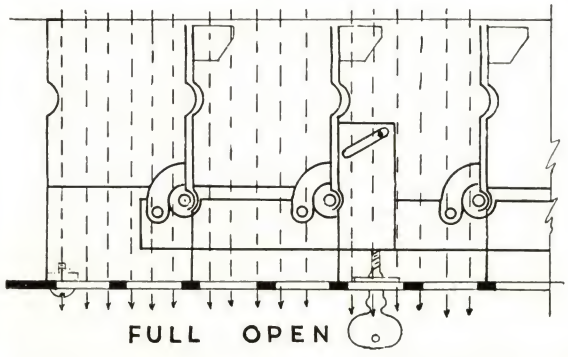
No. 1000

A Straight Flow of Air Now Possible

The patented construction of the register assures a straight flow of air from its face no matter what position the louvres are set. The louvres are locked in such a manner that no vibration occurs at any velocity. They are also so constructed that the air is sent straight out into the room. By this means all drafts are prevented, thus giving more even distribution of air throughout the room and assuring greater efficiency and circulation.

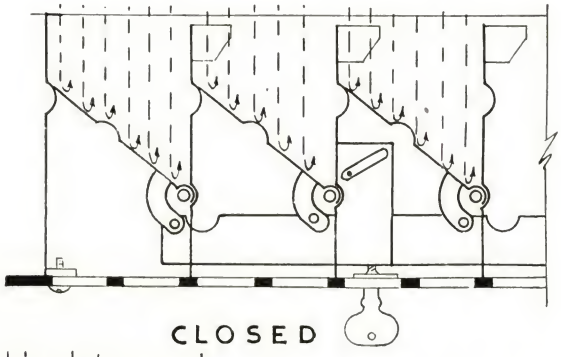
Comparative Cost

The slight additional cost of the register is more than offset by the saving in dampers, access doors, deflectors, an ordinary register, and the necessary time to install these. It also reduces the cost and simplifies the checking of the operation of the system for the architect and engineer as well as allowing future adjustments to be made if desired.



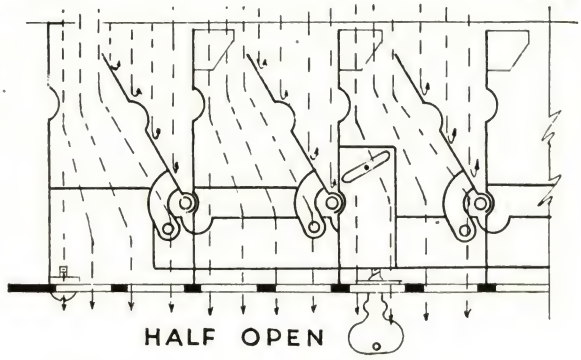
FULL OPEN

With the pivoted louvres close against the fixed vanes when in the FULL OPEN position, there is practically FULL AREA through the register.



CLOSED

Pivoted louvres in the closed position. A touch of the key and they can be opened and locked at any angle desired for volume control.



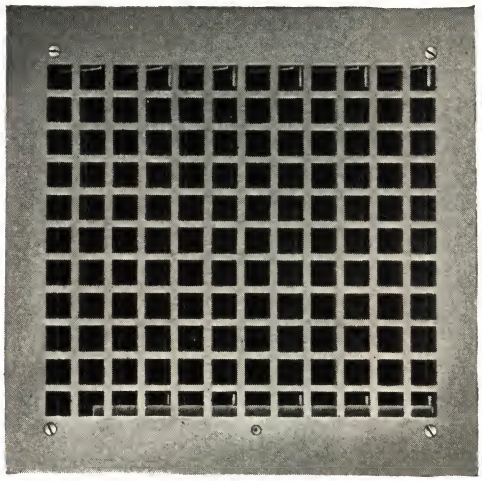
HALF OPEN

With the pivoted louvres HALF OPEN (or at any other angle between the position of full open and full shut) there is no deflection of the air issuing from the register face either up, down or sideways. The air currents always issue at right angles to the register face. Note the air currents trapped in the Vee-shaped spaces produced between the fixed vanes and pivoted louvres creating a perfect throttling effect of the air flow. Also note that the air currents pass through the register face, with a velocity proportioned to the degree of throttling required to meet the varying air volume, when balancing the entire Ventilating system at each register face.

Improves a Poor System ***Makes a Good System Perfect***

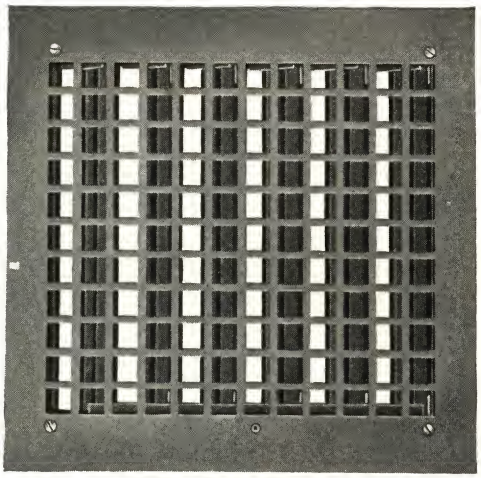
McKNIGHT REGISTER (Continued)

Outstanding Advantages of New Highton—H & C Register



Valves Closed

1. A more accurately balanced system.
2. Ease of balancing.
3. No need for diffusers.
4. Elimination of dampers.
5. No counter-balancing caused by open windows or doors.
6. Even distribution of air throughout the room.
7. Lower total cost for the system.
8. Straight flow of air.



Valves Partly Open

LIST PRICES McKNIGHT REGISTERS

Black Japan or Prime Coat

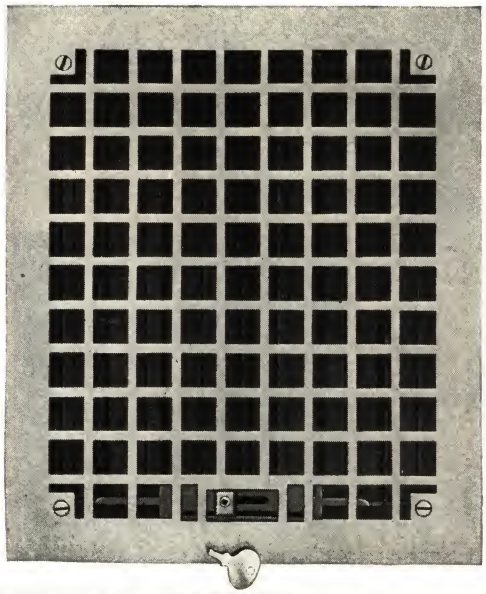
Size WxH	List	Size WxH	List	Size WxH	List	Size WxH	List	Size WxH	List
10x8	$5.15	18x14	$14.00	24x8	$17.25	28x8	$20.00	30x24	$40.00
10x10	6.35	18x16	15.00	24x10	18.25	28x10	21.00	30x26	45.00
12x8	5.65	18x18	20.50	24x12	19.00	28x12	24.50	30x28	50.50
12x9	6.00			24x14	21.50	28x14	25.00	30x30	51.00
12x10	6.40	20x8	11.70	24x16	22.00	28x16	26.60		
12x12	8.35	20x10	14.00	24x18	23.50	28x18	30.90	36x8	31.50
		20x12	14.20	24x20	25.00	28x20	33.40	36x10	34.75
14x8	7.10	20x14	16.00	24x22	31.50	28x22	35.90	36x12	35.75
14x10	7.25	20x16	17.00	24x24	32.00	28x24	37.60	36x14	38.00
14x12	8.85	20x18	21.50			28x26	41.00	36x16	39.00
14x14	9.90	20x20	21.75	26x8	18.00	28x28	46.00	36x18	40.00
				26x10	19.00			36x20	45.00
16x8	8.75	22x8	12.15	26x12	20.00	30x8	21.50	36x22	49.50
16x10	9.20	22x10	16.00	26x14	23.00	30x10	27.50	36x24	52.00
16x12	10.25	22x12	16.50	26x16	24.00	30x12	28.00	36x26	58.00
16x14	10.50	22x14	18.00	26x18	25.00	30x14	30.00	36x28	66.00
16x16	13.00	22x16	18.75	26x20	26.00	30x16	31.50	36x30	69.50
18x8	11.40	22x18	23.00	26x22	33.00	30x18	33.25	36x32	75.00
18x10	12.00	22x20	24.00	26x24	34.00	30x20	35.50	36x34	78.50
18x12	13.00	22x22	30.50	26x26	39.00	30x22	38.00	36x36	82.00

The McKnight Register is made in all steel only at the present time. The face on the smaller sizes are of No. 12 gauge steel and No. 10 gauge on the sizes larger than 14x14. The register bottoms, valves, etc., are made of No. 16 gauge stock.

For information, prices, etc., on other material in which this register can be made as well as different finishes that can be applied on the same, write the home office.

HIGHTON—H & C "SURLOCK" REGISTER

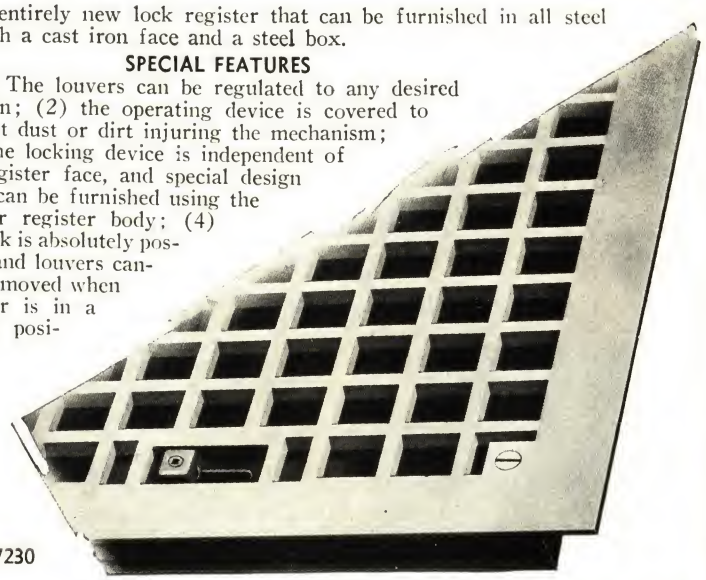
Trade Mark Applied For



An entirely new lock register that can be furnished in all steel or with a cast iron face and a steel box.

SPECIAL FEATURES

(1) The louvers can be regulated to any desired position; (2) the operating device is covered to prevent dust or dirt injuring the mechanism; (3) the locking device is independent of the register face, and special design faces can be furnished using the regular register body; (4) the lock is absolutely positive, and louvers cannot be moved when register is in a locked position.



No. 7230

HIGHTON—H&C VENTILATING SPECIALTIES

Fixed Steel (Fire) Louvres

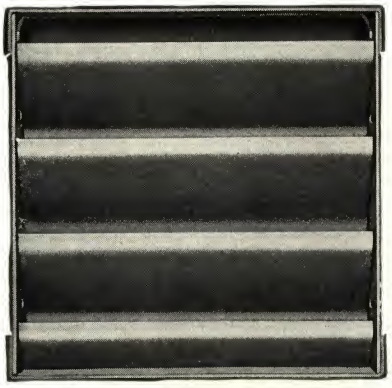
For fire protection. Used in ventilating risers of modern, especially public, buildings.

Steel louvres riveted to frames. Design and construction have approval of National Board of Fire Underwriters. Special fire louvres to meet demands of New York Board of Fire Underwriters.

Standard sizes:

4 x 6	4 x 14	6 x 12
4 x 8	6 x 6	6 x 14
4 x 10	6 x 8	8 x 8
4 x 12	6 x 9	8 x 10
	6 x 10	

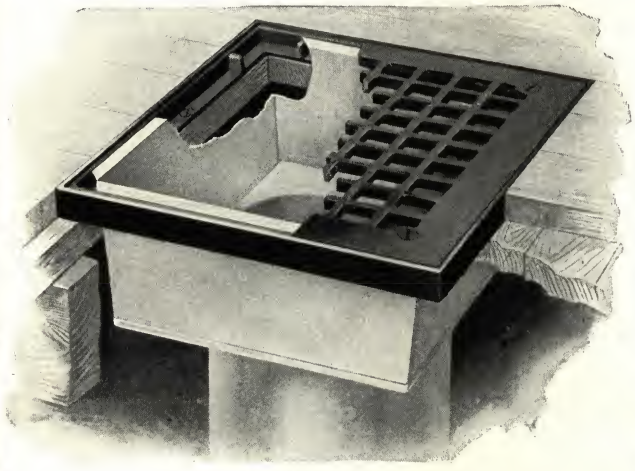
Frames are 2" deep.



No. 306 Fixed Louvre View from Front

Highton-H & C Concealed Warm Air Register Border

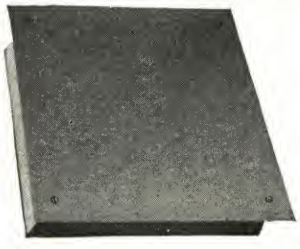
Patented Oct. 18, 1921



No. 297

Saves labor in putting down finished floors, as finished floor boards can be cut to proper lengths after border has been placed and fastened to rough floor. Top surface or edge of border will be flush with top of standard upper flooring or with tile, cement or mosaic floors, also with plaster when used in wall. No wide unsightly flanges like old-style borders to be damaged or broken. Can be installed long before building is ready for finishing and will not show any damage on account of very small edges. Made in Cast Iron, Brass or Bronze Metal, and in any finish. Made to fit standard size Registers.

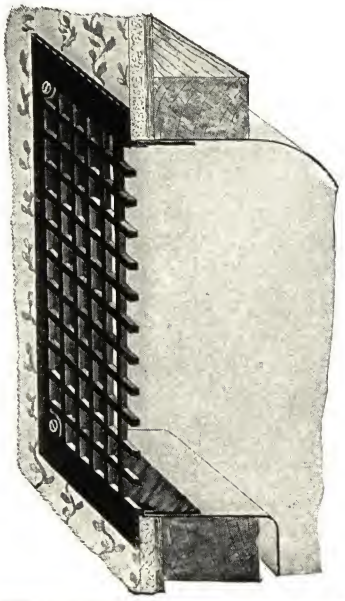
No. 307 Access Panels



Made from 14-gauge solid steel plate screwed in corners to 4-in. cast iron Reverse Bevel Wall Frame. Flanges of plate extend over outer edge of wall frame about 1 in. all around to cover joint between frame and plaster. Can be made in any size listed under Reverse Bevel Wall Frames on page 26.

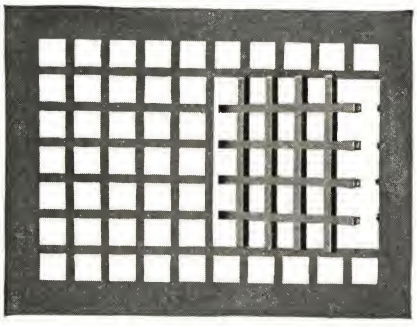
No. 294 Band Iron Frame

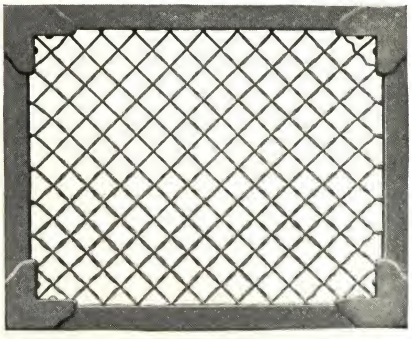
The most improved method of securing Grilles or Register faces to sheet metal ducts. Frames fit inside duct same as Register bodies and are attached in similar manner.



Invisible Hand Hole Door for Access to Radiator Valves

Standard size is approximately 5x 5 in. or 6x6 in., either cast or stamped. The exact location of door must be specified.



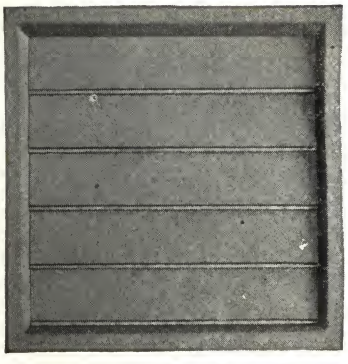


No. 127 Wire Grille

Wire grilles can be furnished in any design or type of wire.

No. 293 Aluminum Back Draft Damper

Frame made of either tin or galvanized sheet steel of light gauge. Louvres of light aluminum sheets, — slightest draft causes them to open and allows air to pass out, but prevents any back draft into room they are used in exhaust ducts. Can be attached to any grille, just like a register box.



CAST OR WROUGHT REVERSE BEVEL WALL FRAMES

THEIR IMPORTANCE TO ARCHITECTS AND ENGINEERS

Cuts Costs, Simplifies Construction and Speeds Up Work

Architects and Engineers are rapidly realizing the value of using cast or wrought wall frames to secure registers and grilles in masonry walls. After they have once been used and their advantages realized, they become standard for specifications thereafter.

Special Advantages of Reverse Bevel Wall Frames

The following advantages of the frames explain the growth of their use.

(1) Economy—Their small cost is offset by the time they save for the various trades in building in, eliminating setting of grounds, acting as screeds or grounds for plastering and cutting the costs of the registers and grilles by eliminating the necessity for special sizes.

(2) Setting—They are quickly set in the masonry and are firmly anchored in place. This eliminates the making of wood bucks or iron frames.

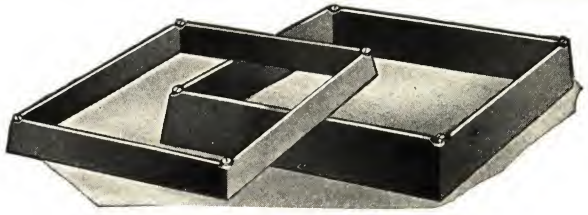
(3) Act as Grounds—The frames are set in the wall so as to receive the plaster and eliminate the necessity of grounds.

(4) Setting of Grilles and Registers—The frames have provision for properly screwing the grilles or registers.

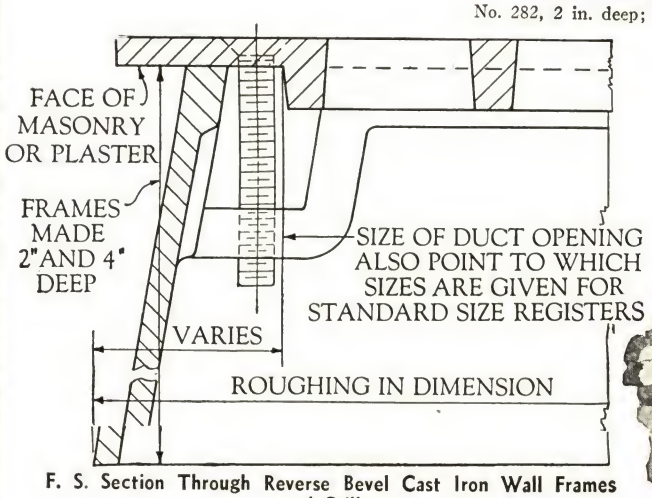
(5) Stock Sizes—Frames are made in cast or wrought metal (specify which) in the same stock sizes as grilles and in 2-in. and 4-in. depths to fit different thicknesses of walls. Special sizes only to order at an increased cost.

(6) Prompt deliveries of necessary grilles or registers can be guaranteed inasmuch as in using the wall frames it eliminates the necessity of making templates or the taking of actual measurements after openings are set and the building almost completed.

(7) Advantages in Cost of Standard Sizes—The use of standard sizes for grilles and registers allows a lower contract price as the cost of the number of moulds and patterns is reduced as well as the time to make them.

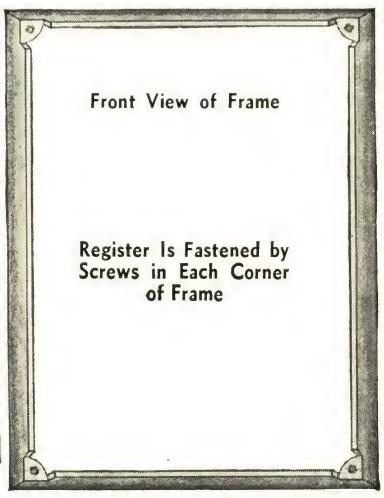


Cast Iron Reverse Bevel Wall Frames
(Made 2 in. and 4 in. Deep)
No. 282, 2 in. deep; No. 284, 4 in. deep.



F. S. Section Through Reverse Bevel Cast Iron Wall Frames and Grilles

Frame Set in Wall



LIST PRICE OF STANDARD SIZE REVERSE BEVEL WALL FRAMES (EITHER 2 IN. OR 4 IN. DEEP)

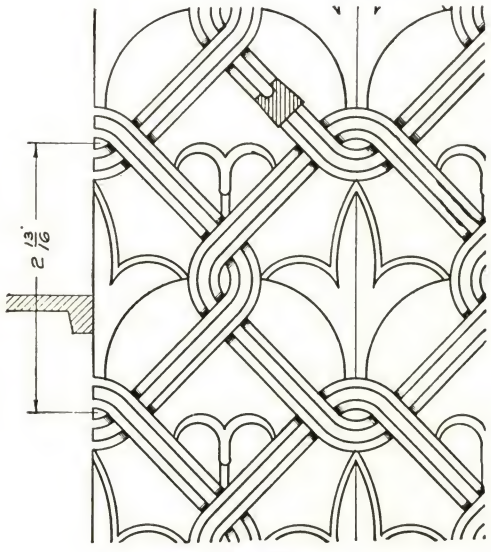
Register Size, Ins.	Price	Register Size, Ins.	Price	Register Size, Ins.	Price	Register Size, Ins.	Price	Register Size, Ins.	Price	Register Size, Ins.	Price	Register Size, Ins.	Price
4½x6½	$1.30	6x16	$2.70	8x18	$3.10	9x32	$6.00	12x16	$3.60	14x30	$6.60	18x36	$7.80
4x 8	1.40	6x18	2.90	8x20	3.40	9x36	6.30	12x17	3.80	14x36	7.50	20x20	5.90
4x10	1.70	6x20	3.10	8x21	3.50	10x10	2.50	12x18	3.90	14x40	8.50	20x22	6.30
4x12	1.90	6x22	3.40	8x24	3.80	10x12	2.80	12x19	4.00	15x15	4.90	20x24	6.60
4x15	2.30	6x24	3.60	8x27	4.20	10x14	3.00	12x20	4.20	15x21	5.00	20x26	6.90
4x18	2.60	6x28	4.10	8x30	4.60	10x15	3.30	12x22	4.70	15x25	5.50	20x28	7.10
4x21	3.00	6x30	4.30	8x32	5.80	10x16	3.30	12x24	4.70	16x16	4.40	20x30	7.50
4x24	3.40	6x32	4.60	8x36	6.30	10x18	3.50	12x26	5.40	16x18	4.70	20x32	7.70
5x 8	1.60	6x36	5.75	9x 9	2.20	10x20	3.80	12x28	5.45	16x20	5.00	20x36	8.50
5x 9	1.70	7x 7	1.70	9x12	2.60	10x22	4.20	12x30	5.50	16x22	5.30	21x29	7.70
5x10	1.80	7x10	2.10	9x13	2.70	10x24	4.30	12x32	5.70	16x24	5.50	24x24	7.20
5x12	2.00	7x12	2.30	9x14	2.80	10x30	5.00	12x36	6.30	16x28	6.10	24x27	7.80
5x14	2.30	7x14	2.50	9x15	2.90	10x36	6.30	12x40	7.20	16x30	6.40	24x30	8.10
5x16	2.50	7x15	2.60	9x16	3.10	10x40	7.20	12x48	9.00	16x32	6.70	24x32	8.60
5x18	2.80	8x 8	1.90	9x18	3.30	10½x16½	3.50	14x14	3.80	16x36	6.80	24x36	9.10
6x 6	1.40	8x10	2.20	9x20	3.50	11x17	3.60	14x15	3.90	18x18	5.20	24x45	10.50
6x 8	1.70	8x12	2.40	9x22	3.80	11x18	3.70	14x16	4.10	18x20	5.50	27x27	8.10
6x 9	1.80	8x13	2.50	9x24	4.00	11x20	4.00	14x18	4.30	18x21	5.60	27x38	9.90
6x10	1.90	8x14	2.60	9x26	4.30	12x12	3.10	14x20	4.60	18x24	6.00	30x30	9.00
6x12	2.20	8x15	2.80	9x28	4.50	12x14	3.40	14x22	4.80	18x27	6.40	30x36	10.00
6x14	2.40	8x16	2.90	9x30	4.80	12x15	3.50	14x24	5.00	18x30	6.80	36x36	11.00

Note: Reverse Bevel Wall Frames can also be furnished in bronze.

"HITONCAST" UNIT DETAILS

On this page are shown four "Hitoncast" Grille Designs which are listed among our more popular designs. They are shown here in half-size details.

Attention is called to the fact that Highton-H&C have prepared full size blueprint details of forty of the more popular "Hitoncast" and Perforated Grille Designs, similar to, but more comprehensive than half-size details shown on this page. These blueprint details not only show the design in full-size, but also give a table which states the exact high by wide opening for any number of units on that particular design. These blueprint details are adapted especially for architects' use in laying out designs on plans, and a complete set of them will be gladly sent *without charge* upon receipt of any such request.



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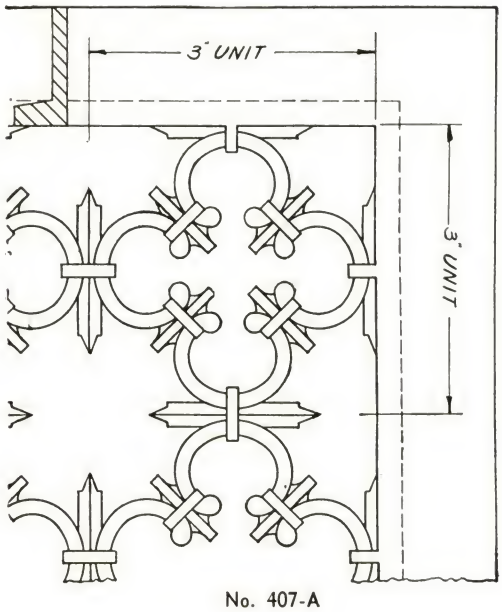

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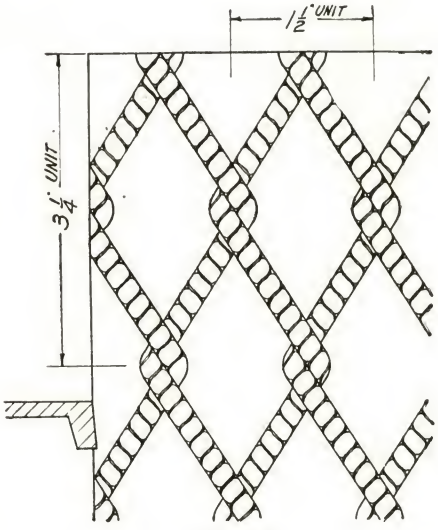

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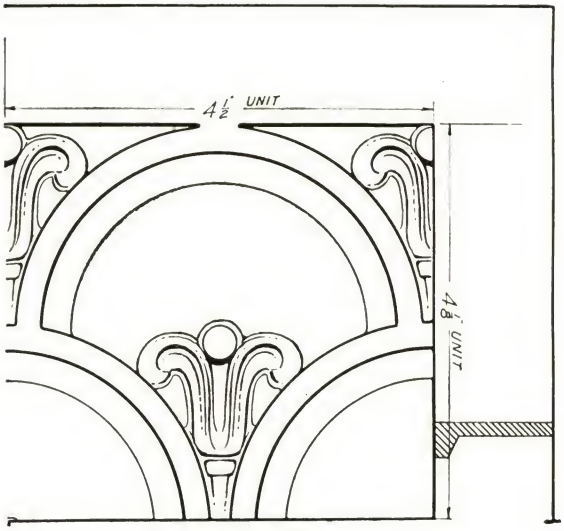
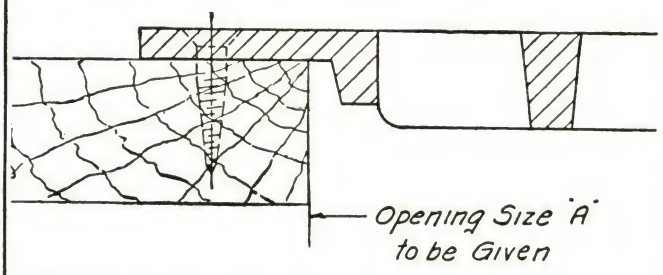


No. 70

Drawings Made to Half-Scale

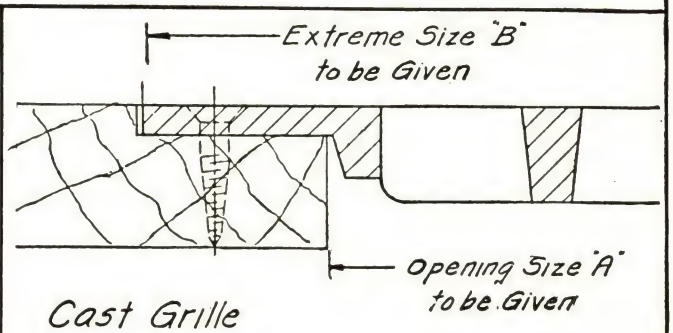
WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

CONSTRUCTIONS AND METHODS FOR FASTENING "HITONCAST" CAST AND HIGHTON—H&C STAMPED GRILLES



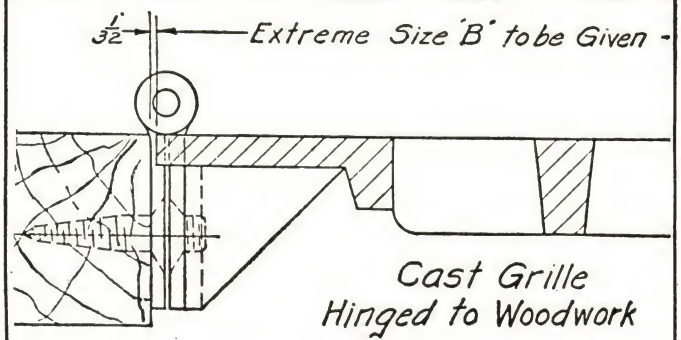
Cast Grille Overlapping the Opening

METHOD 10



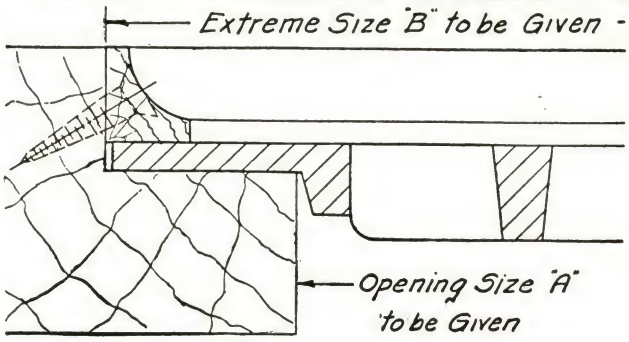
Cast Grille Set in Rabbet

METHOD 11



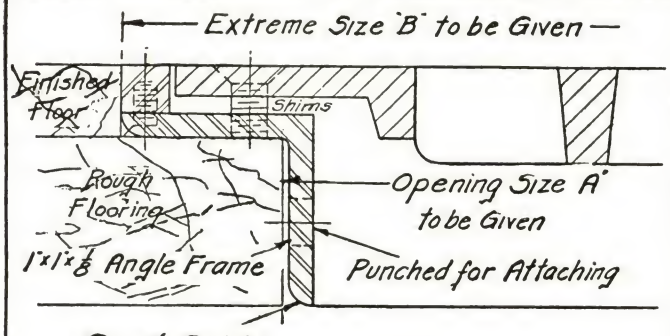
Cast Grille Hinged to Woodwork

METHOD 12



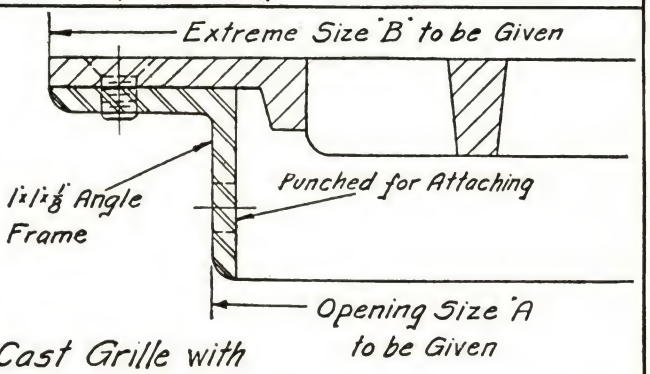
Cast Grille Secured By Moulding

METHOD 13



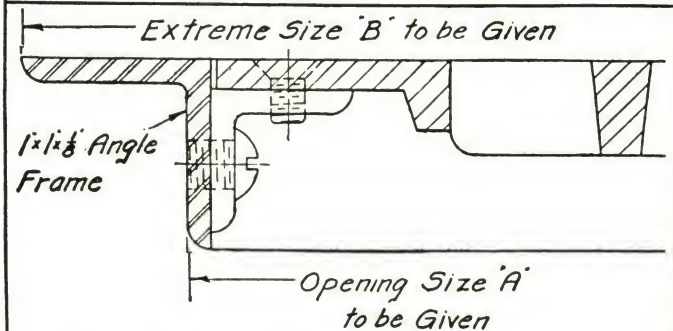
Cast Grille in Floor Frame

METHOD 14



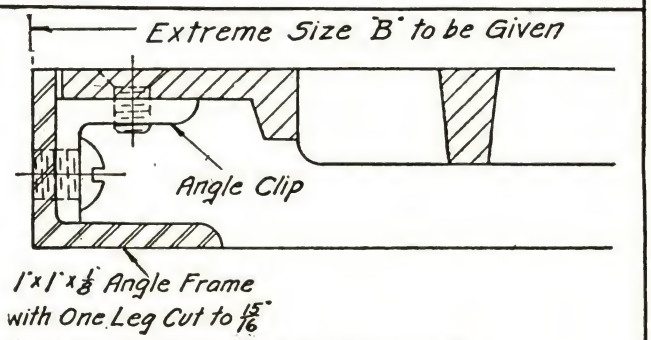
Cast Grille with Angle Frame on Back

METHOD 15



Cast Grille Attached to Frame with Angle Clips

METHOD 16

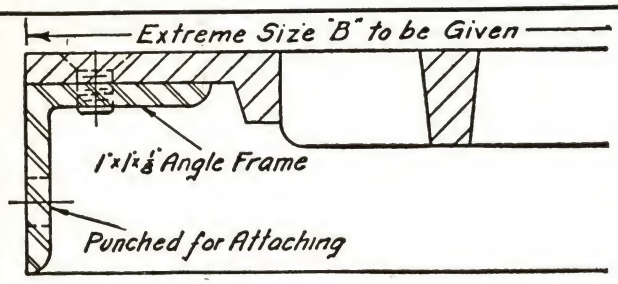


Cast Grille Attached to Reversed Frame with Angle Clips

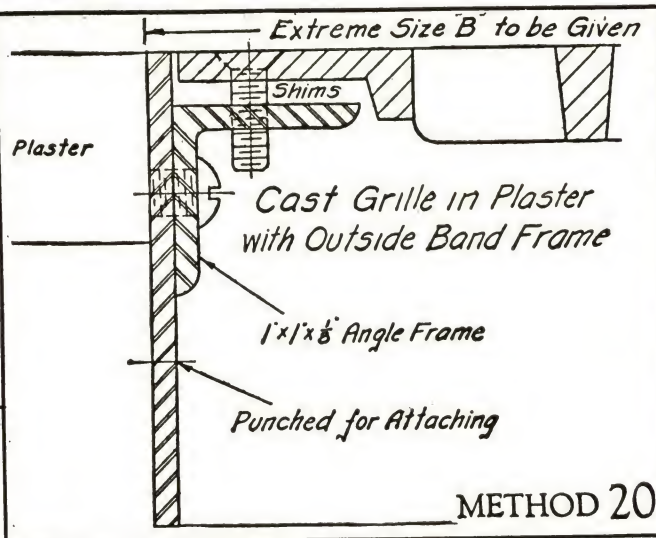
METHOD 18

WM. HIGHTON & SONS—DIVISION OF HART & COOLEY MFG. CO.

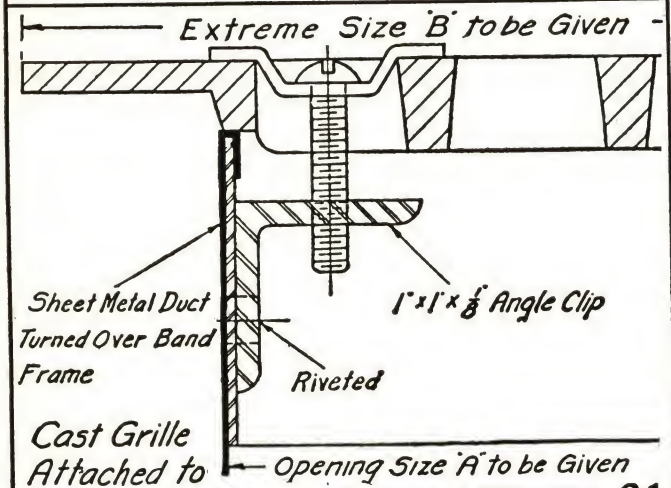
CONSTRUCTIONS AND METHODS FOR FASTENING "HITONCAST" CAST AND HIGHTON—H&C STAMPED GRILLES



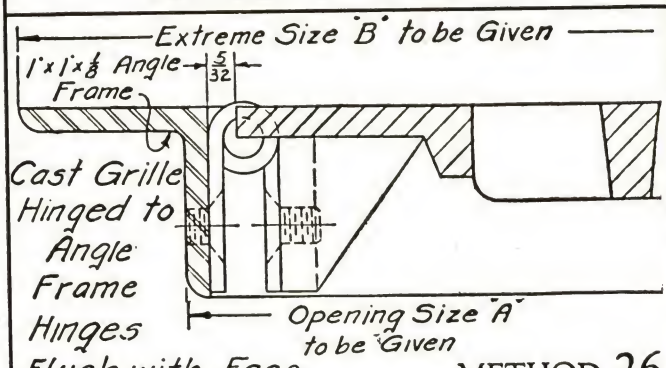
Cast Grille with Reversed Angle Frame on Back METHOD 19



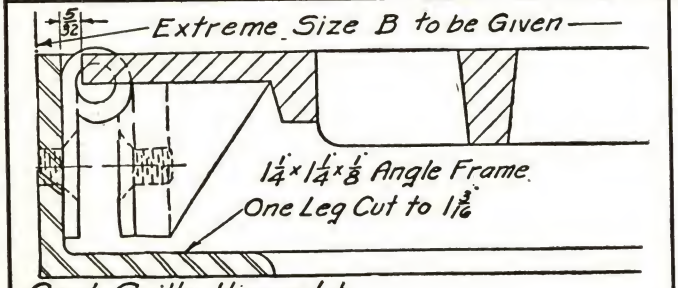
METHOD 20



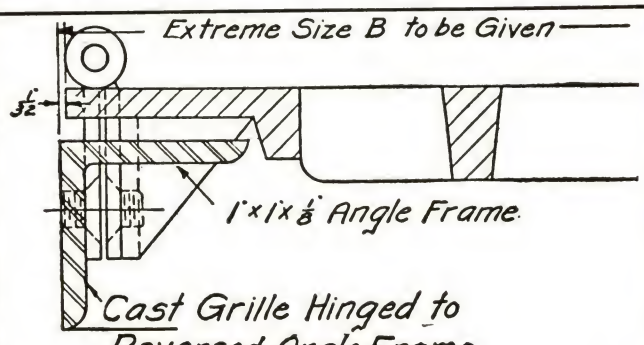
Cast Grille Attached to Inside Steel Band Frame METHOD 21



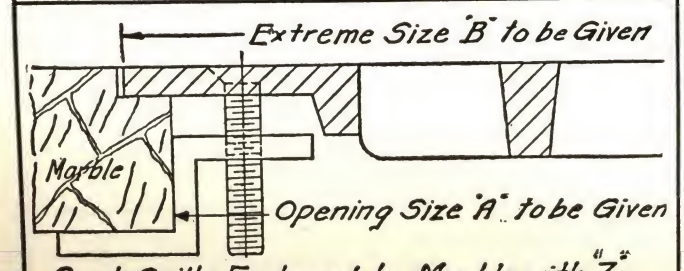
METHOD 26



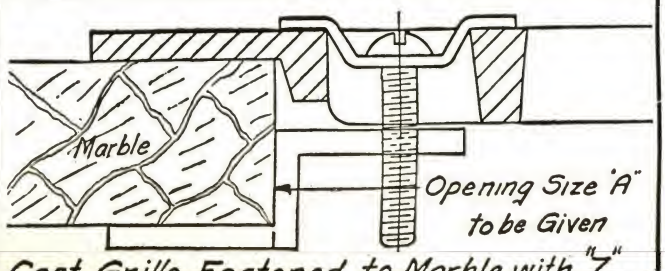
Cast Grille Hinged to Reversed Angle Frame Hinges Flush with Face METHOD 27



METHOD 28



Cast Grille Fastened to Marble with "Z" Lugs Attached with Screw Through Margin METHOD 29



Cast Grille Fastened to Marble with "Z" Lugs and Stamped Metal Block-out Caps METHOD 31

REFERENCES

Leading architects, engineers and builders are using Highton-H & C Registers, Faces, Grilles, Screens, etc., where quality and service are most important, as you will note from the character of the following list of buildings where they have been installed.

CONNECTICUT

Bridgeport Telephone Building, Bridgeport
Aetna Life Insurance Building, Hartford
Hartford County Building, Hartford.
Second Church of Christ, Scientist, Hartford
Sterling Memorial Library, New Haven
Hartford National Bank & Trust Co., Hartford
Stillman Rockefeller Residence, Greenwich
Supreme Court and Library, Hartford.
Charles Hungerford Hospital, Torrington

GEORGIA

First National Bank, Atlanta

ILLINOIS

Austin Senior High School, Chicago
Chandler Department Store, Chicago
Evanston Hospital Nurses' Home, Chicago
Harrison & Wabash Building, Chicago
Kelly High School, Chicago
Merchandise Mart, Chicago
University of Chicago Field House, Chicago
Hamilton Park Field House, Chicago
Parker Junior High School, Chicago
Decatur Armory, Decatur
Women's Bldg. State Fair Grounds, Springfield
Michigan Lake Building, Chicago

KENTUCKY

Inter-Southern Insurance Bldg., Louisville

LOUISIANA

Francis Hotel, Monroe

MAINE

Central Maine General Hospital, Lewiston
Eastern Maine State Hospital, Bangor
Bates College, Lewiston
Custom House, Portland
City Hall, Portland

MARYLAND

Kelly-Springfield Tire Co., Cumberland
Gardenville School, Baltimore
Maryland Casualty Co., Baltimore
Baltimore & Ohio R. R. Office Bldg., Baltimore
Cardinal Gibbons Residence, Baltimore
Municipal Hospital, Baltimore
Aheb Shalem Temple, Baltimore
Popular Grove School, Baltimore
Hutzler Bldg., Baltimore
Citizens National Bank Bldg., Baltimore.
Emerson Hotel, Baltimore
War Memorial Bldg., Baltimore
Mercantile Bank, Baltimore
State Normal School, Baltimore

MASSACHUSETTS

Thompson's Spa, Boston
New Herald Traveler Bldg., Boston
Hayden-Stone Tower Bldg., Boston
New Edison Bldg., Boston
Manger Hotel, Boston
North Station, B. & M. R. R., Boston
Dillon Field House, Boston
Harvard Units 1 and 2, Boston
Temple Israel, Boston
Y. W. C. A., Boston
Harvard Club, Boston
Suffolk County Court House, Boston
South Terminal, Boston
John Hancock Bldg., Boston
Harvard Medical School, Boston
Federal Trust Co. Bldg., Boston
Merchants National Bank Bldg., Boston
Evans Memorial Hospital, Boston
Beacon Trust Co., Boston
Old Colony Trust Co., Boston
Schraffts' Candy Store, Boston
New Second Universalist Church, Boston
St. Paul's Church, Boston
Park Square Office Bldg., Boston
Fenway Apartments, Boston
Corey Hill Hospital, Brookline
St. Joseph's Academy, Brighton
St. Elizabeth's Hospital, Brighton
Cambridge Hospital, Cambridge
Merrimack National Bank, Haverhill
Boston State Hospital, Mattapan
State Armory, Medford
Pittsfield High School, Pittsfield
Salem Hospital, Salem
Hampden County Courthouse, Springfield
Greendale Hospital, Worcester
Bancroft Hotel, Worcester

MICHIGAN

Hotel Statler, Detroit
Book-Cadillac Hotel, Detroit
Ishpeming High School, Ishpeming
Robt. Trombly School, Grosse Pointe
Edw. Denby High School, Detroit
Northeastern Branch Y. M. C. A., Detroit
Michigan State Hospital, Detroit
Genessee Bank, Flint, Mich.

MINNESOTA

Holy Angels Academy, Minneapolis
Folwell Junior High School, Minneapolis
First National Bank, St. Paul

MISSOURI

Globe Democrat Bldg., St. Louis
Scruggs-Vandervoort Dept. Stores, St. Louis

NEBRASKA

Duchesne College Chapel, Omaha

NEW HAMPSHIRE

Amoskeag Bank Bldg., Manchester
Manchester Savings Bank, Manchester
Memorial Hospital, Nashua
Public Library, Nashua

NEW JERSEY

Ritz-Carlton Hotel, Atlantic City
Convention Hall and Theatre, Asbury Park
Lakewood Hospital, Lakewood
Newark & Essex Bank Bldg., Newark
Y.M.C.A., Paterson
Trenton Central High School, Trenton

NEW YORK

Kings County Hospital, Brooklyn
Elmira Telephone Building, Elmira
Myron Taylor Hall, Ithaca
Baptist Home for the Aged, New York
Broadway Temple, New York
Bronx Hospital, New York
Childs Education Building, New York
Chrysler Building, New York
Empire State Building, New York
Guggenheim Dental Clinic, New York
Hunter College, New York
Jewish Theological Seminary, New York
Eighth Avenue Subway Stations, New York
Riverside Church, New York
Temple Emanu-El, New York
Tudor City Apartments, New York
Union League Club, New York
Western Union Telegraph Building, New York
Y.M.H.A., New York
Pelham Memorial High School, Pelham
Walker-Lispenard Telephone Bldg., New York
Waldorf-Astoria Hotel, New York
Elks Home, Brooklyn
Woolworth Bldg., New York
Bellevue Hospital, New York
New York Club, New York
Lincoln Trust Co., New York
Metropolitan Museum of Arts
Hotel Ambassador
Roosevelt Home
Hendricks Memorial Chapel, Syracuse
College of Forestry, Syracuse
Syracuse Memorial Hospital, Syracuse
Syracuse Savings Bank, Syracuse
Forest Hill Drive School, Syracuse
Jefferson Junior High School, Rochester
Washington Junior High School, Rochester

NORTH DAKOTA

Burleigh County Court House, Bismarck

OHIO

First Church of Christ Scientist, Cleveland
Medical Arts Bldg., Cleveland
Leader News Bldg., Cleveland
Engineers Bank Bldg., Cleveland
Severance Hall, Cleveland
Hanna Bldg., Cleveland
Cleveland Railway Co.
Firestone Tire Co., Akron

OKLAHOMA

Ramsey Tower Bldg., Oklahoma City
Medical Arts Bldg., Oklahoma City
Shidler School, Oklahoma City

PENNSYLVANIA

Pennsylvania Hospital, Philadelphia
Girard Trust Co., Philadelphia
Wanamaker Stores, Philadelphia
Gimbel Bros. Bldg., Philadelphia
Jewish Hospital, Philadelphia
Mt. Sinai Hospital, Philadelphia
Bulletin Bldg., Philadelphia
Merchants National Bank, Allentown
First National Bank, Mahanoy City
Mellon National Bank, Pittsburgh
Gulf Bldg., Pittsburgh
Bishop White Memorial Chapel, Valley Forge

RHODE ISLAND

Sayles Memorial Hospital, Pawtucket
State Armory, Providence

SOUTH CAROLINA

Dime Bank & Trust Co., Charleston

TENNESSEE

George Peabody College, Nashville

TEXAS

Forum Cafeteria, Houston
Sanger Store, Fort Worth

VERMONT

Middlebury College, Middlebury
State Capitol Bldg., Montpelier

VIRGINIA

West Hampton High School, Richmond
Richmond Trust Co., Richmond

WISCONSIN

Kenosha, Y.M.C.A., Kenosha
Marquette Tower, Milwaukee

DISTRICT OF COLUMBIA

Italian Embassy, Washington
Accacia Mutual Life Insurance Building, Washington
New Bureau of Engraving and Printing, Washington
Hamilton Hotel, Washington
Eastern High School, Washington

GLASGOW, SCOTLAND

Royal Hospital

MONTREAL, CANADA

Eaton Building
Montreal High School

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MOBILE—McGowin-Lyons Hardware & Supply Co., 113-125 No. Water Street
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COLORADO: DENVER—John T. Rowntree, Inc., 707 Interstate Trust Building
FLORIDA: MIAMI—G. W. Sistrunk, P. O. Box 1007
TAMPA—Carrington Sweeny, 105 Cass Street Arcade
GEORGIA: ATLANTA—Julian F. Baxter, Inc., 397 Peachtree Street, N. E.
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SAN ANTONIO—Geo. H. Swan Co., 314 South Street
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W. VIRGINIA: BLUEFIELD—Central Sales & Purchasing Co.
WISCONSIN: MILWAUKEE—A. F. Wagner Architectural Iron Works, 1483 No. Water Street
WASHINGTON: SEATTLE—J. P. Shallow, 610 Taylor Avenue, North
WASHINGTON, D. C.: Fred S. Gichner Iron Works, Inc., 1214 24th Street N. W.
CANADA: MONTREAL—Ogilvie-Robinson, 2087 Bleury Street

HENDRICK MANUFACTURING COMPANY

Hendrick Perforated Metal Grilles

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Product

HENDRICK PERFORATED METAL GRILLES.

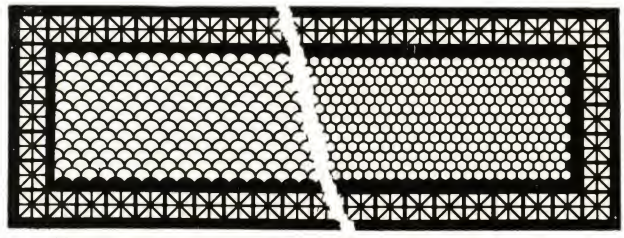
For page on Mitco Interlocked Steel Grating, Mitco Armorgrids and Mitco Shur-Site Treads, see Manufacturers' Index.

Hendrick Perforated Metal Grilles

In working with Hendrick on grille requirements, the architect, builder or engineer is not limited to standard designs. Although Hendrick Grilles are furnished in a wide variety of attractive, standard designs (some one of which usually harmonizes with the general architectural design), Hendrick is always glad to co-operate in development of patterns to meet requirements.

As Hendrick Perforated Metal Grilles are perforated from metal sheets or plates (requiring no casting patterns), Hendrick Grilles can be promptly furnished in steel, brass, bronze, copper, zinc, monel metal, stainless metals, and all other commercially-rolled metals. They are furnished unpainted or with prime coat, with lacquer or duco finish of any specified color, or any standard electroplate finish.

Hendrick always maintains large stocks of standard metals in order to expedite production and make prompt shipments. Architects, builders and engineers will find the Hendrick Grille Catalogue a valuable aid in specifying or ordering. Write for a copy.

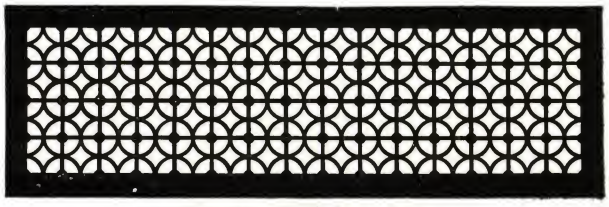


Variations Possible by Combinations of Hendrick Designs

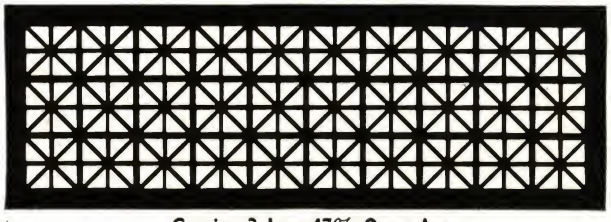
Ordering Information

When inquiring for Hendrick Grilles, or in ordering, please give the following information: quantity; kind of material; thickness or gauge of material; overall dimensions; width of margin or blank border; design of perforation desired; doors or hand holes if any; location, size and style of attachment holes; finish.

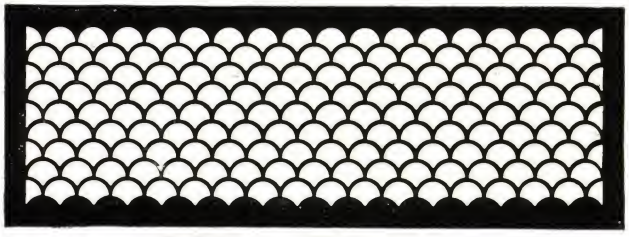
Data contained in the Hendrick Catalogue will be of valuable aid in ordering or specifying designs.



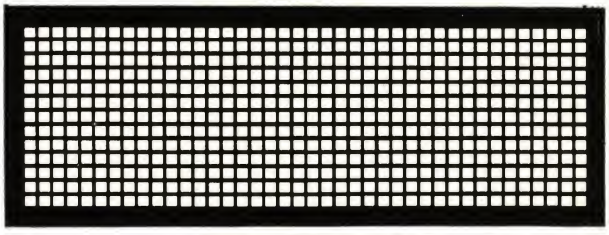
Egyptian—55% Open Area



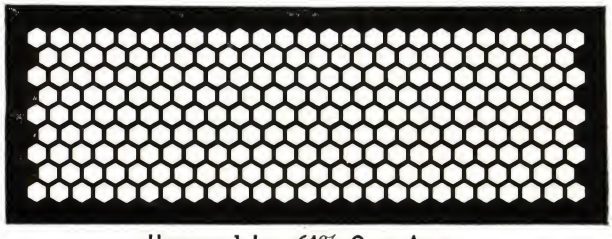
Grecian 3 In.—47% Open Area



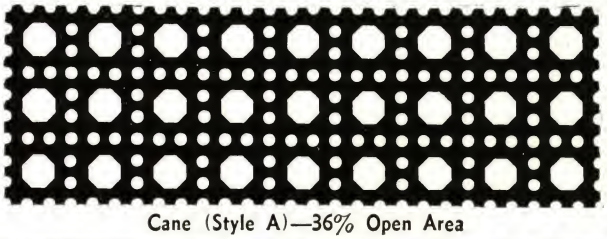
Shell 1¾ In.—72% Open Area



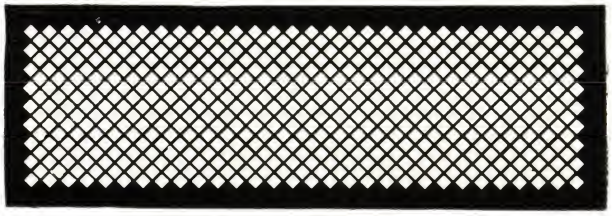
Square—55% Open Area



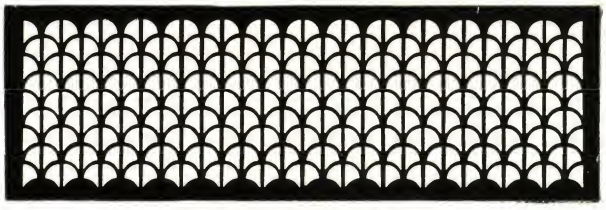
Hexagon 1 In.—64% Open Area



Cane (Style A)—36% Open Area



Diamond ⅝ In.—55% Open Area



Half Shell—60% Open Area

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INDEPENDENT REGISTER & MFG. CO.

CLEVELAND, OHIO

REGISTERS AND GRILLES

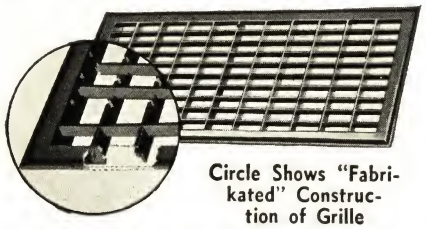
Our new factory is equipped with modern facilities for making many variations of standard and special designs, styles, sizes and finishes of heating and ventilating specialties. The usual finishes are japan, imitation oak lacquer, electroplate, or prime coat ready for painting.

INDEPENDENT

A catalogue containing our complete line of standard grilles and registers sent on request. Information on floor borders, adjustable ceiling and wall ventilators, smoke pipe registers and pipeless furnace gratings also on application.

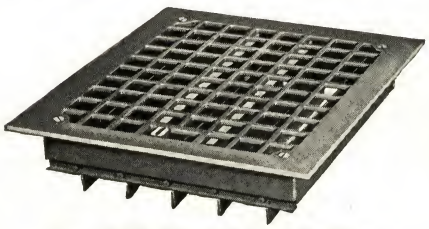
"Fabrikated" Register Faces and Grilles

"Fabrikated" implies an open area of 82% in every face or grille of every size, as compared with 50% to 75% in the usual patterns. A smaller size will provide the same open area, or the same size will give much greater capacity.



Circle Shows "Fabrikated" Construction of Grille

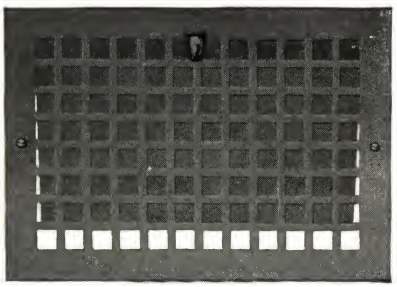
Construction is unusually strong. Welded outer frame is a solid piece and grille is made up of steel strips set on edge as the girders of a bridge. Special patterns for each size are unnecessary. Faces do not sag in service and possible breakage is practically eliminated. Furnished in any size *and* finish with little delay.



No. 12-75 Wrought Steel Register
For operation by lever, key-lock, pole or chain and pulleys

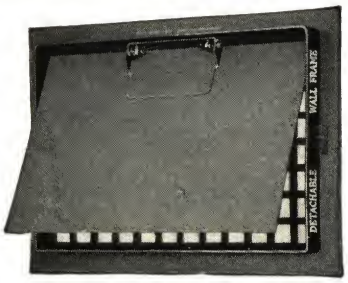
No. 12-75 Wrought Steel Register

Recommended for floor, wall or ceiling. Prompt shipment in any size or finish. For large sizes for use in floor, or where large open area or extra strength is required, we recommend "Fabrikated" register. Lock registers operated by a key can be furnished in either style.

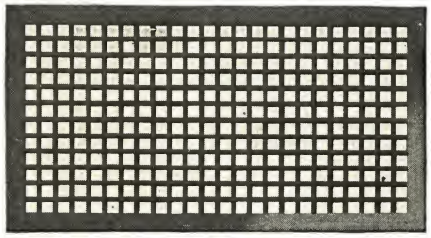


Single Valve Wrought Steel Wall Registers No. 75-12 SV

For forced air heating and ventilating systems, particularly. Single valve attached to face is equipped with operating mechanism permanently adjusted so that valve will remain in any fixed position. Detachable wall frame permits easy installation. Furnished in any size.



Back View Showing Detachable Wall Frame



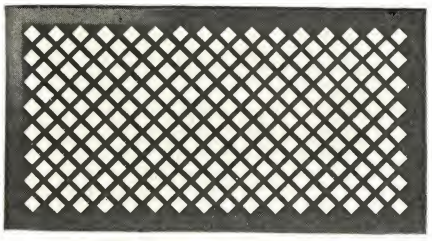
Nos. 50, 75, 100 and 875 Square Design

Wrought Steel Grilles

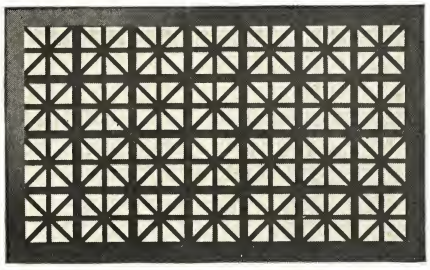
(Grilles also made of brass and bronze).

These grilles are perforated from sheet metal to sizes as specified. They are made to order and in any finish. Standard thickness of 12-gage (approximately ⅛ in.) is recommended.

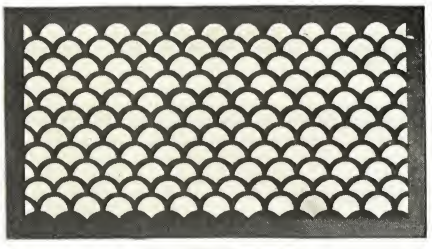
Grilles can be made into complete registers, with air valves. Inquiries should include: quantity and finish, style of perforation, opening and over-all size, and location and number of screwholes.



No. 75D Diagonal Square Design



No. 3⅜G No. 3½G Design



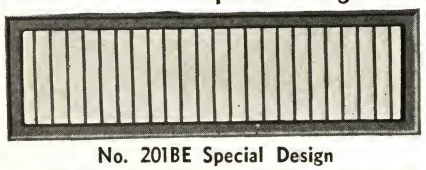
No. 225S Design

WROUGHT STEEL GRILLE OPENINGS

No.	Openings, in.	Bars, in.	Multiples, in.	Open area, per cent
3⅜G	3x3	⅜	3⅜	45 to 50
3½G	3x3	½	3½	45 to 50
75D	¾	¼	1 7/16	57
225S	Width, 1¾	¼	*Width, 2	67
	Height, 1 7/16	¼	*Height, 2¼	
50	½	¼	¾	45
75	¾	¼	1	57
875	⅞	¼	1⅛	61
100	1	¼	1¼	64

*Center to center measurement. Specify which dimension is height.

Special Design Grille



No. 201BE Special Design
Showing bevel edge angle frame which can be furnished with any "Fabrikated" grille not exceeding 36 in. in length or width

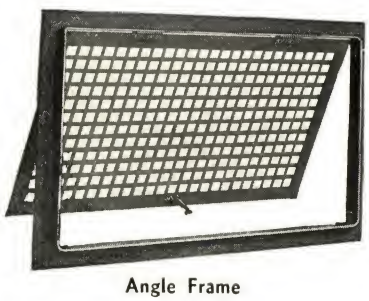
"Fabrikated" construction. Any size or finish. Angle steel frame and interior steel bands, approximately ⅛ in. wide, depths depending on size and use. Bars 1 in. center to center. ⅞ in. by any length openings. 87% open area.

Grilles also made in complete registers with valves or louvres. State over-all or opening sizes, finish and quantity.

Angle Frames

Any grille can be furnished with steel angle frames to which it may be hinged or screwed.

Standard sizes of angle frame material; ⅞ x ⅞ x ⅛ in. and 1¼ x 1¼ x ⅛ in.



Angle Frame

ESTABLISHED 1857

L. J. MUELLER FURNACE CO.

Makers of Registers, Grilles and Ventilators

GENERAL OFFICES

337 South Second Street, MILWAUKEE, WIS.

BRANCH OFFICES

ST. LOUIS, MO., 4246 Forest Park Boulevard
MINNEAPOLIS, MINN., 715 So. Eighth Street
MEMPHIS, TENN., Medical Arts Building
CHICAGO, ILL., 211 W. Wacker Drive
DETROIT, MICH., 1321 Twelfth Street
SEATTLE, WASH., 2401-2405 Utah Street
BALTIMORE, MD., 909 Cathedral Street
SALT LAKE CITY, UTAH, 601 McIntyre Building
LOS ANGELES, CAL., 5450 West Boulevard

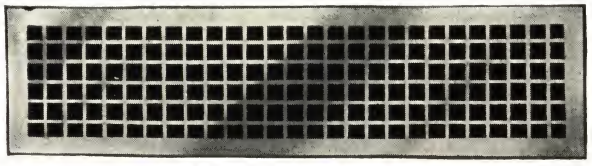
Products

REGISTERS; GRILLES; MUSHROOM VENTILATORS.

For Mueller Gas-Fired Warm Air Furnaces, Gas-Fired Steam and Hot Water Boilers and Air Conditioning Systems, see Manufacturers' Index.

Cast Iron and Steel Grilles

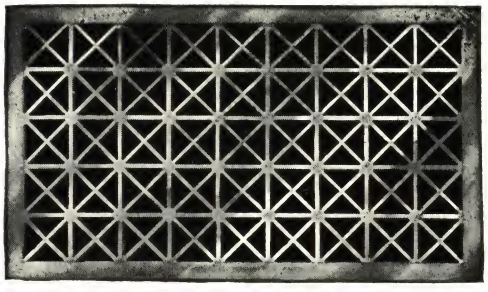
Can be made in any size and finish. Some sizes carried in stock. Any size can be made to order. When ordering, specify whether dimensions are size of opening or extreme size of grille. Can be furnished curved if desired. Also furnished in sheet brass or bronze.



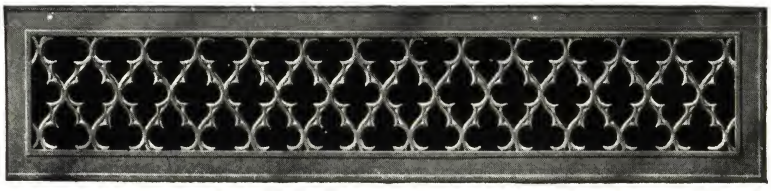
Cast Iron or Steel Grille

Special Design Grilles

Below are shown two of the many special design grilles that we manufacture, in cast iron, brass or bronze. Send specifications for any grilles desired, for prices.



One of Many Special Design Grilles



Special Design No. 258

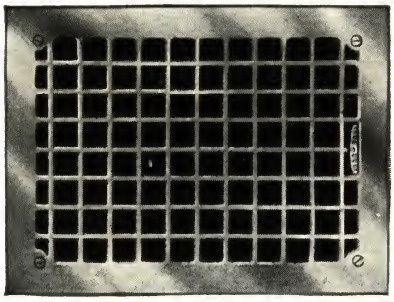
Wire Grilles

Wire grilles made in many different styles, sizes and finishes. Prices on application.

Floor Registers

Plain lattice design—semi-steel construction—boxes and valves of sheet steel, faces cast of semi-steel. These registers have great strength and are unusually neat in appearance.

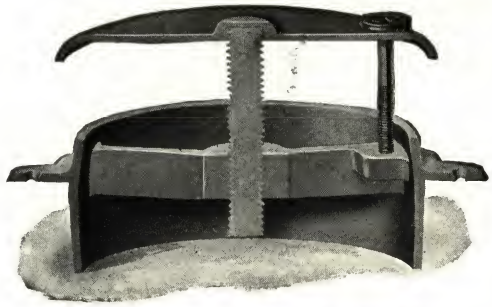
Carried in stock in all standard sizes and finishes. Can be made to special order in any size. Prices will be quoted on application.



Floor Register

Mushroom Ventilators

For use in schools, theaters, churches, and public buildings. Easily adjusted to distribute an equal volume of air.



Perspective of Mushroom Ventilator

Advantages — The Mueller Mushroom Ventilator has the following advantages: positive locking feature, no depression in cap to collect dirt, no setscrew projecting; easy, quick and permanent adjustment.

Carried in six sizes: 4, 5, 6, 7, 8 and 10-in. diameter.

Catalogue and Prices

Upon request we will furnish illustrated catalogue of our complete line of registers, ventilators and grilles. Prices on odd sizes of registers and grilles, also special design grilles will be submitted on application.

THE METALACE CORPORATION

EXECUTIVE OFFICE AND PLANT
60 K Street, SOUTH BOSTON, MASS.

SALES AND SERVICE OFFICES
SOUTH BOSTON, MASS., 60 K Street
NEW YORK, N. Y., 101 Park Avenue
CHICAGO, ILL., 14 E. Jackson Boulevard
SAN FRANCISCO, CAL., 7 Front Street

Product

Metalace Woven Grille, made on power looms by the diagonal strand process. A new and unique grille material.

Uses

All kinds of grille work for heat transmission, ventilation and decorative open paneling everywhere. Adaptability ranges from light weight panels in radiator enclosures up to heavy ornamental grilles in large wall openings, bank caging, guards, and fencing. Among the many uses are the following:

Radiator enclosures
Built-in radiators
Unit heaters
Ventilating ducts
Screen door guards
Window guards
Cashier cages
Backing for cast grilles
Baskets, hampers
Fire screens
Electric refrigerators
Kitchen cabinets
Elevator cabs
Loud speakers
Radio cabinets
Automobile radiator guards

Characteristics

The outstanding features of this remarkable grille are *beauty, strength* and *convenience.*

It is *strong* to the end of indestructibility—first because it is made of extremely tough metal strands, and second because the unique process by which it is woven firmly interlocks the strands so they cannot be distorted or spread.

The rare *beauty* in all of its designs harmonizes with any ornamental setting for grilles.

One of the extraordinary advantages in using Metalace as a grille is that the material may be cut on the premises to exact sizes to meet specifications, thus effecting great convenience and time saving, particularly where grilles may be set with wood moulding.

The *convenience* it offers to contractors and grille makers is of special importance. Shipped in rolls, it may be cut easily to meet any specifications and attached with simplicity.

Designs

Only a few of the available designs are shown on these pages. Our general catalogue describes the full line.

Material

Produced in steel, brass, bronze, copper, aluminum and stainless steel. Any of these metals may be supplied as specified.

Distribution

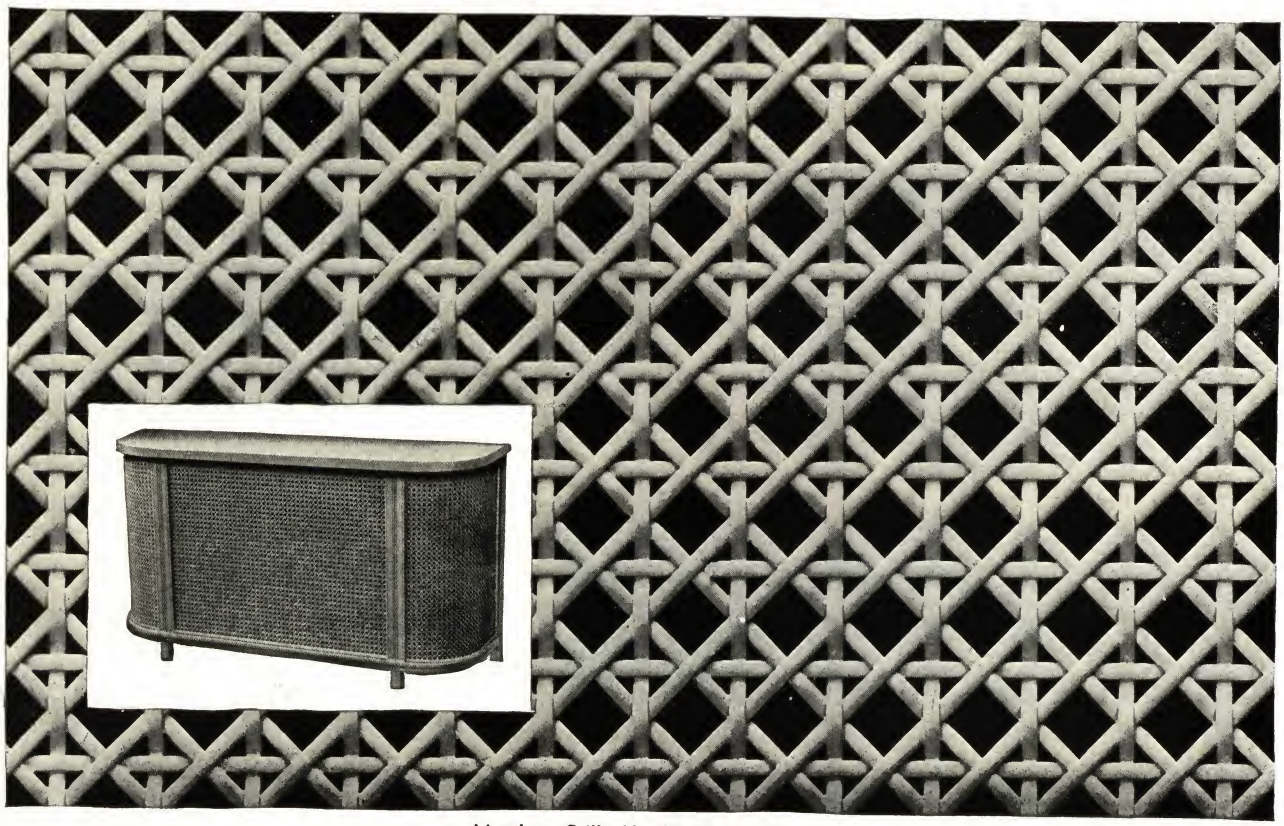
Wire and grille dealers in principal cities stock Metalace in rolls or cut to size, available for immediate delivery. Available in rolls 3 and 6 ft. wide, and 25 and 50 ft. long, and in panels cut to size. Grille manufacturers and radiator enclosure makers use Metalace regularly and can supply it on demand.

Samples and Catalogues

Samples and descriptive literature may be secured from distributors and dealers or from any of the Company's offices on request.

Specifications

Complete information on wire sizes and shapes, free air percentage, and methods of installing are given in specification manual sent on request.



Metalace Grille No. 10 (Actual Size)

Installation

On metal frames Metalace can be welded, soldered, riveted, clamped or applied by any of the usual methods suited to metal.

On wood construction it is fastened to surface with staples and edges covered with moulding—a very simple procedure.

Any grille manufacturer or cabinet maker can apply Metalace conveniently and economically.

Painting and Finishing

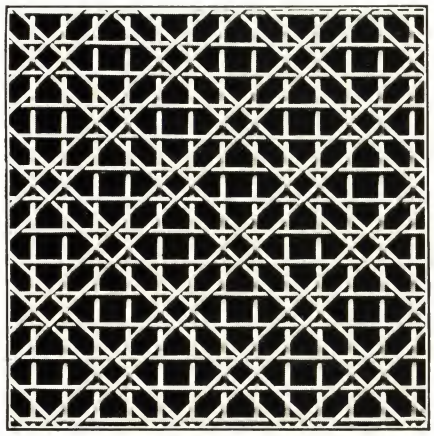
Always clean material thoroughly before finishing.

On steel, a finish should always be applied to Metalace. It may be painted or lacquered by usual methods, or electroplated in nickel, chromium, copper, brass, silver or gold.

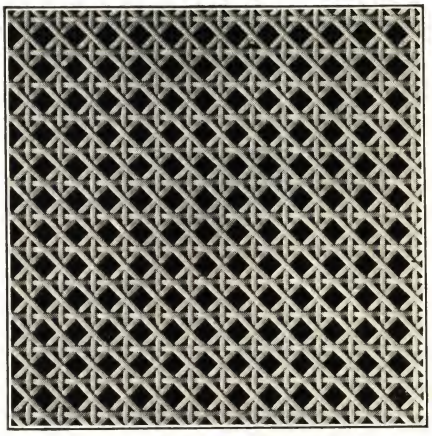
On brass, bronze, or copper, a finish may not be necessary, but wonderful antique effects can be produced by oxidizing and buffing the high spots.

On aluminum the same finishes may be used as for steel, or the metal may be polished without any coating.

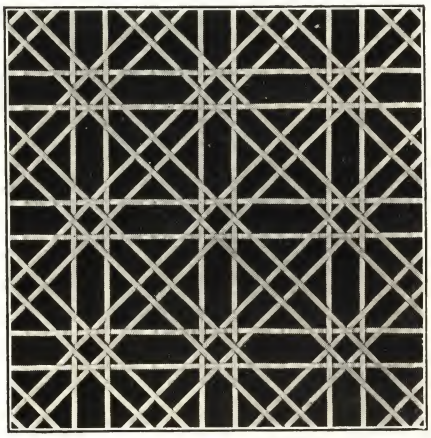
See permanent Metalace Exhibit, Architects' Samples Bureau, 101 Park Avenue, New York City.



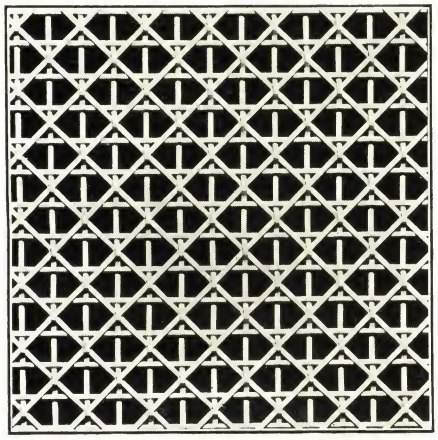
Metalace Grille No. 30 (⅓ Size)



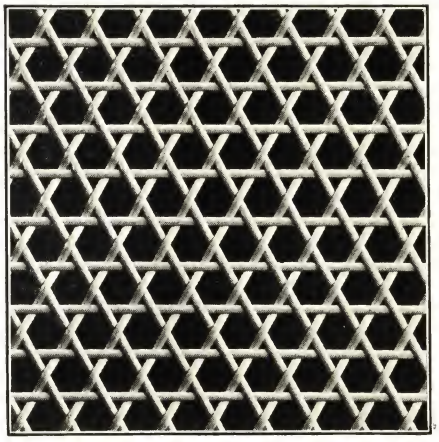
Metalace Grille No. 10 (⅓ Size)



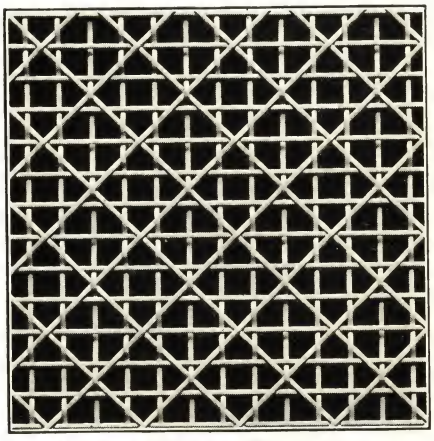
Metalace Grille No. 40 (⅓ Size)



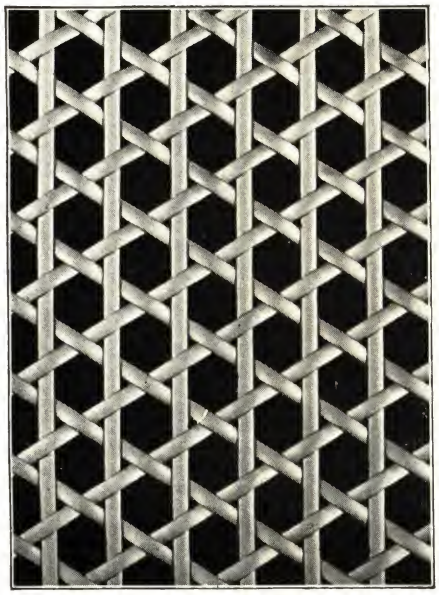
Metalace Grille No. 12 (⅓ Size)



Metalace Grille No. 50 (⅓ Size)

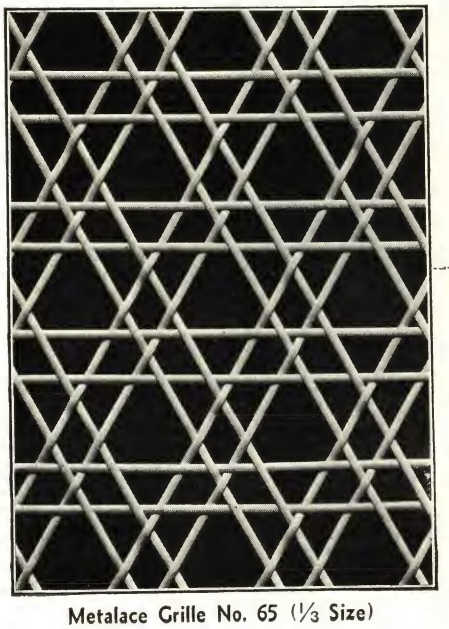


Metalace Grille No. 20 (⅓ Size)



Metalace Grille No. 150 (⅓ Size)

Metalace Grille No. 143 (⅓ Size)



Metalace Grille No. 65 (⅓ Size)

TUTTLE & BAILEY MFG. CO.

ESTABLISHED 1846

Founders of the Register and Grille Industry in America

155 East 44th Street, NEW YORK, N. Y.

BRANCHES

BOSTON, MASS., 36 Portland Street
CHICAGO, ILL., 407 South Dearborn Street
KANSAS CITY, MO., 704 East 18th Street
LOS ANGELES, CALIF., 3437 West First Street

Representatives in all Principal Cities of the United States

Products

REGISTERS, GRILLES, VENTILATORS, TEL BOXES of stock or individual design.

For Radiator Cabinets, Fronts and Shields, see Manufacturers' Index.

FERROCRAFT
Reg. U. S. Pat. Off.

Ferrocraft Cast Grilles

"Ferrocraft", the trade-name, registered in the United States Patent Office, applies to special cast work.

Hundreds of designs are available in period or modern styles, or a casting can be made, translating the architect's individual design.

For "color in metals", we offer cast iron, bronze, brass, aluminum or monel metal. For added effect—duotones in electroplated finishes or enamels, we provide an almost endless choice if the desire is to avoid ordinary grilles.

A few complete designs on hand may be had in standard sizes, which requiring no new pattern work can be produced at very moderate prices.

In designs of the multiple unit type, a pattern of the unit is stocked from which grilles of many sizes and shapes can be made.

Grilles can also be furnished concave or convex as well as flat.

Stamped Metal Grilles

For various uses where a cast grille is not feasible, a stamped grille can be chosen from many designs and ordered in any size stamped from steel, bronze, brass, aluminum or monel metal.

Frames, Angles, Louvres, Etc.

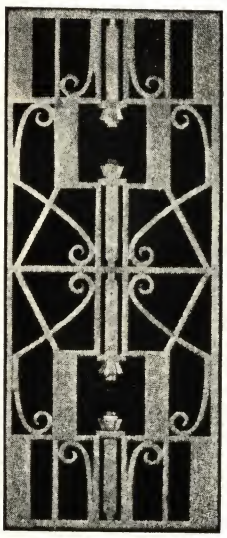
For complete installations, we can furnish wall frames for use in brick walls, T&B Band Frames for attaching grilles to ducts, Ferronique Construction (see "Grilles" Supplement No. 1) for recessing fretwork of grilles to give real panel effect, the Gordon Adjustable Frame ("Grilles" Supplement No. 3) for tight seal, and such angles or frames as may be required for different installations. Grilles can be equipped with fixed or self-acting louvres, and multi-valve registers are supplied with fusible link attachment for fire protection when required by building laws.

For a complete brochure on grilles, we recommend our catalogue "Grilles" and its supplements especially prepared for architects' files and which contain complete directions for specifying Ferrocraft Cast Grilles by method numbers and many other convenient "helps" for the architect and specification writer.

Trade names, slogans and features of products illustrated below are fully covered by patents and copyrights.

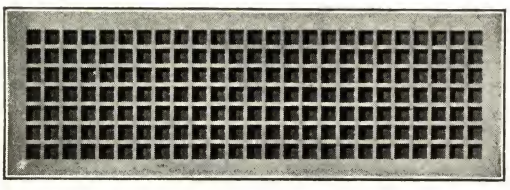
Catalogue

Our special architects' catalogue "Grilles" (and Supplements) is a complete brochure on the application and specification of grilles.



T&B Design No. 602

Design No. 602, Ferrocraft, was cast of aluminum and finished in a hammered effect. "Grilles" Supplement No. 2 shows possibilities of unusual finishes for Ferrocraft cast grilles

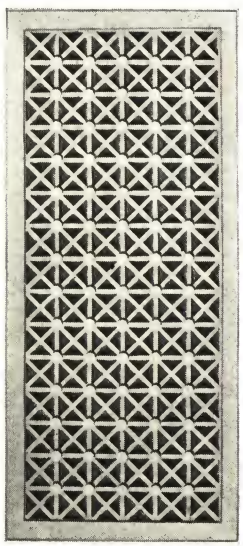


Style No. 1. Cast Ferrocraft Iron Grille

Plain lattice, standard ⅞-in. mesh. Over 100 standard sizes carried in stock in cast iron unfinished. Other sizes and cast bronze or brass made from patterns on hand

Style "09" Stamped Metal Grille

With small openings—1½ in. long, ¾ in. wide, with ⅛-in. horizontal bars. Maximum daylight size 2½ in. wide, length as specified. Vertical bars ⅛ in. wide can be wider if demanded. One of several grilles for special uses

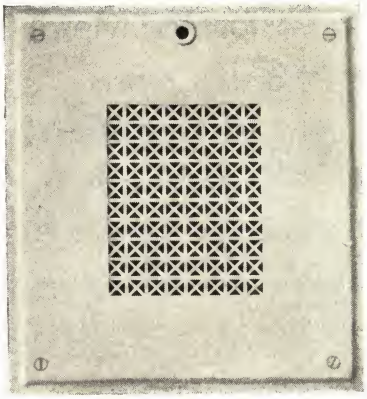


T&B Design No. 42

Design No. 42, Ferrocraft, is a sample of a unit type grille. From a stock pattern of one unit in such designs, any size grille can be cast. Units may be increased or decreased in size when important enough to warrant additional expense

Tel Box, Registers, Ventilators, Etc.

Style 3113—1



Style 1381—1

Style 2510—1

These styles also come in double boxes for two bells

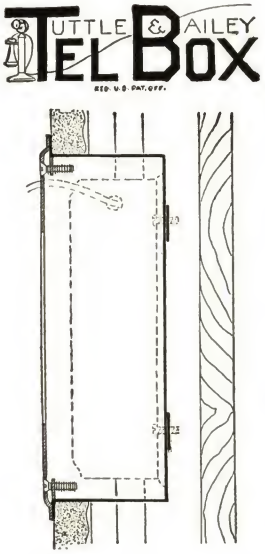
Tel Box

A decorative metal cabinet for setting in wall, in which the out-of-place but necessary telephone signal box can be recessed and concealed (see "Grilles" Supplement No. 4).

Knockouts for conduits are provided in addition to drilled and tapped holes for fastening telephone signal box in cabinet. The finish, at list price, is a gray prime coat, and the grilles (sound openings) are as illustrated, but for an additional small charge electroplated or lacquered finishes and other grilles may be ordered.

The several styles cover the different telephone installations and the grilles of sound openings are those most frequently suited to the style of architecture.

For best results when planning Tel Box installations, consult the local Telephone Company.



Tel Box Dimensions, Etc.

Style 3113—1—Single box for one bell. Cast iron face fastens into a flat rim with pivot hinges and special screw-locking device. Sound opening Ferrocraft cast grille as illustrated. Box: 10 3/16 in. sq., 3 7/16 in. deep. Face including rim, 11 3/16 in. high, 11⅛ in. wide. 3113—2 is double box for two bells.

Style 1381—1—Single box for one bell. Steel face fastened to steel box with long screws. Sound opening stamped Greco grille welded to face. Box: 9 3/16 in. high, 8 3/16 in. wide, 3⅛ in. deep. Face: 10 1/16 in. high, 9⅛ in. wide. 1381—2 is double box for two bells.

Style 2510—1—Single box for one bell. Steel face fastens into a flat rim with spring catches. Sound opening perforated. Box: 10 3/16 in. sq., 3⅛ in. deep. Face including rim, 11 3/16 in. high, 11⅛ in. wide. 2510—2 is double box for two bells.

Registers, Ventilators, Etc.

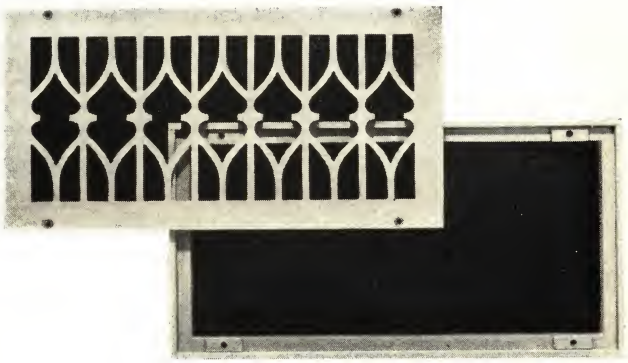
Standard registers of all types can be furnished in all finishes.

Fusible Link Registers are available for ventilating ducts in multiple dwellings when required by building laws.

Ventilators of all kinds can be ordered in suitable finishes.

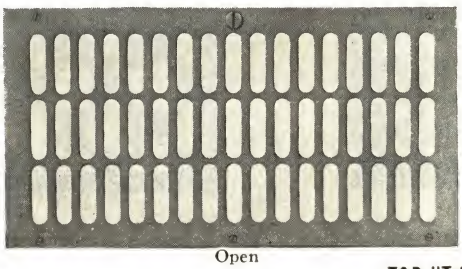
For air conditioning work of a high type, we offer the special Design No. 612. If ordered with Wallcraft Frame, our Method No. 8 (see page 38 of "Grilles") should be specified. This grille is made in two opening sizes—6⅜ x 14 in. and 6⅜ x 30 in.

Trade names, slogans and features of products illustrated are fully covered by patents and copyrights.

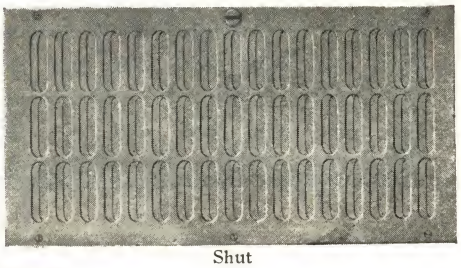


T&B Design No. 612

Fusible Link Registers



Open



Shut

T&B "Tri-Sli" Damper

WICKWIRE SPENCER STEEL COMPANY

Clinton Perforated Metal Grilles

GENERAL OFFICES

41 East 42nd Street
NEW YORK, N. Y.

OFFICES AND WAREHOUSES

WORCESTER, MASS., 80 Webster Street
CHICAGO, ILL., 208 So. La Salle Street
LOS ANGELES, CAL., 1070 No. Alameda Street
BUFFALO, N. Y., 1 River Road
CLEVELAND, OHIO, 1217 Guarantee Title Building
TULSA, OKLA., 314 East Archer Street
SAN FRANCISCO, CAL., 114 Townsend Street
SEATTLE, WASH., 1025 Sixth Avenue, So.
PORTLAND, ORE., 361 14th Street, No.

Product

CLINTON PERFORATED METAL GRILLES.

For our pages on Electrically Welded Wire Fabric for concrete reinforcement, Woven Wire Lath and Wire and Iron Fences and Gates, see Manufacturers' Index.

Clinton Perforated Metal Grilles

The Clinton Works of the WICKWIRE SPENCER STEEL COMPANY was the first plant in America to perforate grilles. In over fifty years of constant operation, we have built and maintained dies enabling us to produce grilles of all standard and many unusual designs. Our heavy and modern equipment provides for fabricating steel or bronzes into grilles as heavy as $\frac{5}{16}$ in. in thickness. Grilles of curved shapes and grilles made in accordance with your own designs and specifications can also be supplied.

We have our own finishing plant for electroplating and can match any special finish desired. Invisible doors, hinged grilles, angle frame mountings, and many other specialities are within the scope of our manufacture.

We carry in our warehouse at all times a large tonnage of various gauges of sheet bronzes, steel and other metals. This large stock of material enables us to render most efficient and quick service.

Materials—We recommned for consideration "Wissco" Bronze, a special alloy developed by the metallurgists of WICKWIRE SPENCER STEEL COMPANY. It has a higher tensile strength than commercial bronze and can be finished in any color to harmonize with the surroundings.

"Wissco" Bronze compares in price with electroplated steel, but for durability, it equals commercial or naval bronze.

Clinton Grilles are also furnished in other metals—steel, brass, copper, bronze, nickel, zinc, aluminum, monel, etc.

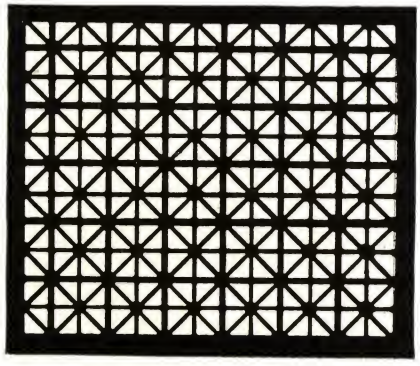
Finish—Grilles may be electroplated, japanned, painted, buffed or we can duplicate any finish upon receipt of sample. When grilles are to be finished with paint, we recommend that they be shipped with shop coat only and that the finishing coat be applied on the job.

Dimensions and Shapes—Grilles can be made in any sizes or shape up to 60x156 in. in one piece. Larger sizes are made in two or more pieces carefully joined together with suitable butt straps, so that the joint is virtually invisible from the front.

Thickness—It is well to bear in mind that perforated metal grilles are stronger than cast grilles and a much thinner metal can be used. We perforate the various designs in steel in gauges ranging from ¼ in. to 16 U. S. gauge and in bronze $\frac{5}{16}$ in. to 16 B&S gauge.

Designs

Forty-five different designs are procurable from standard dies and any new design required may be made to order. The Clinton Grille Handbook, the most complete of its kind, gives a detailed analysis of grille layouts and is invaluable to the architect.



Design 1054
Free air opening 52%

Special Features

Angle frames, screwholes (plain or countersunk), invisible doors, handholes or any other special features can be supplied exactly according to your specifications.

Specifications

When specifying please give all the following information.

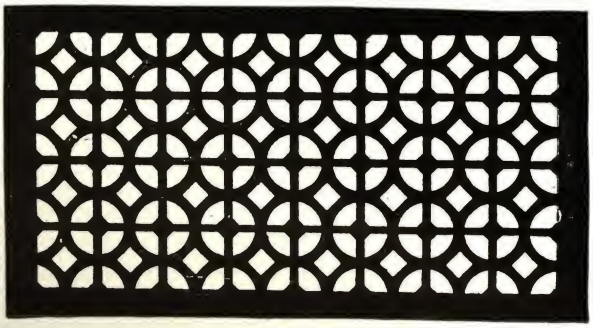
Quantity. Style of perforation.

Gauge of material. Kind of metal.

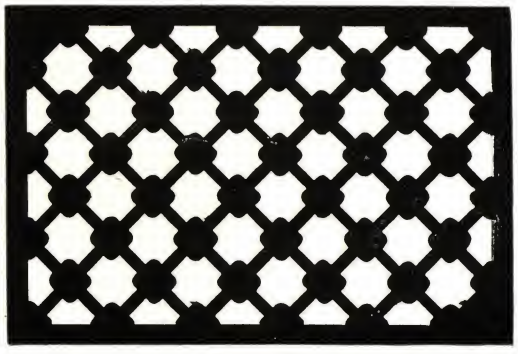
Width of blank margins, and whether included in dimension specified.

Screwholes or other special features. Finish.

In other than lattice grilles and similar symmetrical designs, be careful to indicate which dimension is the vertical height of each grille when installed.



Design 122
Free air opening
⅜-in. bar, 47% ½-in. bar, 43.4% ⅝-in. bar, 40.3%



Design 137
Free air opening, 48.5%

KNOWLES MUSHROOM VENTILATOR CO.

TELEPHONE
WAlker 5-2820

41 North Moore Street, NEW YORK, N. Y.

Products

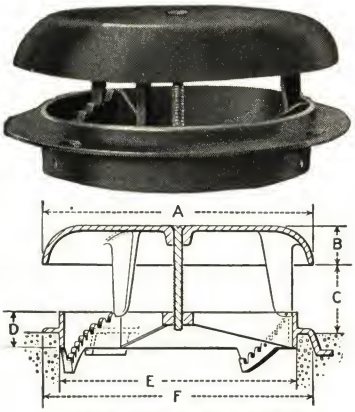
CAST IRON and ALL-STEEL ADJUSTABLE MUSHROOM VENTILATORS; TU-WAY and AISLE HOOD AIR DEFLECTORS; ROUND and OBLONG GALLERY RISER VENTS; STEEL GRILLES with DAMPERS.

Uses and Operation of Air Controlling Heads

Used for controlling the supply of fresh air or the exhaust of vitiated air, particularly in the ventilation of auditoriums of theaters, schools, public buildings and large rooms of factories. Equally effective in up-draft or down-draft methods. Heads are usually located on the floor under the seats and connected with the plenum chamber or ducts. They are individually adjusted for their relative distance from the fan, so that each will distribute an equal quantity of air, or so that the distribution is regulated for different parts of the room.

Knowles Nu-Notch Mushroom Ventilator or Air Diffuser (Dome or Flat Top)

Cast L Lug Type



Cast L Lugs and Dirt Ring

The ideal cast iron mushroom. Head has three outer bearings and is absolutely rigid. Ten recessed notches give close regulation of air. Locked into positive adjustment by tightening head screw. Supplied with dome or flat tops; three screw-holes in floor flange for wood floor, or three L lugs cast on flange for setting in concrete, or three threaded holes in floor collar for inserting set screws.

Size No.	A in.	B in.	C in.	D in.	E in.	F in.	Wgt., lb.	Area, sq. ft.	C.f.m. at velocity of 200 ft.	250 ft.	300 ft.	350 ft.	400 ft.
5	6	7/8	1 3/4	1 5/16	5 3/16	6	4	.1364	27.3	34.2	41.	47.7	54.6
6	7 1/8	1 1/8	1 1/2	1 1/2	6 3/16	7 7/8	4 3/4	.1964	39.3	49.1	59.	68.7	78.6
7	8 1/4	1 1/4	2 1/8	1 1/2	7 3/16	8 1/4	6 1/2	.2673	53.5	66.8	80.2	93.5	107.
8	9 5/8	1 1/2	2	2	8 3/16	10 1/8	9	.3491	69.8	87.3	105.	122.	140.
10	11 1/2	1 5/8	3	2 1/2	10 3/16	11 7/8	14 1/2	.5454	109.	136.3	163.6	191.	218.

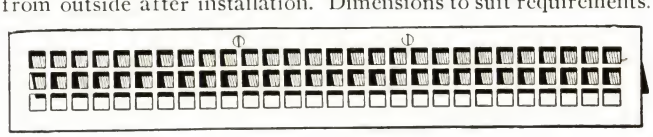
Specifications—Furnish and install where indicated on drawings or as hereinafter specified [5-in.] [6-in.] [7-in.] [8-in.] [10-in.] [Dome Top] [Flat Top] Nu-Notch Cast Iron Mushroom Air Diffusers with recessed notches for the permanent adjustment of mushroom caps at any desired opening together with center locking screw feature as manufactured by KNOWLES MUSHROOM VENTILATOR CO., New York, N. Y.

Provide under each air diffuser one No. 20 galvanized iron sleeve to be set by the heating contractor in conjunction with the general contractor at the time the floor is laid. In concrete floors when sleeves are located on forms fill sleeves with sand before being grouted in to prevent their distortion.

For wood floors: attach the mushrooms to the floor by means of flat head screws. *For concrete or similar type floors:* by inserting 3 setscrews in the collar, or by embedding 3 L lugs in cement. (In your specification please indicate the desired diameter size, style of top and method of attachment.)

Knowles "Dampagrille"

Strong, simple, economical, ideal for many purposes. Heavy steel; regulating volume damper attached to inside of grille. Easily adjusted from wide open to completely closed. Locked from outside after installation. Dimensions to suit requirements.

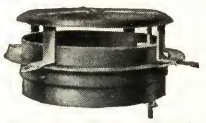


Oblong Gallery Riser Ventilator (Cast Iron) Grilles

With regulating volume damper. In two sizes. (See Booklet.)

Size No.	Collar and Riser Opening: Length, o.d., in.	Collar and Riser Opening: Height, o.d., in.	Area, sq. ft.	C.f.m. at 300 ft. vel.
8	10 1/4	6 3/4	.35	105
6x12	12 3/8	6 3/8	.5	150

Knowles "Aerovalve"—The Improved Mushroom



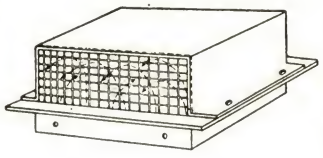
Knowles Heavy Steel "Aerovalve"

Easy to regulate and install. Low in price. A solid, heavy steel air unit of fixed height with cap supports bearing directly on flange. Parts cannot be separated either before or after installation. Quick, easy adjustment for finest control of air, by turning screw on top of cap. Rigid locking device prevents rattling. Quick anchorage to wood floors with screws through extended lugs on flange, and to concrete with special masonry nails furnished with mushroom. Furnished with or without adjustable air valve damper in 6 and 8-in. diameter sizes (only) same capacity as Nu-Notch type (see table). "Aerovalve" also can be furnished with *cast iron top* and *cast iron supports.*

Specifications—Furnish and install, where indicated on drawings or as hereinafter specified [6-in.] [8-in.] Steel Aerovalve Mushrooms [with] [without] adjustable Air Valve Damper.

Tu-Way Air Deflectors Deliver Full Area of Floor Opening

Designed to give maximum area with minimum fixed height. Air is discharged at both ends along the row of seats. Volume damper easily adjusted with screwdriver on top of hood.

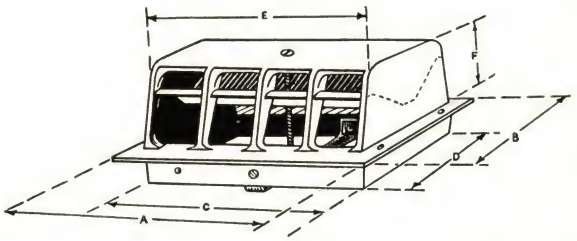


Size No.	Dimensions, in. High	Wide	Long	Wt., lb.	Area, sq. ft.	C.f.m. at 300 ft. vel.
†2	2 3/8	8 1/2	4 1/2	5	.223	67
†4	4 3/8	8 1/2	8 1/2	11	.45	134
*5	5 3/8	8 1/2	10 1/2	16	.56	167
*6	6 3/8	8 1/2	12 1/2	22	.67	200

*Made only with heavy steel hoods.
†Made of all cast iron.

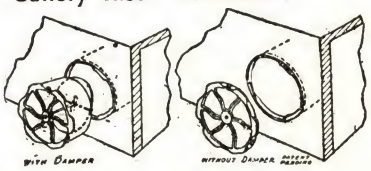
Improved No. 3 Size Tu-Way Air Deflector (Cast Iron)

The most popular size in this type deflector. Ornamental design. Adjustable double-wing curved damper deflects air downward. Fine, positive adjustment. Rattleproof; noiseless.



Size No.	A. in.	B. in.	C. in.	D. in.	E. in.	F. in.	Wt., lb.	Area, sq. ft.	C.f.m. at 300 ft. vel.
3	10	8	8 1/2	6 1/2	8 1/4	3 1/2	10	.333	100

Knowles Disc-Loc Gallery Riser Ventilators



Designed to insure better control of air. Round holes in gallery risers do not weaken construction but, on the contrary, with the cast iron rings it is actually strengthened. Cast iron grille is quickly inserted and locked by simple twist motion—no bolts, screws or springs. Furnished with or without damper to fit same rings.

Size No.	Diameter of grille, inches: Opening	Flange	Outside diameter of ring and contractor's sleeve, in.	Casting Thickness, in.	Net area, sq. ft.	C.f.m. at 300 ft. vel.
4	3 3/4	5 1/8	4 3/4	1/8	.08	24
5	4 3/4	6 1/4	5 13/16	1/8	.13	39
6	5 3/4	7 3/8	6 7/8	1/8	.19	57
*7	6 5/8	7 7/8	7 13/16	1/8	.24	72

*Square mesh grille.

AIRMASTER CORPORATION

Manufacturers of Ventilating Equipment
230 West Huron Street, CHICAGO, ILL.

BRANCH OFFICES
NEW YORK, N. Y., 682 Sixth Avenue
LOS ANGELES, CAL., 316 Commercial Street

SALES REPRESENTATIVES
BALTIMORE, MD., 107 E. Pleasant Street
BOSTON, MASS., 136 Federal Street
DETROIT, MICH., 932 Book Building
CINCINNATI, OHIO, 140 E. 6th Street
INDIANAPOLIS, IND., 825 Architects & Builders Building
KANSAS CITY, MO., 1204 Oak Street
MILWAUKEE, WIS., 744 No. Jefferson Street
PHILADELPHIA, PA., 102 No. 5th Street
PITTSBURGH, PA., 607 Westinghouse Building
ST. PAUL, MINN., 915 Pioneer Building
NEW ORLEANS, LA., 918 Union Street

Products

MOTOR DRIVEN VENTILATING and EXHAUST FANS; Airmaster patented propeller blades. U. S. Patents Nos. 1372441, 1623420. Other patents pending.

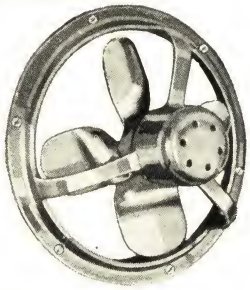
Airmaster Fan Assembly

All residence type Airmasters are equipped with this fan assembly. Airmaster patented propellers 10 in. diameter. Outside diameter housing ring 12½ in.

Revolutions per minute	1440
Capacity, cu. ft. per min.	800
Watts	62
Amperes	.78

Straight induction shaded pole motor.

A-c. or d-c., 110-120 volts, 25-30 and 60-cycle motors.



Propeller and housing are pure cast aluminum, accurately machined, balanced and highly polished.

Does not interfere with radio reception. Equipped with pull switch, 10 ft. of connecting cord and attachment plug.

Airmaster Built-in-wall Cabinet Electric Ventilator

Interior View

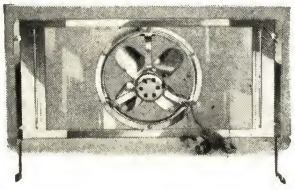
Exterior View

Packed complete with all necessary parts and instruction sheet ready for installation. Requires wall opening 13⅛ in. square. Unit comes in two separate pieces. The cabinet and ventilator assembly and the louvres, connected with operating table. Cabinet containing ventilating unit fits flush with inside wall; louvres fit flush with outside wall. Connecting cable between inside door and louvre takes care of any thickness of wall. When inside door is opened it automatically starts motor and opens louvres. Louvres not held open by air thrust which increases air capacity. Double protection against weather. Solid and compact.

Airmaster Adjustable Window Panel for Kitchen, Bedroom, Living Room, or Attic Installations

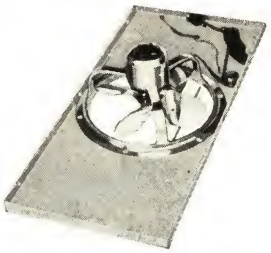
Easily placed in upper part of window and does not interfere with movement of window sashes, shades, or curtains. Panels are adjustable to fit windows 17 to 63 in. wide. Portable and interchangeable for transfer to any room. Unusually attractive. Highly polished aluminum parts, pearl gray panels. Easily cleaned and oiled. Quickly and silently removes cooking odors, greasy steam, dust, dirt, etc.

Airmaster DeLuxe Model—Plate glass panels mounted in polished Hyblum frame. Adjustable to fit windows between 22 and 60 in. wide. Exquisitely designed and beautiful in appearance. Glass panels permit full amount of daylight to enter. Completely harmonizes with finest interior decorating and furnishings. Very silent in operation. Packed complete and ready for installation.



Airmaster Transom Model

Adjustable panels to fit window or door transoms. Expands from 26 to 36 in. wide. 13 in. high. Installation can be made in oversize transoms with addition of wood or metal panel to fit opening. Does not interfere with movement of transom. Automatic louvres can be furnished for outside transoms.



Airmaster Exhaust Fans for Commercial and Industrial Installations

Equipped with propellers 12, 16, 18, 20, 24 and 30-in. diameter, with capacities of 1000-1500, 2300-3500, 2400-3300, 3300-4400, 6500-8200 and 7400-15000 c.f.m., respectively. Standard makes of motors, specially constructed. Totally enclosed. Thrust bearings. Self-cooled. Propellers one-piece cast aluminum. Housing ring one-piece cast aluminum. Greater air capacity at lower initial and operating cost.

AMERICAN BLOWER CORPORATION

GENERAL OFFICES AND FACTORY
DETROIT, MICH.
BRANCHES IN ALL PRINCIPAL CITIES

Products

HEATING, VENTILATING, DRYING and AIR CONDITIONING EQUIPMENT; EXHAUST SYSTEMS; AIR BLAST APPARATUS; AIR FILTERS; DUST COLLECTORS; STEAM ENGINES.

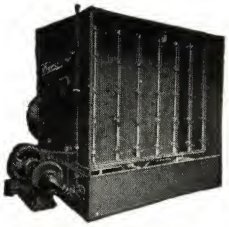
"Sirocco" Multiblade Fans and Blowers

"Sirocco" Fan

The standard wherever fans are required for heating, ventilating, air conditioning, mechanical draft, drying, mine ventilation and exhaust systems.

High volumetric and mechanical efficiency. Driven by belt, steam engine, motor or turbine.

"Sirocco" Air Washer



"Sirocco" Air Washer

For purifying, cooling, humidifying and dehumidifying air in all classes of buildings and in various manufacturing processes. Thoroughly cleanses the air of all foreign materials and permits control of air temperatures and humidities.

"ABC" Air Filter

"ABC" Air Filter

For use in industrial, public, and practically all types of buildings. Cleanses the air of dust, dirt and impurities before distributing it throughout the building. Simplicity of design, and construction make it extremely easy of installation. It requires a minimum amount of attention and is quickly and readily unloaded.

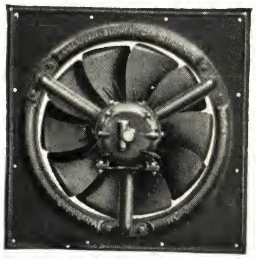
Venturafin Unit Heater

"Venturafin" Unit Heater

For use in modern industrial buildings, stores, garages, etc., and designed to keep the heat in working areas where it is needed.

Venturafin units are adaptable to high, medium or low pressure steam applications—for floor, wall or ceiling installation. Venturafin units are easy to install, economical to operate and maintain.

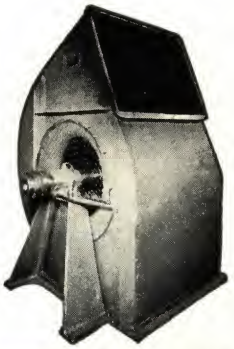
"Ventura" Disc Ventilating Fans



"Ventura" Disc Ventilating Fan

For ventilating rooms or small mines and for exhausting fumes from pickling vats; paint fog from paint spray booths, etc.; require very little space and slight operating costs make them very economical; light, strong, quiet and efficient. Built either with direct connected motor or for belt drive.

American H.S. Blowers

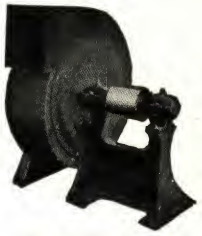


American H.S. Forced Draft Blower

These blowers are designed especially for turbine and high speed motor drive.

Distinguished by a design which insures the maximum degree of efficiency, strength and safety, while keeping the weight of rotating parts to a minimum.

Exhaust Fans and Pressure Blowers



Steel Plate Exhaust Fan, Type "E"

These are manufactured in a number of different types to meet varying requirements.

Exhaust fans remove refuse and waste of all kinds and are also used for conveying.

Blowers supply air blast to forges, furnaces and cupolas; sintering, smelting and pulverized coal machines; also used for blowing scale from dies, or other duties requiring air at pressures up to 1½ lbs.

Have many advantages over blowing engines or rotary blowers, and furnish air as needed at nearly constant pressure.

Built for either belt or direct connected motor drive, in sizes to meet any requirements.

"Sirocco" Dust Collector

"Sirocco" Dust Collector

A most practical, successful means of collecting a wide variety of fine dusts. Particularly applicable to the collection of cinders, fly-ash and the coal dust arising from the preparation of pulverized coal in powerhouses. Of rugged design and construction, each unit is gastight throughout.

Extensive laboratory facilities are maintained for testing purposes.

"ABC" Vertical, Fully Enclosed Self-oiling Steam Engines

"ABC" Vertical Self-oiling Steam Engine Direct Connected to Generator

For direct connection to fans, centrifugal pumps, stokers, generators, etc.

Enclosed, self-oiling type well known for high speed, high efficiency and small space occupied.

Will run for months without additional oil or adjustment.

Built in single and double cylinder types, developing up to 120 hp.

Catalogues and Bulletins

General catalogue or special bulletins on request.

BUFFALO FORGE COMPANY

"Air Engineers for Over Fifty Years"

484 Broadway, BUFFALO, N. Y.

SALES ENGINEERING OFFICES

ALBANY, N. Y., 414 Standard Building
BOSTON, MASS., 10 Milk Street
CHATTANOOGA, TENN., 318 Volunteer Life Building
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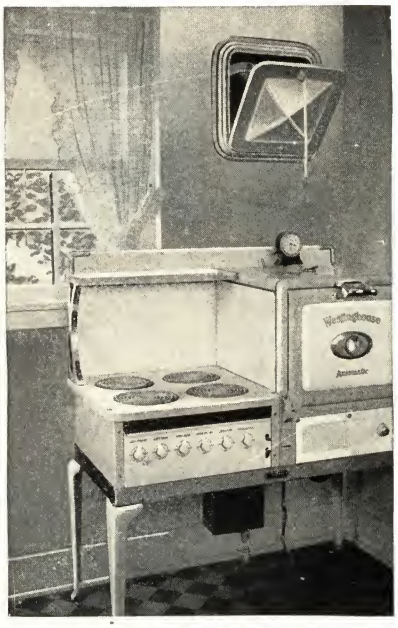
CLEVELAND, OHIO, 368 Rockefeller Building
CINCINNATI, OHIO, 605 Mercantile Library Building
DALLAS, TEX., 2710 Live Oak Street
DENVER, COLO., 1621 17th Street
DETROIT, MICH., 2051 W. Lafayette Boulevard
GRAND RAPIDS, MICH., 1009 Division Avenue, South
GREENVILLE, S. C., P. O. Box 563
HARTFORD, CONN., 750 Main Street
INDIANAPOLIS, IND., 1125-27 Circle Tower
KANSAS CITY, MO., 1025 New York Life Building
LOS ANGELES, CALIF., 610 Pershing Square Building, Hill Street at Fifth
MINNEAPOLIS, MINN., 459 North Western National Life Building
NASHVILLE, TENN., 117 Fifth Avenue
NEW YORK, N. Y., 39 Cortlandt Street
OMAHA, NEB., 923 W. O. W. Building
PHILADELPHIA, PA., 810 Land Title Building
PITTSBURGH, PA., 927 Union Trust Building
ST. LOUIS, MO., 906 Chemical Building
SAN FRANCISCO, CALIF., 140 First Street % Herberts Moore Machinery Company
SEATTLE, WASH., 303 Alaska Building
TOLEDO, OHIO, 1817 No. 13th Street
WASHINGTON, D. C., 403 Commercial Nat'l Bank Building, 14th and G Streets, N. W.

COMPLETE LINE MANUFACTURED IN CANADA BY CANADIAN BLOWER & FORGE CO., LTD., KITCHENER, ONT.

Products

HEATING and VENTILATING EQUIPMENT, including: Home Ventilating Units, Multiblade Fans, Pipe Coil Heaters, Unit Heaters, Buffalo Air Washers, Exhaust Fans, Blowers, Dust Collectors, Disc Fans, Spray Nozzles, Mechanical Draft Fans, Drying Equipment, Multistage Blowers and Exhausters.

Complete illustrated literature on request.



Unit Installed and Operating

Home Ventilating Unit

The Improved Buffalo All-steel Home Ventilating Unit is made for permanent installation in wall of brick, stucco or frame residences. It is easily installed, and should be included in the architect's specifications wherever possible. When desired, it may be installed in buildings already erected by cutting a square hole in the wall.

Design of box incorporates every advantage and improvement. One-piece, die-formed steel doors are rigid and weatherproof. Fan has blades set at just the proper angle to handle a large volume of air at comparatively low speed, thus assuring quiet operation.

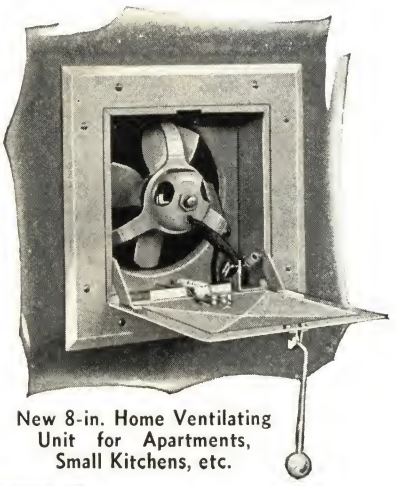
Fully enclosed motor is lubricated with wool-packed bearings.

This unit may be installed in walls of varying thicknesses from 5¾ ins. up, and only one pair of rods need be adjusted to fit box to the wall.

Of importance are the doors, operated simultaneously by one lever, which also starts and stops the motor.

A constant tension is maintained on both doors, making them rattleproof.

In cold weather the doors keep out cold when fan is not in operation and due to double construction condensation does not form.

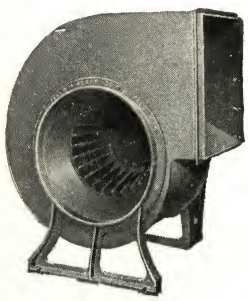


New 8-in. Home Ventilating Unit for Apartments, Small Kitchens, etc.

Exterior—Showing Neat Appearance of Unit

The 8-in. Home Ventilating Unit is excellent for apartment and other kitchens where wall space is limited. Easily installed, low in price and efficient.

Space requirement of this unit has been reduced to such an extent that it can be installed in the smallest of kitchenettes; all that is necessary is an opening in wall 13 ins. square, putting in a 1-in. frame and leaving an 11-in. opening for unit.



Silex Conoidal Fans

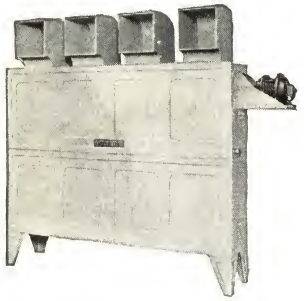
The Silex Fan is an improved type of ventilating fan, designed from our experiments and experiences to reduce audible noise to a minimum. The housing is a "rolled-up evase stack," converting air velocity leaving the rotor into static pressure. The cone is carried out beyond casing in order to get best conversion efficiency and to provide an extremely quiet streamline fan cut-off. They are particularly suited for direct connecting to motors.

Double curved silex shells will deliver the desired air capacity even if the resistance is somewhat different than specified, and the horsepower will not vary to any extent.

Unit Heaters

Buffalo Highboy (shown) and Lowboy Heaters, units of large capacity, heat and ventilate large areas economically. Heating coils and centrifugal fans are arranged for maximum efficiency. Every part is accessible for inspection.

Buffalo Wetboy efficiently cleans and moistens the air in addition to heating it. Removes 70% of the dirt and dust and adds 25% to 35% moisture to the air.



Buffalo Breezo-Fin, Model "B" Unit Heaters are easily installed, light in weight and deliver a large volume of air at little power consumption.

THE EMERSON ELECTRIC MFG. CO.

Portable, Ceiling, Exhaust and Ventilating Fans and Accessories, Furnace Blowers

ST. LOUIS, MO.

BRANCH OFFICES

CHICAGO, ILL., 806 West Washington Boulevard

NEW YORK, N. Y., 155 Sixth Avenue

Products and Service

PORTABLE OSCILLATING and NON-OSCILLATING FANS; CEILING FANS; EXHAUST FANS; VENTILATING FANS; AUTOMATIC SHUTTERS, MOUNTING PANELS and WALL BOXES for ventilating fans; WARM AIR FURNACE FANS and BLOWERS.

Also makers of Electric Motors, 2 hp. and smaller, for all commercial circuits and purposes.

An Engineering Department will assist architects.

Guarantee

Emerson exhaust fans, ventilating fans, furnace fans and blowers are guaranteed against electrical or mechanical defects for one year from date of purchase.

Emerson oscillating, non-oscillating and ceiling fans are sold with a 5-year factory-to-user guarantee which is applicable in any quantity.

Exhaust Fans

Sizes 12 to 36 in. Efficient, quiet fans with capacities of from 1000 to 10,000 cu. ft. of air per minute. Fully enclosed, cool running alternating and direct-current motors with extra large oil reservoirs, wool packed, requiring only infrequent lubrication. Temperature rise less than 40° C. Bulletin with details on request.

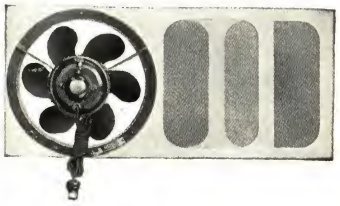
Exhaust Fan

Ventilating Fans

Sizes 9, 12 and 16 in., motor driven type; capacities 600 to 1750 cu. ft. of air per minute. Lower priced than exhaust fans described above. Designed primarily for domestic service. Fan shown with mounting panel is 12-in. size. 9-in. size, 4 blade; 12 and 16-in. sizes, 6 blade.

Mounting Panels

Mounting panels can be furnished for 9 and 12-in. ventilating fans only. Panels for 9-in. fans are metal with translucent inserts adjustable for windows from 26 to 38 in. in width. Wood mounting board can also be furnished for this type fan.



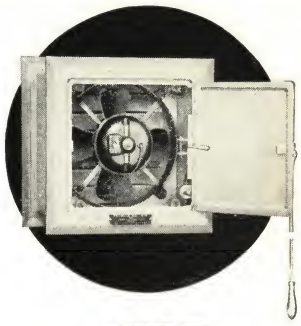
Metal panels with translucent inserts and all-metal panels can be furnished for 12-in. ventilators. Translucent panels furnished in two sizes adjustable for windows from 27 to 46 in. in width. Three sizes of all-metal panels adjustable for windows 22 to 46 in. in width. Especially desirable for domestic kitchens.

Automatic Shutters

A full line of aluminum-leaf automatic shutters can be supplied for use with 12 and 16-in. ventilating fans and all sizes of exhaust fans. They effectively shut out rain and cold air when fan is not in use.

Wall Boxes

Made in two sizes for 9 and 12-in. ventilating fans. Fan operation provides for either blowing in or out. A simple toggle switch, conveniently located, controls the direction of air flow. A jamb switch turns on the fan when door is opened. Handle for opening door provided. Boxes are made in two telescoping sections. The 9-in. box is adjustable for walls from 7 to 13½ in. in thickness and the 12-in. box for walls 9 in. in thickness and larger. The 9-in. box requires a wall opening 11¼x11¼ in. and the 12-in. box, a wall opening 14¼x14¼ in. Finished in French gray overall.

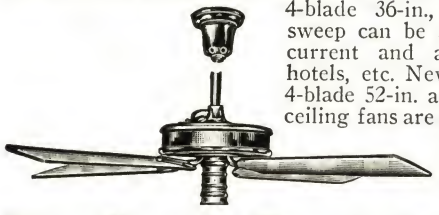


Portable Fans

Emerson oscillating and non-oscillating fans are made in 8, 10, 12 and 16-in. sizes for alternating and direct current; all with three speeds, except the lower priced single speed Emerson B Jr. fans. Emerson fans have many unique and valuable features.

Ceiling Fans

Emerson alternating and direct-current ceiling fans of type shown below (4-blade 56-in. sweep) are the most popular for commercial use, but a 6-blade 32-in., 4-blade 36-in., and 4-blade 52-in. sweep can be supplied for 60-cycle current and are in demand for hotels, etc. New up-and-down-draft, 4-blade 52-in. and 4-blade 36-in. a-c. ceiling fans are also in large demand. The reversing action of these fans are entirely electrical.



Furnace Blower for Warm Air Heating Systems

The Emerson Furnace Blower gives the warm air heating system forced circulation and has many outstanding features. These features include direct drive—no belts or pulleys; 3-speed operation; adequate air moving capacity—955 to 2540 c.f.m.; flexibility of speed regulation; quietness of operation and high motor efficiency with low starting current.

Bulletins

Descriptive bulletins on any or all of above apparatus with complete detailed data will be sent promptly on request.

ESTABLISHED 1923

PRYNE & CO., INC.

Manufacturers of Domestic Electric Ventilators and Building Specialties

791-793 East 15th Street, LOS ANGELES, CAL.

BRANCH SALES OFFICES

SAN FRANCISCO, CAL., 557 Market Street

BROOKLYN, N. Y., 49 34th Street

GUARANTEED "PRYANCO" PRODUCTS

Domestic Electric Ventilators, both Ceiling and Sidewall Types.

Also, Built-in Residence Mail Boxes—counterweighted, springless, cast outside plate, cast inside grille door.

Apartment Mail Boxes—Government approved; solid brass, even to locks and hinges; electrically welded.

"Lockapak" Package Receivers—self-locking.

Iron Receptacles—for safety and convenience both while ironing and when iron is not in use.

"Prynite" Illuminated House Numbers—operate off doorbell transformer at nominal cost; always lighted.

"Dorgril" Door Communicators—improve the door; provide safety; combine knocker, number and wicket.

Built-in Clothes Racks, Match Boxes, etc.

ELECTRIC VENTILATORS

Pryne & Co., Inc., manufacture two types of Domestic Electric Ventilators. The "Pryne" is designed primarily for built-in installation above stoves in kitchen ceilings, and the "Pacific Breeze" for sidewall installation. They efficiently remove grease-laden steam and odors as fast as they form, and are equally practical for bathrooms, basements, dens, etc.

A decorative aluminum plate with grille or door is the only part visible. The quiet and fully enclosed induction type Westinghouse motor will not interfere with the radio. Special bearings and oiling device permit motor to run for long periods without oiling or other attention. The complete unit is fully guaranteed against defective material and workmanship.

"Pryne" Ceiling Type Ventilator

Ventilator fits between the ceiling joists, flush with ceiling. Decorative circular cast aluminum grille. Five-blade one-piece aluminum fan set directly above grille. All "Pyrne" Ventilators are equipped with automatic shutters to prevent backdraft and No. 2 types are furnished with outside cap wind deflector.

No. 1 Type for Direct Discharge Above Ventilator—Discharges air straight up and should be used *only* where duct may proceed directly above the ventilator.

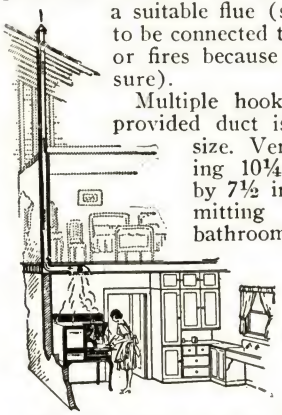
Furnished for an 8-in. round duct. Ventilator housing is 10¼ ins. square and 12 ins. high.

Type No. 1

No. 2 Type for Diverted Discharge—Used whenever the duct cannot be pointed straight up from the ventilator. Discharges to one side, into a duct 4x10¼ ins. which may be continued to the outside wall, to the nearest second-story partition and thence to the roof, or to a suitable flue (such flue not to be connected to the heaters or fires because of air pressure).

Type No. 2

Multiple hook-up possible, provided duct is of suitable size. Ventilator housing 10¼ ins. square by 7½ ins. high, permitting use under bathroom floors.



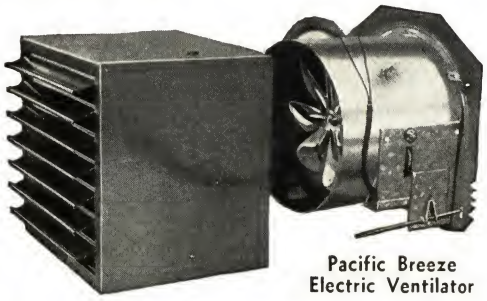
When the stove is on an inside wall, a ceiling ventilator is from 30% to 40% more efficient than a side-wall ventilator, due to its utilization of natural drafts.

"Pacific Breeze" Sidewall Type Ventilator

For use where ceiling type ventilator is not desired. Has one-piece, 8-blade solid aluminum fan. Capacity, approximately 500 cu. ft. of free air per minute. Outside shutters close mechanically when motor is not in operation, protecting working parts from dampness and insects.

Decorative solid aluminum inside plate with door or cast aluminum grille for interior wall.

Two operating levers: one lever opens outside shutters and starts motor; other lever reverses motor for intake or exhaust operation at will. Also furnished without reversible fan feature.

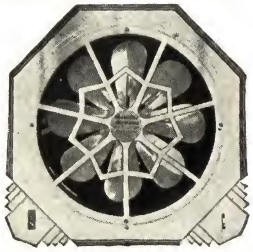


Pacific Breeze Electric Ventilator

Installation—Outside square housing or "shell" (which contains shutters) is set into wall "in the rough." All machinery, including switch and electrical connections, installed with inside section "at the finish." Very simple to install. Housing set flush with inside finish wall or casing, regardless of wall depth.

Roughing-in Size—12 ins. wide, 12 ins. high, 9½ ins. deep for reversible model; 6 ins. deep for non-reversible model. Extensions available for deep walls or cabinets.

Solid Type Inside Door



Motor Control — Fan Control

Grille Type Inside Door

UNITED STATES BLOWER AND HEATER CORP.

Manufacturers of Air Conditioning Equipment

2133 Kennedy Street, N. E., MINNEAPOLIS, MINN.

REPRESENTATIVES IN PRINCIPAL CITIES

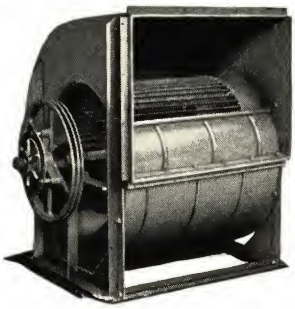
Products

DOUBLE INLET BLOWERS.
SINGLE INLET BLOWERS.
FURNACE BLOWERS.
AIR WASHERS.
UNIT HEATERS.
UNIT AIR CONDITIONERS—DOMESTIC and COMMERCIAL.

Also Remote Hydraulic Speed Control, Variable Speed Pulley and Humidifiers, domestic and commercial.

Proven Accepted Designs with New Features

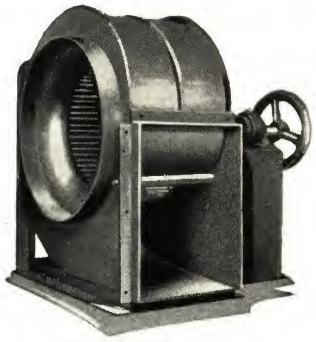
United States Blowers meet the demand for quiet operation. They are arc-welded for increased strength and rigidity. Each impeller wheel is properly balanced and is of multiblade design with forwardly curved blades, producing quiet, uniform air flow. Extra heavy drive shafts are used. Ball or roller bearings prevent end-thrust, vibration and chatter, regardless of speed. Hydraulic remote control, if desired. Non-slip Multi-V-belt drive with short shaft centers assures silent operation and economizes on floor space.



Double Inlet Blower

United States Blowers are made in all sizes, wheel diameter being constructed in increments of 3 and 6 in. with capacities of from 100 to 200,000 cu. ft. per minute. Multi-V-belt standard equipment.

Small sizes may be direct connected or belt driven, as desired.



Single Inlet Blower

Unit Heaters

Absolutely leakproof. Withstands steam pressure as high as 150 lb. The union between fins, tubing and headers is accomplished without brazing or soldering, by means of our exclusive "mechanical bond." No seam separation or metal fatigue.

A high-velocity heater which effectually prevents cold areas at the floors.

Unit Heater

Air Washers

Draws the air through misty, penetrating curtains of water, cools, humidifies and cleanses, removing dust, soot and foreign matter.

Spray Nozzles—Especially constructed in such a manner that the water entering the nozzle is forced to take a circular motion producing a fine misty spray covering a wide area. Nozzles are of simple construction, having only two parts. Each nozzle contains two inner orifices to guard against clogging.

Settling Tank—Constructed of copper bearing steel with arc-welded seams wherever laps or joints occur. Pump suction chamber is protected by heavy cover plate, preventing foreign matter from entering recirculating water pump.

Recirculating Water Pumps—All air washers are equipped with double suction, closed impeller, horizontally split casing, bronze fitted, ball-bearing recirculating water pumps mounted on cast iron bed plate with direct connected motor and flexible coupling.

Air Washer

Balmi-Aire—The Complete Air Conditioning System for Homes

The complete system provides temperature reduction by forced circulation of pre-cooled, washed air in summer; and winter heating and humidity with positive circulation of heat and humidity, both automatically regulated.

Summer Cooling—In warm weather this system lowers the temperature as much as 10 to 15 degrees below the outside heat. This positive cooling is further increased by the air movement throughout the house. The cooling equipment consists of insulated electric motors; a U. S. Blower of ample capacity and a U. S. Air Washer. The washed, cooled air is circulated at the desired volume through ducts to various parts of the house.

Balmi-Aire All-season System

Winter Humidified Heating—The same equipment, together with the Balmi-Aire Heating Unit provides properly conditioned air in winter. The heating unit is heavy, seamless welded steel, permanently gas-tight. Positive pressure circulation provides fast, sure distribution of heat and humidity. Simple grilles or blowers in the walls, as used in concealed heating, save floor space and reduce costs. Uses any fuel, coal, oil or gas.

Any part of the Balmi-Aire System may be purchased and installed separately, for use in homes now equipped with any type of heating plant. We also manufacture various other types of humidifiers with new features.

Catalogues

Catalogues, rating tables, complete information, prices and terms on any products of the UNITED STATES BLOWER & HEATER CORP. will be sent promptly on request.

B. F. STURTEVANT COMPANY

Heating, Ventilating and Air Conditioning Apparatus

MAIN OFFICES

410 No. Michigan Avenue
CHICAGO, ILL.

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BOSTON, MASS.

681 Market Street
SAN FRANCISCO, CAL.

PLANTS LOCATED AT

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CARACAS, VENEZUELA, International General Electric Co.
HONOLULU, T. H., Honolulu Iron Works
MANILA, P. I., Earnshaws Docks & Honolulu Iron Works
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LIMA, PERU, Pedro Martinto, Inc.
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WELLINGTON, N. Z., Blair, Reed & Co., Ltd.

Sturtevant Products

The complete line of Sturtevant Equipment includes practically every type of AIR SUPPLYING, EXHAUSTING and CONDITIONING APPARATUS; UNIT HEATERS for industrial plants and other places; PORTABLE and STATIONARY VACUUM CLEANERS and many other related items too numerous to mention.

Shown on these pages are merely those products of widest interest to architects.

Sturtevant
REG. U.S. PAT. OFF.

Engineering Service

Experienced Sturtevant Engineers are located at each of the offices above.

These men are at your service.

They will gladly co-operate and advise on any heating or ventilating problem with which you may be confronted.

Sturtevant Silentvane Fans

The Sturtevant Silentvane is a high speed ventilating fan especially designed for installations where exceptionally rugged construction and the utmost in efficiency and operating economy are required. It is the highest priced Sturtevant Ventilating Fan made.

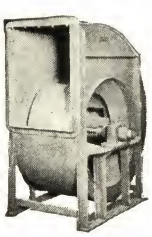
Silentvane Wheel

Ninety of these fans, capable of handling over 11,500,000 cu. ft. of air per minute, are installed in the famous Holland Vehicular Tunnels linking New York and New Jersey. Hundreds of others are installed in fine buildings everywhere.

They are made in a wide variety of sizes—with tip speeds ranging from 2400 to 9000 r.p.m.

A few of the outstanding Silentvane features are as follows:

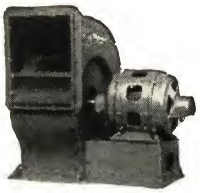
(1) Static efficiency—over 70%.
(2) Quiet operation.
(3) Self-limiting horsepower characteristic—eliminates danger of overload and the usual excess in motor size. Permits use of motors about half the size ordinarily needed for the same working conditions.
(4) When the Silentvane is direct-connected, high-speed motors are used. As high-speed motors are lower in cost than low-speed motors a worthwhile saving is effected.



Silentvane Fan

Sturtevant Multivane Fans

The Sturtevant Multivane is a so-called low-speed fan designed for ventilating duty. From the standpoint of efficiency, performance and dependability it meets all the requirements of slow-speed fan service. It is highly efficient and is of typical rugged Sturtevant construction. Multivane fans are made in a wide variety of types and sizes.



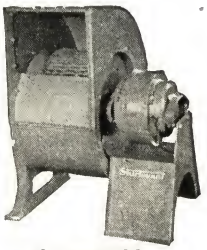
Multivane Fan

Sturtevant Convertible Multivane Fans

The Sturtevant Convertible Multivane is the same in performance and dimension as the standard Design 3 Multivane but is built with convertible and reversible housing in both motor and pulley types.

The roundabout scroll sheet is die formed with beaded edges locking over the side sheets. It is not welded to the sides and may be removed easily by simply taking out two or three bolts at each end.

Pulley and wheel are both overhung in the single width, single inlet type, the wheel shaft being carried on two ball bearings at either end of a solid sleeve between pulley and wheel. On the electric type, the motor is carried in a cradle and fan is overhung on motor shaft. One of the quietest motor mountings known is used for this fan.

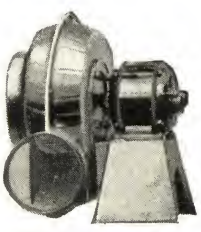


Convertible Multivane Fan

Sturtevant Ventilating Sets

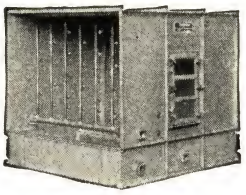
These fans are ideally adapted for the ventilation of small or medium size rooms, in general up to 7500 ft. cubic contents. They are widely used for ventilating kitchens, toilets, chemical laboratory hoods, motion picture and telephone booths, bank vaults and similar places.

A ventilating set consists of a direct-connected motor-driven fan of the Multivane type, and is particularly adapted to handling air through duct work. It may be operated either as an exhauster or blower. Six sizes—which meet practically all requirements—are carried in stock.



Ventilating Set

Sturtevant Air Washers



Air Washer

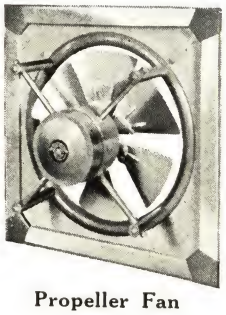
Sturtevant Air Washers are built in three standard types, each being recommended for the service to which it is best adapted.

Type H is designed for all general work in washing, purifying and humidifying.

Type C is for severe humidifying and cooling service and is similar to Type H but with an additional group of nozzles and longer spray chambers.

Sturtevant Propeller Type Ventilating Fans

The new Sturtevant Propeller Fan strikes a note of originality in fans of this type, and at the same time combines the advantages of high capacity and light weight.



Propeller Fan

The design of the wheel produces a practically uniform air velocity over its entire area, making it exceptionally effective. The ball bearing motor is suitable for either horizontal or vertical operation and is totally enclosed for permanent protection against dust and grease.

The motor support is solidly welded to the ring, which is curved both for strength and to provide a stream-lined path for the air. The fan may be purchased either with or without the furniture-steel mounting panel. Sizes 12 to 25-in. wheel diameter; 60-cycle a-c. motors only.

Sturtevant Propeller Fans are made in larger sizes in another type, with either alternating or direct-current motors.

Sturtevant Flexible Unit Heater-Ventilator

Exclusive Sturtevant developments of signal importance are provided in the new Sturtevant FLEXIBLE Unit Ventilator.

With this equipment Sturtevant introduces *flexibility in unit ventilation.* This standard equipment can be simply adapted to exactly suit the requirements of a particular building or service. The unit may be arranged in any one of three ways:

Arrangement 1—Delivers all outdoor air at all times.

Arrangement 2—Delivers all outdoor air when room is occupied; recirculates and heats all interior air when room is unoccupied, to accomplish quick, economical heating.

Arrangement 3—Delivers 50% outdoor air in constant quantity when room is occupied and at the same time recirculates 50% of the room air; when room is unoccupied it recirculates and heats 100% of the room air. This arrangement, permitted to date in a few states, effects large fuel savings. It also saves on first cost, since auxiliary radiation can usually be dispensed with.

Sturtevant Flexible Unit Ventilator

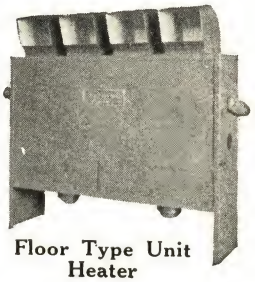
An investment in Sturtevant FLEXIBLE Unit Ventilation equipment is safeguarded against future changes in law, practice and personal preference. At negligible cost this FLEXIBLE equipment can be simply rearranged after installation to function in a different manner.

Sturtevant also introduces another exclusive development—the *Sturtevant Self-contained Automatic Temperature Regulator*—which can be obtained, when desired, only in Sturtevant FLEXIBLE Unit Heater-Ventilators. It is an extremely sensitive, simple and reliable thermal control element which is mounted completely in the unit cabinet. It requires neither electrical nor pneumatic connection. However, if the pneumatic or electric types of control are preferred, the necessary attachments of the particular make chosen will be mounted in the unit cabinets at our factory.

Detailed information on the Sturtevant FLEXIBLE Unit Heater-Ventilator is available in our new Catalogue No. 377.

Sturtevant Unit Heaters

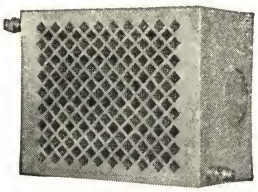
Sturtevant Unit Heaters are made in both overhead and floor types.



Floor Type Unit Heater

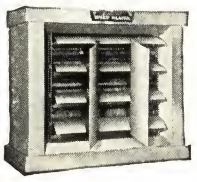
Floor Type: Made in a range of sizes and capacities. When equipped with fresh air inlets, they may be used for ventilating as well as for heating. Motors for both alternating and direct current and for standard voltages.

Overhead Type: Known as the Speed Heater; built in two types, in several sizes and capacities. *Cabinet type* is used in offices, schools, gymnasiums, swimming pools, etc. and wherever exceptionally quiet operation is desirable; delivers 500 to 750 cu. ft. per minute. *Industrial type* is used in plants, shops, garages, etc.; delivers 920 to 5400 cu. ft. per minute.



Cabinet Type Speed Heater

Speed Heaters have 2-speed motors—high speed for extra fast heating, low speed for maintaining set temperature. Each heater is wired for individual control, but several heaters can be wired for remote control from one switch (complete wiring diagrams with each heater). All models have high pressure heating surface for steam pressures up to 150 lbs. No alterations or special provisions are needed to operate on a desired pressure. Vertical louvres (a new exclusive feature on industrial type of Speed Heater) diffuse air flow over wider area. Motors for both alternating and direct current and for standard voltages.

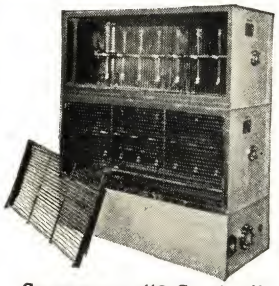


Industrial Type Speed Heater

Sturtevant Air Conditioning Equipment

The new Sturtevant line of Air Conditioning Equipment meets a wide variety of needs, overcomes many of the limitations of existing apparatus, and incorporates a number of new and highly advantageous features. Only brief description of this equipment is possible here. Complete information is available in the new Bulletins mentioned below.

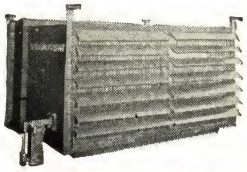
Sectional Type Units—These units take the place of ordinary air washers but occupy only from one-third to one-half as much space. Suitable for central systems. Are designed on sectional basis, so that any capacity required can be quickly and easily provided by merely assembling the required number of sections.



Sturtevant "2-Section" Air Conditioning Unit

Units for cooling, filtering and dehumidifying are known as "Filti-coolers," described in our Bulletin No. 378. Units for filtering and humidifying are known as "Humidifilters," described in our Bulletin No. 383.

Suspended Type Units—Made in types for cooling, humidifying and dehumidifying purposes. Like the sectional type units, described above, they embody the water spray principle. May be used with brine—in which event there are no frosting difficulties. Equipped with propeller fans. Particularly suitable for industrial plants. When heat is required in addition to air conditioning, these units are supplied with the required amount of fin heating surface and may be used as unit heaters.



Sturtevant Suspended Type Air Conditioning Unit

They are described in detail in our Bulletin No. 384.

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue
For References to Other Products, see Index to Manufacturers

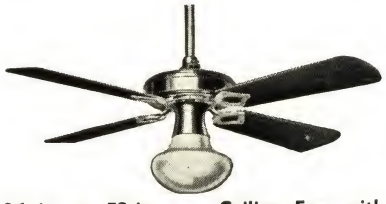
WESTINGHOUSE FANS

Westinghouse makes a complete line of fans noted for beauty, power and silence.

Ceiling Fans

With Westinghouse ceiling fans installed, stores and shops are always fresh and cool. These fans keep in circulation the constantly changing, refreshing air at a cost for current that is surprisingly low.

They are made in the paddle fan type with 36, 52 and 56-in. blades and can be furnished with a simple adapter for attaching underneath any type of lighting unit desired.



36 in. or 52-in. a-c. Ceiling Fan, with Globe Holder and Socket, without Switches
Both fan and light are controlled by wall switches

For attaching lighting units to the 52-in. ceiling fan, a globe holder and socket can be provided. Fans can be furnished from factory on special order, equipped with lighting attachment, or it can be ordered separately.

The Rotaire Fan

The Rotaire is a commercial fan that combines the efficiency and low operating cost of the regular 16-in. fan with the recognized advantages of ceiling suspension. In the commercial and industrial fields, the Rotaire with its economy in price and efficiency in performance, has met with widespread approval. In the Rotaire the 16-in. oscillating fan is adapted for ceiling mounting. It may be installed wherever the common type of ceiling fan is practicable. It is especially adapted to restaurants, theaters, stores and offices or any other place where many people gather.

Rotaire Fan

Suspended from the ceiling the fan is held rigidly at an angle of 45° from the perpendicular. One Rotaire will efficiently cool a circle 20 ft. in diameter. Fan should be mounted 8 ft. from floor to secure best results.

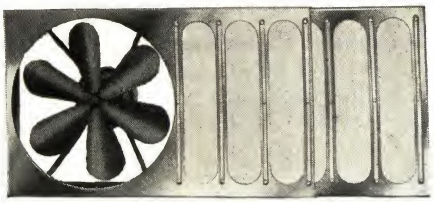
Exhaust Fans

Made in 12 and 16-in. sizes for horizontal or vertical mounting. They are single-speed fans, but a speed regulator can be supplied if desired. They have Micarta blades.

Kitchen Exhaust Fan—Will operate as an exhaust or intake fan. It will force smoke and objectionable odors from the room or will draw the invigorating outside air into the room; it prevents greasy kitchen fumes from marring furniture, walls and draperies. Smoke and fumes are banished before they have an opportunity to do any damage.

Frame has translucent panels which improve the appearance of the unit and allow a maximum amount of light to enter. This feature is particularly valuable in rooms where there is only one window.

The kitchen exhaust fan is more than a hot weather fan. The year around it helps to maintain a comfortable temperature and healthful atmosphere in the kitchen or in any room in which it is installed. Can also be used in small restaurants, restaurant kitchens, smaller theaters, laboratories and domestic science rooms.



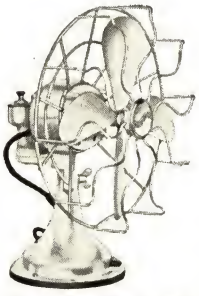
Kitchen Exhaust Fan

Two sizes can be furnished to fit 24-in. to 34-in. to 54-in. openings. Diameter of fan is 12 in. The unit is provided with 15-ft. cord and plug. Fan is furnished in 110 volts, 60 cycles, only.

The Home Fan

The splendid 10-in. ivory and nickel Home Fan should not be confused with low priced fans, of similar size, which do not have the refinements of design and construction. Is also applicable for restaurants, bakeries, beauty shops, barber shops, doctors' offices, and hospitals.

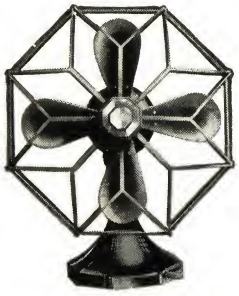
Hotels can use this fan, or one in black to make their rooms attractive and cool in hot weather.



The Home Fan in Old Ivory

The Debon-Air Fan

The Debon-Air Fan is a new standard in fan beauty brought about by Westinghouse engineers and artists. Its design and silver oxide finish, giving a subdued richness, harmonizes with modern furnishing and modern surroundings. Blades are of Micarta. It is a 10-inch, oscillating, two-speed fan.



Desk and Bracket Fans

Made in 8, 10, 12 and 16-in. sizes; the two smaller fans being generally used in homes and small offices.

The 12 and 16-in. sizes cover a very broad field of commercial uses. They may be tilted forward 15° or 20° and tilted backward 90° for wall mounting.

The 10-in. fans are single speed; 12 and 16-in fans have three speeds controlled by a switch in the base and an arc of oscillation of 90°, readily changed to 45°, or to operate without oscillating.

The 10, 12 and 16-in. fans have Micarta blades which, with a 6-pole, slow-speed motor, contribute greatly toward silent operation and long life.

The standard finish is a rich, dull black. A special finish can be readily secured when desired.

L. J. WING MFG. CO.

WORKS
NEWARK, N. J.

51 Seventh Avenue, NEW YORK, N. Y.

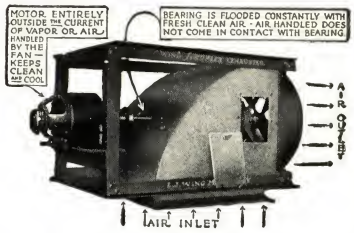
BRANCH OFFICES IN
PRINCIPAL CITIES

Wing Products

WING FEATHERWEIGHT UNIT HEATERS and PROCESS HEATING UNITS; UTILITY HEATERS; WING-SCRUPLEX SAFETY VENTILATING FANS; FOG ELIMINATORS; WING-SCRUPLEX EXHAUSTERS; WING FORCED DRAFT BLOWERS, TURBINE or MOTOR-DRIVEN; STEAM TURBINES; MAN COOLERS.

Wing-Scruplex Exhausters

The motor is entirely removed from the exhaust housing, which facilitates periodic servicing and remains clean and cool. As an elbow in duct systems where resistance is moderate, it provides efficient, low cost, convenient ventilation. For acid-laden air, fan and exposed parts can be supplied in monel metal. Made for horizontal or vertical operation—top, bottom, or side intakes.



SIZES AND CAPACITIES OF WING-SCRUPLEX EXHAUSTERS

Size	Inlet square, in.	Outlet round, in.	Speed, r. p. m.	Free air		.15 in		.25 in.		.40 in.		.50 in.	
				C. f.m.	Hp.	C. f.m.	Hp.	C. f.m.	Hp.	C. f. m.	Hp.	C. f.m.	Hp.
1-A	10	10½	1750	850	.052	630	.054	330	.060				
2-A	13½	14	1150	1440	.060	950	.069	395	.090				
2-B	13½	14	1750	2050	.195	1895	.208	1695	.216	1155	.248	750	.285
3-S	16¾	17½	850	2130	.090	1250	.110						
3-A	16¾	17½	1150	2700	.180	2150	.195	1550	.221				
3-C	16¾	17½	1750	4000	.600	3720	.635	3510	.655	3150	.700	2840	.720
4-S	21	21¾	850	2850	.100	2200	.100	1610	.120				
4-A	21	21¾	1150	3570	.170	3150	.200	2775	.220	1950	.245	1550	.280
4-C	21	21¾	1750	5400	.540	5160	.600	4990	.650	4670	.710	4440	.750
5-A	25	25	1150	5200	.330	4720	.380	4250	.440	3300	.530	2610	.600
5-B	25	25	1750	8000	1.330	7740	1.360	7540	1.400	7175	1.480	6900	1.540
6-A	30	30	600	5500	.210	3725	.250	2375	.330				
6-B	30	30	850	7400	.550	62 0	.600	5450	.740	4000	.830	3400	.960
6-C	30	30	1150	10250	1.500	9520	1.550	8950	1.570	8000	1.620	7340	1.760

Where particularly quiet operation is desired, as in offices, residences, hospital wards, churches, laboratories, etc., use lowest speeds in all sizes. For toilet rooms, laboratories, motion picture booths, stockrooms, etc., use any speed in sizes 1 and 2; low and medium speeds in all other sizes. In industrial plants, hotel and restaurant kitchens, engine rooms, workshops, etc., use any speed.

Complete table for pressure up to 1-in. static sent on request.

Wing-Scruplex Safety Ventilating Fans

The true screw design fan wheel moves all the air in straight and parallel lines. The safety guard welded to fan frame prevents accidents. Generously proportioned, totally enclosed motors require no artificial ventilation — accessibility insures long life with minimum attention. Power consumption is reduced to a minimum per cu. ft. of air moved, due to absence of eddy currents. Parts subject to corrosion can be supplied of Monel or other acid-resisting metal. Also furnished for pulley or turbine drive.

SIZES AND CAPACITIES OF WING-SCRUPLEX SAFETY FANS

Size in.	Speed, r.p.m.	Free air capacity, c.f.m.	Motor hp.	Size, in.	Speed, r.p.m.	Free air capacity, c.f.m.	Motor hp.
10 H-18†	1750	950	1/20	30 L-9	850	6000	⅓
13 L-18†	1750	1400	1/20	30 H-60	600	7000	.4
13 H-12	1150	1550	1/10	36 L-60††	600	8000	.4
13 H-18	1750	2400	¼	36 L-70*	700	8800	.4
17 L-12	1150	2100	1/10	36 H-60	600	11000	.6
17 H-12	1150	3150	¼	42 L-60	600	12700	.6
17 H-18	1750	4800	1	42 H-45	450	14700	¾
22 H-9††	850	3450	1/10	48 L-45	450	17500	¾
22 H-12	1150	4150	¼	48 H-45†††	450	19500	1
22 H-18	1750	6300	1	54 L-45	450	21000	1
25 H-9	850	4500	⅙	54 H-45	450	24000	1¼
25 H-12	1150	6000	½	60 L-45	450	26000	1¼
25 H-18	1750	9100	2	60 H-40	400	33000	2

†Not available for polyphase. †††Not available for single-phase.
††Not available for d-c. *Not available for a-c.

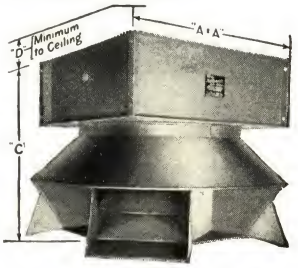
Table of capacities at various static pressures on request.

The 13, 17, 22 and 25-in. sizes in speeds above 1150 r.p.m. are designed for industrial plants and locations where a little noise is not objectionable. All other speeds given are "quiet speeds."

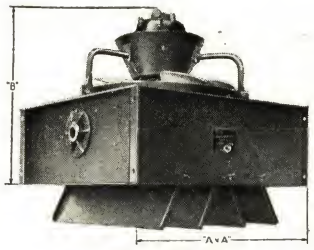
Wing Featherweight Unit Heaters

For large or small single or multiple story buildings. Their lightness permits—easy overhead suspension near roof or ceiling. The high velocity multiple discharge outlets insure delivery of heated air to working level first. Drawing air from highest point in building, prevents overheating of upper spaces, eliminating this source of waste.

The new Wing Featherfin heating element is of the extended fin and tube type of hairpin or return bend design. Tubes are secured to headers by compression unions, making a positive steam joint. Each heater is tested at 150 lbs. steam pressure, and a hydrostatic pressure of 1,000 lbs. The original and exclusive Wing vertical design, with multiple discharges, permits overhead installation, insures direct and rapid heating, economy in first cost of units and smaller quantities of piping, fittings and traps.



Type LC Unit

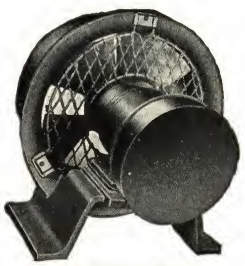


Type HC Unit

CONDENSED TABLE OF ENGINEERING DATA

Unit size	AxA, in.	B, in.	C, in.	D, in.	Air c.f.m.	Motor hp.	Temperature, Room	Temperature, Leav.	B.t.u. rating	Net wt., lb.
13-HC	16	20½	.....	.....	800	1/15	60	123	55500	95
17-HC	19¾	22	.....	.....	1400	1/10	60	125	100500	130
19-HC	22¾	24½	.....	.....	2000	¼	60	123	139500	160
22-HC	27¾	23¾	.....	.....	2750	¼	60	128	206000	200
25-HC	32¾	24	.....	.....	4300	½	60	126	315000	285
30-HC	39⅛	30	.....	.....	6600	1	60	123	461000	430
36-HC	45⅛	30½	.....	.....	9800	2	60	120	656000	560
13-LC	16	.....	20	6	750	1/15	60	122	47500	95
17-LC	19¾	.....	20	6	1310	1/10	60	124	85500	130
19-LC	22¾	.....	21	6	1860	¼	60	122	118500	160
22-LC	27¾	.....	22⅜	6	2530	¼	60	127	175000	200
25-LC	32¾	.....	25½	7	4000	½	60	125	268000	285
30-LC	39⅛	.....	32	8	6150	1	60	122	392000	430
36-LC	45⅛	.....	35⅝	8	9130	2	60	119	557500	560

Space does not permit complete table, but this data will gladly be furnished on application.



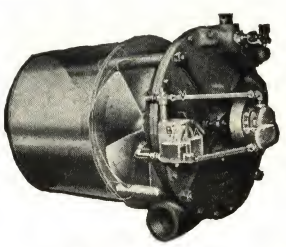
Motor-Driven Blower

Wing Motor-Driven Blowers

Designed for supplying the forced draft in heating and low pressure boilers burning the smaller sizes of anthracite or slack coals. They are strongly built and will give years of reliable service without repair. Their variable speed control affords the convenience of draft regulation necessary for efficient boiler operation. Thousands of schools, apartment houses, hospitals, etc., are saving half their fuel bills annually with Wing forced draft systems.

Wing Turbine Blowers

For every stokered or hand-fired boiler to supply the forced draft necessary to obtain higher boiler ratings. They increase flexibility carrying peak loads quickly and easily without dropping steam pressure. They cut fuel costs by allowing the use of the cheapest grades of fuel available. They are cemented into the boiler wall, occupy practically no space and eliminate duct work and excavation.



Turbine Blower

AIR-CONTROL SYSTEMS, INC.

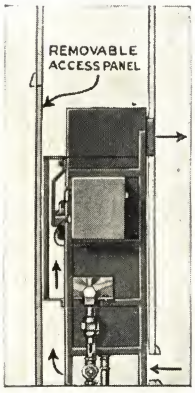
Small Unit Humidifying—Air Washing—Cooling Equipment

2240 No. Racine Avenue, CHICAGO, ILL.

A Compact, Silent, Complete Small Unit Air Washer

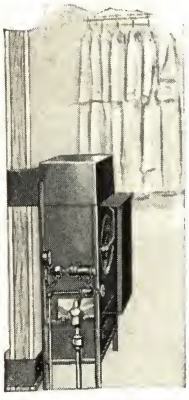
ZEPHYR AIR

For Homes, Offices, Hospitals and Industrial Plants



Concealed in Deep Wall

Access panel opposite discharge and inlet openings



Installed in Closet

With inlet through baseboard and short discharge duct through wall

Unique Principle

The "Zephyr 75" provides continuous and thorough air washing and air purification for homes, offices, hospitals and industrial plants. Air is pre-heated before entering spray chamber and reheated by mixing with heated by-passed air.

Silent Operation

A slow speed, capacitor type motor (3-speed switch); aluminum blower type fan; an entirely new atomizer which delivers finely atomized spray at 10 to 12 lbs. water pressure; and acoustical treatment in hood and over fan inlet, combine to make the "Zephyr 75" silent in operation.

Room Heating

A section of copper finned radiation provides room heating as well as pre-heating of the air going through spray chamber. The "Zephyr 75" may be installed in place of a small cast iron radiator (See below.)

Correct Humidity

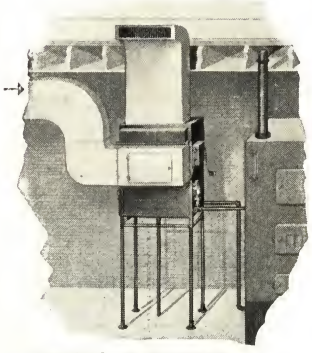
The "Zephyr 75" will maintain correct humidity in space up to 40,000 cu. ft. Inherent self-regulation governs amount of evaporation in relation to varying requirements occasioned by outdoor temperature changes. Air discharged contains *no free moisture,* also *no steam odor,* as the spray does not come in contact with hot radiator.

Room Cooling

A 1-ton refrigerating machine connected to the "Zephyr 75" in accordance with our detailed specifications will provide satisfactory cooling in 3000 to 5000 cu. ft. of space, depending upon room construction and heat load.

Six Ways to Install

The "Zephyr 75" may be installed in any of the 4 ways illustrated, or may be recessed in wall with grille over recess or suspended on wall 7 ft. or more above floor for industrial installations. 8-page specification folder on request.

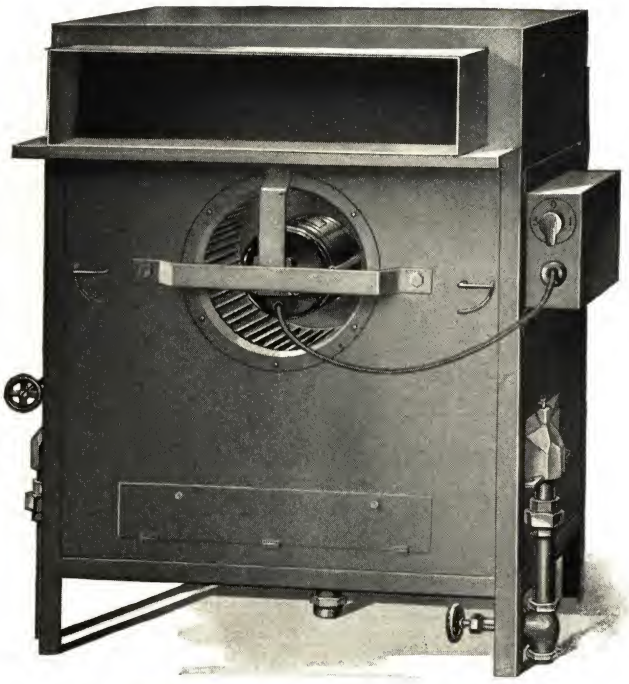


Installed in Basement of Residence

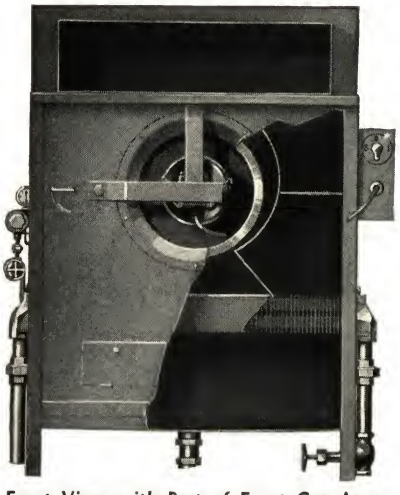
With discharge duct to register in baseboard and return duct from floor or wall register to fan inlet

Replacing Ordinary Cast Radiator

Enclosed in console cabinet of steel or wood

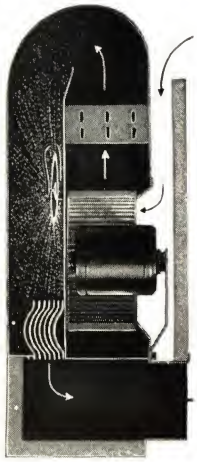


The "Zephyr 75"—With Front Acoustical Panel Removed



Front View, with Part of Front Cut Away

Showing fan scroll which directs air downward through center half of heating radiator. By-passed air is reheated by passing upward through end quarters of radiator. Space at right and left of fan scroll forms by-pass chambers to hood. When by-pass dampers are closed, as illustrated, all air is forced through spray chamber



Cross Section Through Center

Showing air flow upward to fan, downward through radiator and upward through spray chamber and eliminators to hood

AMERICAN AIR FILTER COMPANY, INC.

226 Central Avenue, LOUISVILLE, KY.

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CANADIAN ASSOCIATES, MIDWEST CANADA, LTD., MONTREAL, QUEBEC

Products

The American Air Filter Company, Inc., manufactures a complete line of Air Filtering Equipment, including Automatic Self-cleaning, Standard Unit and Dry Process Air Filters, all used for the removal of dust, dirt, bacteria and other foreign matters from the air.

This equipment is used for general ventilation, drying operations, process dust control; for air compressor and diesel engine; mill motor, turbo generator and other electrical applications; and for air or gas under pressure to remove entrained oil, moisture and dirt.

Air Cleaning Principle

All American Air Filters (viscous type) operate on the adhesive impingement principle. The air to be cleaned is drawn through the filter media by means of fans or blowers.

The centrifugal force actuated upon the air streams in passing through the filter throws the dust particles against the surface of the filter media where they are caught and held by a viscous coating.

Guaranteed cleaning efficiency on any American Air Filter—97% to 98%, at a resistance of .25 to .385 in. water gauge.

Automatic Self-cleaning Air Filters

Automatic Multi-panel

The American line of automatic air filters is among the most complete that have ever been offered. All of the filters described below have been in use for a number of years in connection with both general ventilation and industrial applications. Positive self-cleaning features on each assure maximum cleaning effectiveness and eliminate practically all maintenance.

All types are furnished for either continuous or intermittent service and are available in sizes and set-ups suitable to any desired capacity or space conditions.

Multi-panel Type

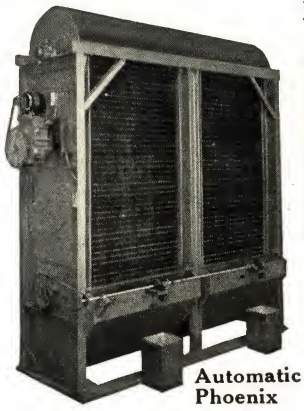
The filter media consist of a multiplicity of closely overlapping bakelite fiber coated screen panels, which form a continuous movable curtain having a high efficiency in dust removal.

When the curtain enters the charging liquid bath at the base of the filter, the panels are automatically separated and individually cleaned, thus insuring positive self-cleaning.

Automatic Horizontal

Horizontal

The filter media consists of horizontally placed unit cells of expanded metal, arranged in rows one above the other. Self-cleaning is accomplished automatically, at predetermined intervals, by a flushing device which moves over each row of cells, cleaning and recoating them with a fresh supply of charging liquid.



Automatic Phoenix

Phoenix

With filter media of innumerable small die-formed metal plates secured in position by cross rods and incorporated in a rotating filter screen. The screen, mounted on sprockets, is automatically cleaned and recharged by intermittently moving through a bath of charging liquid located at the base of the filter.

Unit Filter

Rated capacity—800 c.f.m.
Size of units (outside frames)—20x20x4 in.
Effective opening—18x18 in. (2¼ sq. ft.)
Dust holding capacity—2 lb. per cell
Weight—unit 30 lb.—cell 20 lb.

Standard Unit Filters

The American Unit Filter is made up of a standard sheet steel frame and interchangeable cell, with filter media of expanded metal or crimped wire, scientifically graded to produce maximum cleaning efficiency. Filters are arranged in wall type set-ups to deliver the required capacity and to meet space conditions. Automatic latches placed conveniently near handles of the cell permit instant and easy removal of the latter for cleaning and recharging. Cleaning requires but a few minutes time and is usually accomplished by means of a steam or hot water tank.

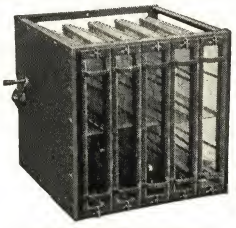
"Airmat" Dust Box

Airmat Filter—Dry Type

The basic element in this type is the "Airmat" sheet, a dry filter media composed of sheets of gauzy cellulose tissue. These sheets are renewable and when thoroughly filled with dirt are discarded for new ones, the useful life of each mat depending upon the hours of service, dust conditions, etc.

Pocket Type—In this form the mats, held in place by screens, are mounted in a boxlike frame of metal "pockets." These unit frames can be set up to meet any space conditions and capacity requirements. The Pocket Type is used for both general ventilation and industrial air cleaning.

Dust Arrester—In this form the Airmat pockets are arranged in standard dust "boxes" or dust arrester "systems" designed for individual needs. The Airmat Dust Arrester is ideal for the recovery of valuable dust, for abating the dust nuisance in factory and factory districts, and for saving fuel and eliminating drafts due to the recirculation of air in winter.



"Airmat" Pocket Type

Technical Facilities

Our research laboratory and engineering staff are always at your service. Let our engineers study your dust problem, make tests in our laboratory and recommend the proper type of equipment.

THE DOHERTY-BREHM HUMIDIFYING RADIATOR

MANUFACTURED BY DOHERTY-BREHM CO.
EXECUTIVE OFFICES
333 No. Michigan Avenue, CHICAGO, ILL.

Sold by
CRANE CO.

Uses

This modern humidifier is used in homes, offices, stores, shops, hospitals and schools heated with hot water, steam, vapor, or any form of radiator heat.

Description

The Doherty-Brehm Humidifying Radiator consists of a specially designed humidifying radiator with hollow, horizontal radiator sections made of cast iron.

These hollow sections of the humidifier act as heating units. The heating mediums—hot water, steam or vapor—flow through the hollow part of each radiator section.

The top of each section is designed as a trough to hold water. A city water line runs through a pressure-reducing valve to the top of the humidifier. This pressure-reducing valve supplies from 2 to 3 gallons of city water per hour into the trough on the top horizontal radiator section.

The trough in this top section fills up 1/8 in. in depth over its entire area and then overflows through a down-spout onto the next horizontal radiator section below. The trough in this second section then fills up 1/8 in. in depth over its entire area and in turn overflows onto the next section below.

This process continues until the tops or troughs of all the radiator sections are entirely covered with water. The small amount of surplus water not evaporated flows into the base of the humidifier, which acts as a catch basin, and from there to a drain.

Efficient Operation

The Doherty-Brehm Humidifying Radiator embodies the two fundamental factors in the efficient evaporation of water.

First, a large area of shallow water is supplied with heat.

Second, heated air currents are deflected across these surfaces of shallow water by the patented design of the radiator sections.

Because of these factors, the Doherty-Brehm Humidifier will evaporate from 20 to 50 gallons of water a day, depending on the size of the unit and the type of heating system on which it is used.

One unit will adequately humidify the ordinary home or office.

Simple Installation

The humidifier acts as a heating unit as well as a humidifier and can be installed to displace an ordinary cast-iron radiator in the heating system or as an extra heating and humidifying unit. It is connected to the heating system in the same manner as the ordinary radiator with the addition of a water line and sewer connection.

Attractively Enclosed

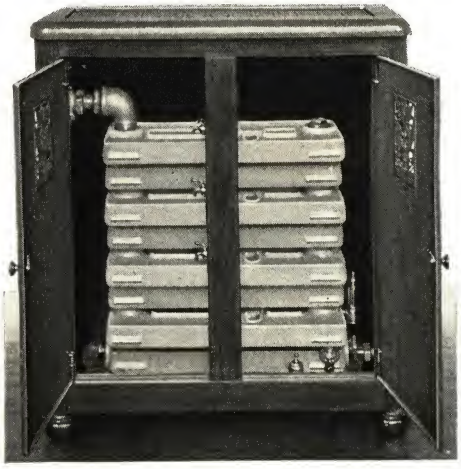
After the humidifier is installed it is enclosed in an attractive console cabinet of wood or metal finished in keeping with the other furnishings of the quarters in which it is placed. Or, it can be recessed into the wall and enclosed with an attractive grille, using a curved metal shield behind the humidifier to direct the moist air out into the room.

Silent, Automatic, Economical

Every detail of the Doherty-Brehm Humidifying Radiator is made to last—to give years of satisfactory service. It has no fans, belts or motors; no pans to fill, no noise, no steam, no odor. It is entirely automatic in operation, providing the right amount of humidity for all variations in the outside temperature by a very simple but effective method. Evaporation caused by the humidifier is in direct proportion to the amount of heat in the radiator sections. When the weather is cold, the outside air is dry—the colder the weather, the drier the air and the greater the amount of artificially produced moisture that is needed indoors. Correspondingly, the colder the weather, the hotter the radiator sections in the humidifier are maintained to heat the building and the greater the evaporation from them. In mild weather, when outdoor air is more humid, less moisture is required indoors as well as less heat, so the lowered temperature of the radiator sections reduces evaporation by the humidifier. Thus, the thermostat which controls the heating of the building also controls the action of the humidifier and provides correct humidity at all times.

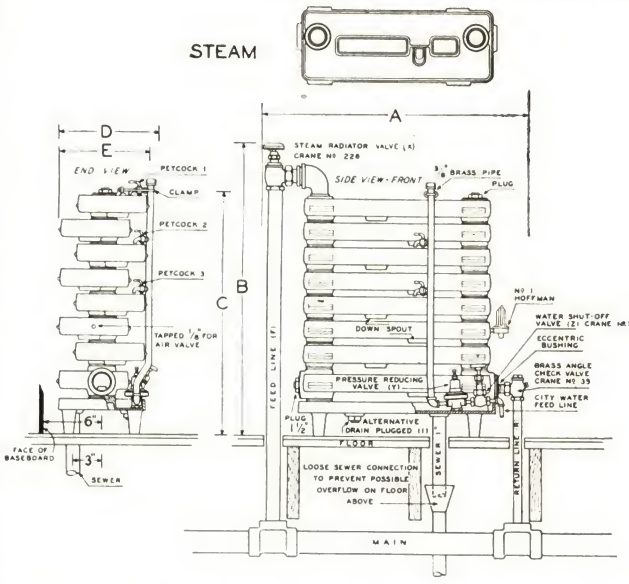
Models

The entire Doherty-Brehm Humidifier line is pictured on the following pages. These sizes and styles fill practically every requirement for an efficient, durable, economical humidifier for homes, offices, shops, stores, hospitals, schools, etc.

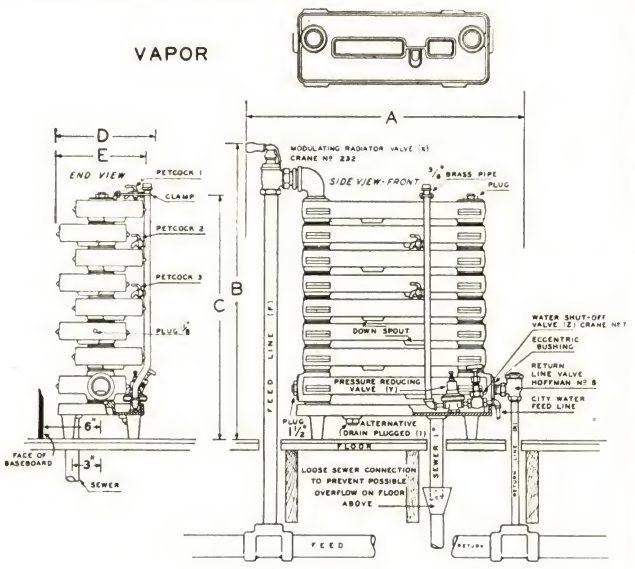


The Open Doors of the Metal Cabinet Reveal the Doherty-Brehm Humidifying Radiator Unit for Steam, Hot Water, or Vapor Heating Systems

STEAM, VAPOR, AND HOT WATER INSTALLATIONS

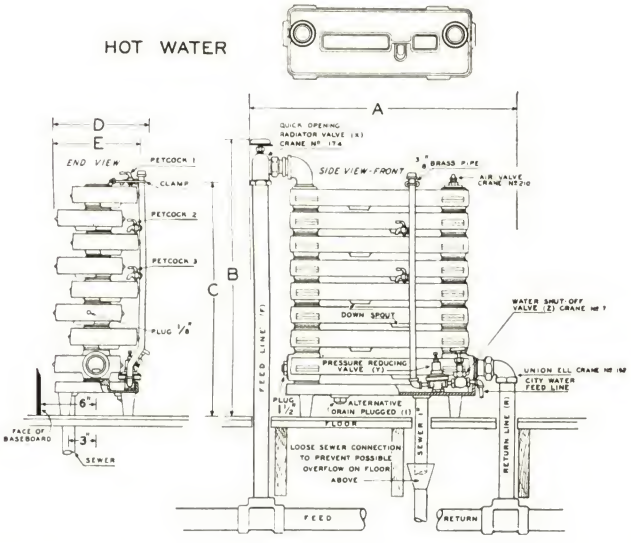


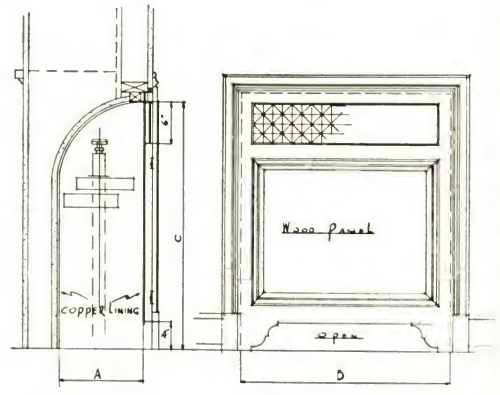
Installation Details on Doherty-Brehm Humidifying Radiators, for Steam, Vapor, and Hot Water

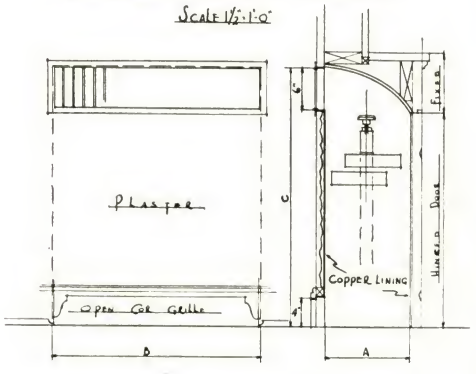


Below:

Plan for Building Wall Recess for Doherty-Brehm Humidifying Radiator, Installed Without Cabinet



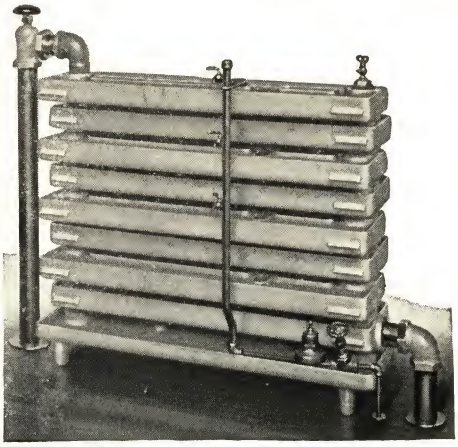




Furniture metal cabinets are supplied for Doherty-Brehm Humidifying Radiators in the following finishes — red mahogany, antique walnut, ivory, natural oak and prime (for finishing to suit interior decorations). Also supplied in handsome Deluxe Wood cabinets of genuine mahogany or walnut.

MODEL	A	B	C
20-C-4	12"	30"	28"
20-C-6	12"	30"	33"
20-C-8	12"	30"	38"
20-C-10	12"	30"	43"
30-C-6	12"	40"	33"
30-C-8	12"	40"	38"
30-C-10	12"	40"	43"
30-C-12	12"	40"	48"

CAPACITIES, SIZES AND PRICES



Left:

The 30 C-8 Doherty-Brehm Humidifying Radiator with eight 30-inch Sections and Base

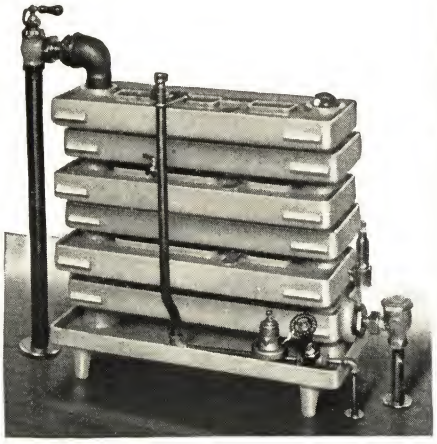
(See table below for capacities)

Right:

The 20 C-6 Model has six 20-inch Sections and Base

(See table below for capacities)

Note: Either of these models can be installed in metal or wood cabinets, in a range of finishes and types, or may be recessed in the wall.



COMPLETE SPECIFICATIONS

Model			20-C-4	20-C-6	20-C-8	20-C-10	30-C-6	30-C-8	30-C-10	30-C-12
Type of Heating System			Hot Water Steam or Vapor	Hot Water Steam or Vapor	Hot Water Steam or Vapor	Hot Water Steam or Vapor	Hot Water Steam or Vapor	Hot Water Steam or Vapor	Hot Water Steam or Vapor	Hot Water Steam or Vapor
Number of Sections			4 and base	6 and base	8 and base	10 and base	6 and base	8 and base	10 and base	12 and base
Prices F. O. B. factory, installation extra	Without cabinet		$103.50	129.00	149.00	167.00	145.00	165.00	185.00	207.00
	With metal cabinet		$122.50	150.00	170.00	190.00	170.00	190.00	210.00	235.00
	With period wood cabinet		$223.50	249.00	269.00	None	300.00	320.00	340.00	362.00
E. D. R.‡			52	79	105	131	102	136	170	204
Dimensions, in.	Unit without fittings	Length	21	21	21	21	30	30	30	30
		Width	9¾	9¾	9¾	9¾	9¾	9¾	9¾	9¾
		Height	14½	19½	24½	29½	19½	24½	29½	34½
	Unit over all with fittings	Length	28	28	28	28	38	38	38	38
		Width	10½	10½	10½	10½	10½	10½	10½	10½
		Height	19¾	24¾	29¾	34¾	24¾	29¾	34¾	39¾
	Metal cabinet (outside)	Length	31½	31½	31½	31½	41	41	41	41
		Width	11¾	11¾	11¾	11¾	11¾	11¾	11¾	11¾
		Height	21	33	33	36	36	36	36	42
	Per'd wood cabinet (outside)	Length	35	35	35	None available	43	43	43	43
		Width	12½	12½	12½		13	13	13	13
		Height	33	33	33		41	41	41	41
Weights, lb.	Unit complete with fittings	Uncrated	112	154	196	239	199	255	312	368
		Crated	127	169	211	254	219	275	332	396
	Metal cabinets	Uncrated	40	53	53	65	70	70	80	90
		Crated	85	100	100	115	120	120	135	145
	Wood cabinets	Uncrated	35	35	35	None available	55	55	55	55
		Crated	110	110	110		146	146	146	146

COMPLETE CAPACITIES

MODEL		20-C-4			20-C-6			20-C-8			20-C-10		
Capacities													
Temperature of heating medium	Inches of vacuum or pounds pressure	Pounds Evap'd per hour	Homes* and small apts.	Offices† and public bldgs.	Pounds Evap'd per hour	Homes* and small apts.	Offices† and public bldgs.	Pounds Evap'd per hour	Homes* and small apts.	Offices† and public bldgs.	Pounds Evap'd per hour	Homes* and small apts.	Offices† and public bldgs.
140°	24.0	1.1	3070	2560	1.53	4280	3570	1.88	5260	4380	2.51	7030	5850
150°	22.4	1.39	3890	3245	1.95	5460	4550	2.65	7410	6180	3.41	9550	7950
160°	20.3	1.95	5460	4540	2.65	7410	6180	3.48	9740	8120	4.38	12250	10200
170°	17.7	2.7	7560	6300	3.55	9940	8280	4.46	12480	10400	5.50	15400	12830
180°	14.6	3.48	9740	8120	4.46	12480	10400	5.56	15560	12960	6.75	18900	15750
190°	10.9	4.32	12095	10080	5.5	15400	12830	6.82	19800	15900	8.20	22950	19130
200°	6.5	5.29	14810	12350	6.72	18820	15680	8.28	23170	19300	9.95	27850	23200
215°	1 lb. pressure	9.9	27700	23050	14.9	41720	34750	19.8	55400	46200	24.8	69400	57900
E. D. R.‡		52			79			105			131		
Model		30-C-6			30-C-8			30-C-10			30-C-12		
140°	24.0	2.2	6150	5130	2.7	7560	6300	3.6	10070	8400	4.6	12880	10730
150°	22.4	2.8	7840	6530	3.8	10640	8860	4.9	13700	11440	6.1	17050	14200
160°	20.3	3.8	10640	8860	5.0	14000	11650	6.3	17600	14700	7.7	21550	17950
170°	17.7	5.1	14250	11900	6.4	17900	14920	7.9	22100	18430	9.5	26580	22150
180°	14.6	6.4	17900	14920	8.0	22400	18650	9.7	27100	22630	11.6	32450	27000
190°	10.9	7.9	22100	18430	9.8	27400	22850	11.8	33000	27500	14.2	39760	33130
200°	6.5	9.7	27100	22630	11.9	33300	27750	14.3	40000	33300	17.1	47900	40000
215°	1 lb. pressure	19.5	54600	45490	26	72800	60660	32.5	91000	75820	39.	109200	90987
E. D. R.‡		102			136			170			204		

*This capacity is on the basis of adding 2½ grains of water per cu. ft. of air (at 70°) per hour.

†This capacity is on the basis of adding 3 grains of water per cu. ft. of air (at 70°) per hour.

‡E. D. R. is the equivalent direct radiator load in square feet based on the Engineering standard of 240 B.t.u. per sq. ft. per hour at 70° room temperature with 1 lb. steam pressure.

Note: The above humidifiers are not recommended for steam pressures in excess of two pounds as the extremely rapid evaporation causes a boiling sound which makes them unsatisfactory for domestic service. For industrial use where noise is not a factor, higher pressures may be used with correspondingly higher outputs.

The ratings on this sheet are based on a maximum relative humidity of 40%. For special installations requiring a higher percentage a larger size will be necessary.

THE DOHERTY-BREHM WASHED AIR AND HUMIDIFYING SYSTEM

Manufactured and Sold by DOHERTY-BREHM CO.

The Doherty-Brehm Washed Air and Humidifying System is a combination humidifying air washing and air circulating unit and humidifier for large homes, office suites, schools, hospitals, stores and shops. Through its installation fresh, clean, healthfully moistened air may be provided at moderate cost. In the field of air conditioning, this system has proved a distinct advance.

Original ideas, conceived by George D. Doherty, an engineer of prominence, who has devoted many years to the study of air-conditioning, have been utilized to make it the most practicable and efficient air washing and humidifying system that can be procured. Tests by eminent engineers and the experience of hundreds of prominent home owners have proved its high efficiency over a period of many years.

Description

The Doherty-Brehm Washed Air and Humidifying System consists of a cabinet, located at some convenient point, generally in the basement of the building, into which the dry, dust-laden air of the home or office is drawn by means of a powerful, rotary blower.

Within the cabinet are a battery of sprays connected to the city water line which form a curtain of water through which the air is forced to pass, cleaning it of all dust, dirt and bacteria. At the same time these sprays play directly upon a heating unit which is connected to the heating system of the building, securing efficient evaporation of large quantities of water. The washed and moistened air is then drawn through a special filter curtain which removes all surplus moisture and is returned to the living quarters through one or more metal ducts.

The rotary blower assures positive circulation of the air and complete distribution of the moisture throughout the home or office.

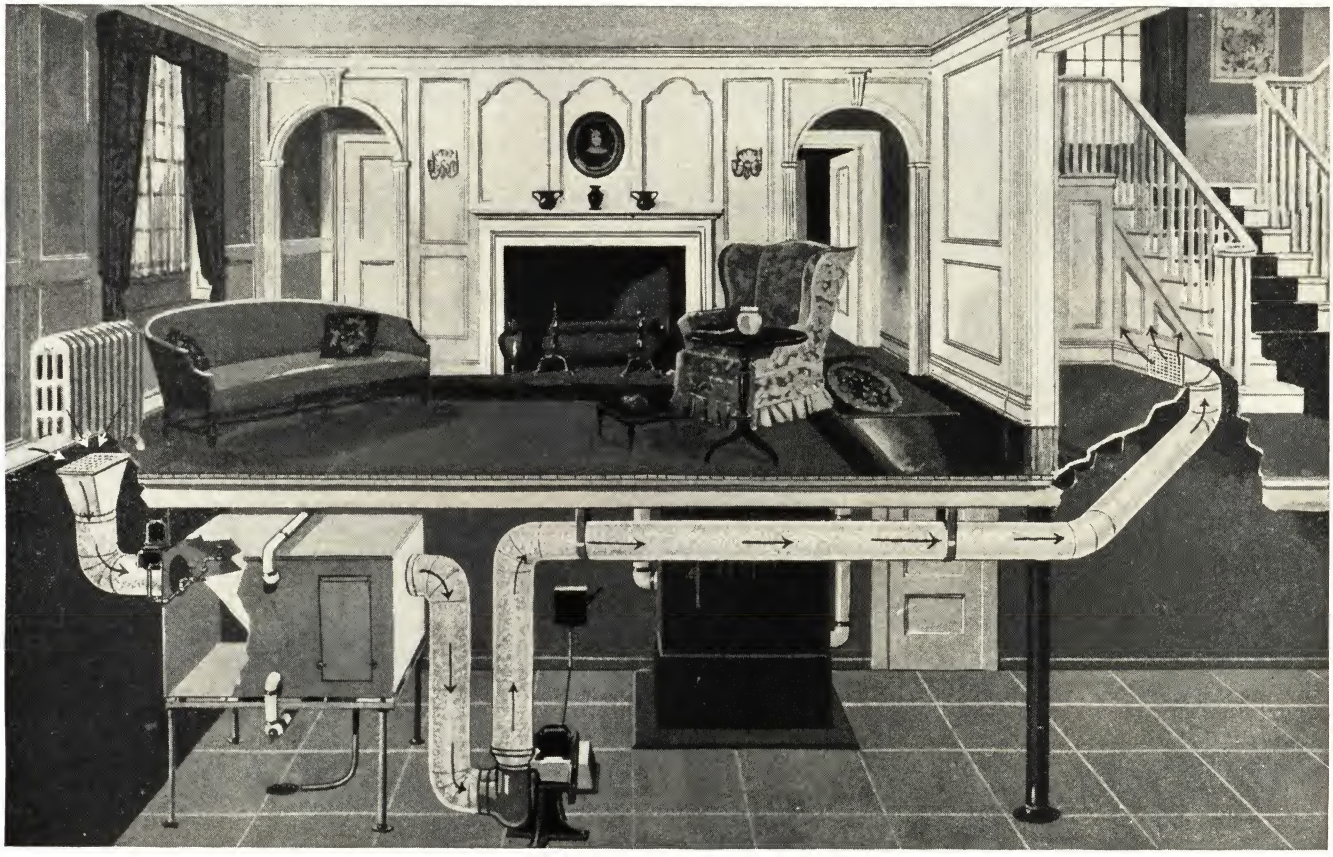
Careful attention to the acoustical problems of the installation has eliminated all possible noises from the system and provided an absolutely silent unit.

Construction

All parts of the Doherty-Brehm Washed Air and Humidifying System are made of the finest materials available. The cabinet is of 26 gauge galvanized sheet iron with brass fittings.

The drip pan is of heavy sheet copper set on a 1½-in. plank base framed in angle iron. The standards are of 1½-in. iron pipe adjustable in height to the location of the cabinet. The spray assembly is of brass throughout with special spray nozzles, water strainer and control valves. Intake ducts are of 10-in. galvanized round pipe with 12-in. pipe fitted with 1-in. felt silencers at the floor opening. Outlet ducts are of 9-in. galvanized round pipe with 11-in. pipe fitted with 1-in. felt silencers at the outlet opening.

Write for complete information and installation data



Typical Installation of the Doherty-Brehm Air and Humidifying System

Detailed Operation

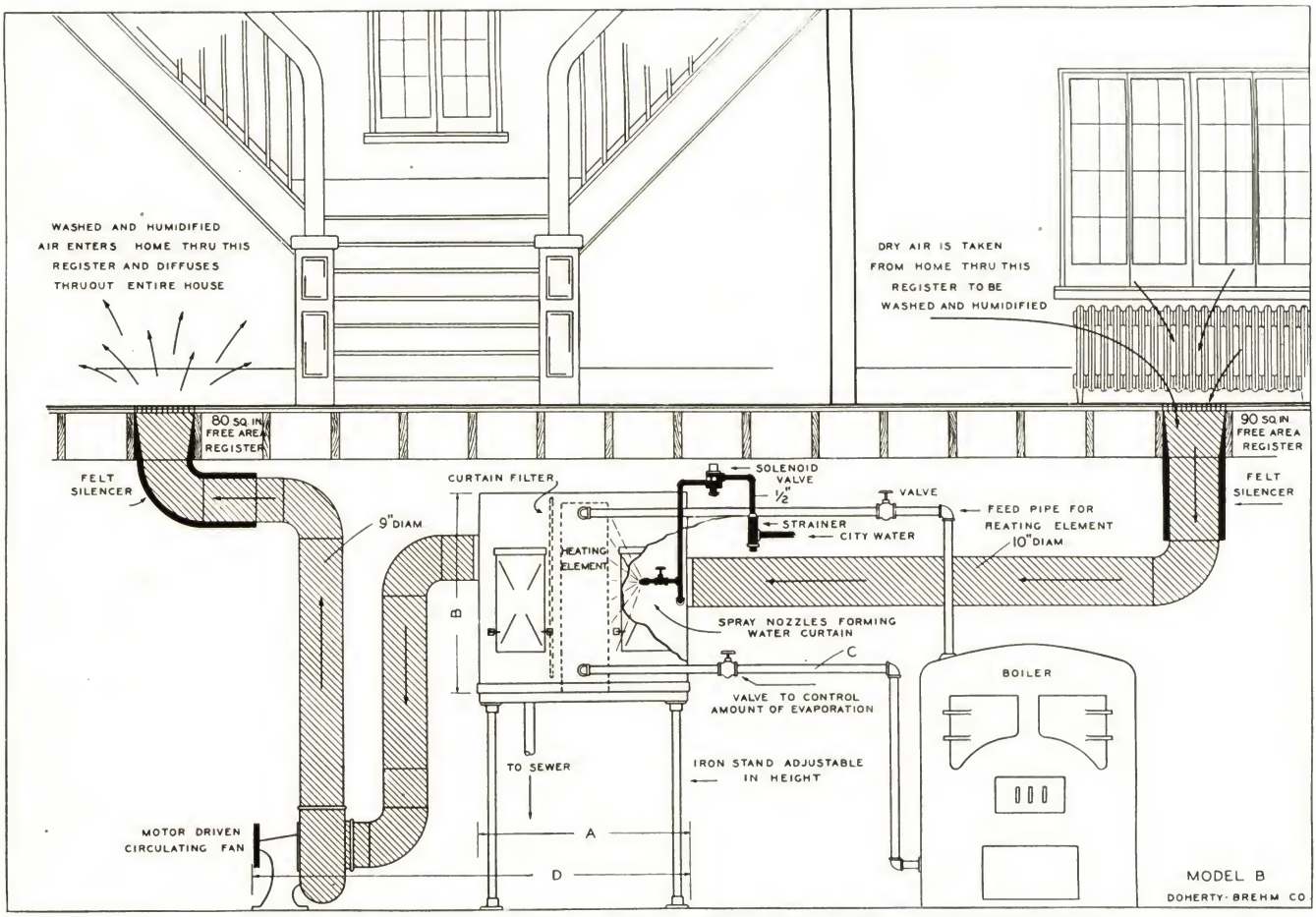
Referring to the detail drawing below, the house air is taken from floor register shown at right. The humidified and washed air is blown into house through one or more floor registers as shown at left. From here the moisture diffuses all through the house. The register at right may be located anywhere. The moist air registers are carefully located to give complete diffusion throughout the home or building.

Standard Equipment

The heating element is connected to the heating system in the same manner as an ordinary radiator.

The water from the city water line is fed to the spray nozzles through a Solenoid valve and strainer.

A drain line completes the installation.



Detail of Typical Basement Installation of Doherty-Brehm Washed Air and Humidifying System

DIMENSIONS AND SPECIFICATIONS

Humidifying capacity	Volume of air circulated per hour	Percentage of dust, dirt, smoke removed	Percentage of humidity guaranteed	Water consumed	Electricity consumed per hour, watts
Any residence exceeding 30,000 cu. ft. capacity	30,000 to 60,000 cu. ft.	93%	40% or more as desired	Each nozzle passes 3 gal. per hour at 45 lbs. pressure	75

Washing and filtering equipment		Humidifier	Circulating equipment	
Sprays	Filter		Motor	Blower
From 2 to 6 as needed. All brass assembly. ½-in. pipe, shut-off valve and strainer.	Spun glass enclosed in copper wire mesh.	Cast iron radiator 75 sq. ft. heating surface.	⅙ hp. repulsion induction type quietly operating 1725 r.p.m.	Centrifugal type, low speed. Delivers 500 c.f.m. @ 530 r.p.m.

Acoustical treatment	Sheet metal ducts	Air washing and humidifying cabinet				Floor registers
		Length "A"	Height "B"	Width	Over-all dimensions	
Special floating motor mounting. Felt lined ducts. V-type belt drive. Canvas connections.	26-gauge round or square galvanized pipe. 10-in. diam. on inlet. 9-in. diam. on outlet.	46 in.	40 in.	30 in.	6 x 3 ft.	12x14 in. or equivalent. May be concealed under radiators. Wood or metal, as desired.
		Special sizes to suit requirements.				

HEALTH-AIR DIVISION OF ECONOMY BALER CO.

Manufacturers of the Health-Air Heating System
1025 North Main Street, Ann Arbor, Mich.

Products

AIR WASHERS, AIR CONDITIONING APPARATUS; FURNACES, Warm Air, Pipeless, Forced Circulation, Oil Fired, Gas Fired; HEATING and VENTILATING UNITS COMBINED; BLOWERS, Pressure or Volume; HUMIDIFYING SYSTEMS; HEAT ECONOMIZERS.

Also Fans, ventilating or exhaust; Unit Heaters; Baling Presses; Waste Collection and Disposal Equipment.

HEALTH-AIR
Warms in Winter — Cools in Summer

Advantages of the Health-Air Heating System

(1) Long life, copper alloy, anti-rust steel throughout, welded solid with only one joint.

(2) Three times radiating surface of average furnace.

(3) Air is drawn into center between radiating flues away from outside casing.

(4) Automatic direct draft by-pass sends gases direct to chimney at start, closing at 250 degrees.

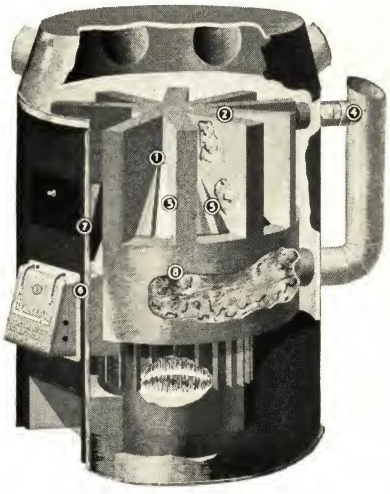
(5) Vertical radiating fins absorb heat at hottest point.

(6) Safety door releases hard puffs.

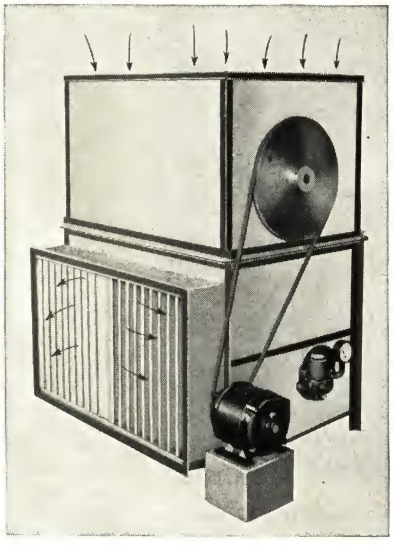
(7) Compact design fits old casings without disturbing pipes.

(8) More than 80% over all efficiency.

(9) Five-year guarantee.



Health-Air Conditioner



The Health-Air Conditioner combines into a single unit the four independent units necessary to the operation of the old style conditioning systems. (1) A squirrel cage, positive type blower which creates a gentle, constantly circulating flow of washed and humidified air. (2) An efficient "air washer" that actually washes the dust from the air. (3) A humidifier in winter. (4) A cooler in summer. It is priced well within the range of the average householder.

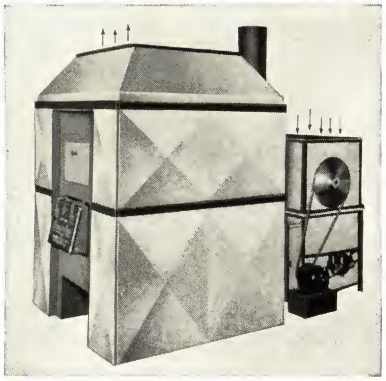
The Health-Air Conditioner is an independent unit made in several sizes to fit any installation. There are no working parts inside of furnace casing where noise would be carried into the house.

Health-Air Blower

A compact and simple mechanism consisting of a squirrel cage, positive type blower which circulates the air throughout the house every ten minutes. A Health-Air Automatic Drip Humidifier should be used with this unit for best results. It is a splendid unit for installations that require inexpensive forced circulation.

Health-Air Heating System

The Health-Air Heating unit, designed especially for oil and gas burners, has three times the flue travel and radiating surface which it is possible to build into coal fired furnaces. This special design allows oil to be burned at a saving which often exceeds 50%. Tests made by members of the University of Michigan Engineering Staff show an average efficiency well over 80% after deducting stack, condensation and all other losses. Automatic by-pass and draft starter guarantee starting.



This heating unit is made in various sizes and carries a five-year guarantee.

Health-Air Humidifier

The Health-Air Automatic Drip Humidifier is controlled at all times by the heat of the furnace, evaporating gallons of water when the fire is hot and less when less is needed.

Heat Economizer

The Health-Air Heat Economizer—for use with oil or gas burner installations—lengthens the flue travel of furnaces or boilers designed for coal burning with a short flue travel, giving plenty of opportunity for the heat to be absorbed from the gases before they are sent up the stack. In ordinary installations the Health-Air Economizer saves sufficient heat to warm two average rooms and cuts fuel cost accordingly. Vertical baffles and large cleanout at bottom permit use with hard coal or coke furnaces or boilers.

THE HART & HUTCHINSON COMPANY

Manufacturers of Humidifying Radiators

NEW BRITAIN, CONN.

For Veneer-Steel Toilet Partitions, Shower Stalls and Recessed Radiators, see Manufacturers' Index

THE HART & HUTCHINSON HUMIDIFYING RADIATOR

No Motors, Fans or Moving Parts

This humidifying radiator has been developed to meet the demand for a humidifying unit which will restore to the atmosphere an adequate amount of moisture, but without motors, other moving parts, fans, etc. Hart & Hutchinson have developed a humidifying radiator which evaporates moisture in proportion to the degree of heat and consequently in proportion to the atmospheric requirement of moisture. Tests have shown that with this H. & H. Humidifying Radiator the moisture is distributed uniformly throughout the house without the use of fans, that the humidity in distant rooms approximately equals the humidity in the room in which the humidifier is placed. The H. & H. Humidifying Radiator takes the place of an ordinary radiator and is usually placed in the hall or other central point. The cabinet is finished in wood grain or prime coat finish. It is absolutely silent, forming an attractive accessory to the room with its beautifully proportioned cabinet, the top of which can be used for plants, books, vases or ornaments.

Typical Hart & Hutchinson Humidifying Radiator Installation

Automatically Restores Moisture to the Air

The unit is formed of a copper fin radiator. Above the radiator are copper tubes, carrying the steam, hot water or vapor through copper water pans. The water flows from upper to lower pans and pans are so staggered that all of the air after passing through radiator and being warmed must pass over the surface of each pan. Evaporates from 8 to 20 gals. per day depending on requirements.

Suggested Specifications

Install where shown on plans a Hart & Hutchinson Humidifying Radiator Unit, No.....; size:....ins. deep, ...ins. wide, ...ins. high, having a radiation capacity of .... sq. ft.

Finish of this unit as supplied by manufacturer to be in prime coat —final finish coats under Painting Schedule (or if wanted in imitation wood grains, so specify).

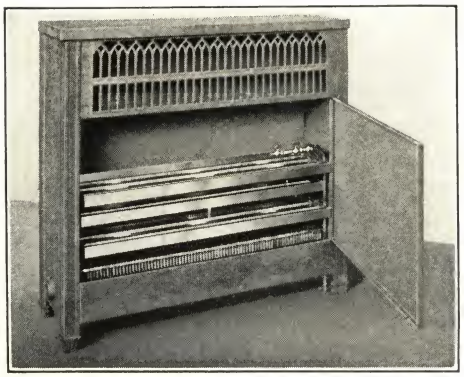
In connection with this unit, provide and connect to water service ⅛-in. standard brass [iron] pipe. Also provide and run to drain ¼-in. brass [iron] pipe.

EVAPORATION REQUIREMENTS IN GALLONS FOR EACH 24-HOURS

Ave. R. H. equals average relative humidity. Ave. temp. equals average temperature.

Total Cubic Feet of space to be conditioned	New England ave. R. H. 64% ave. temp. 36.8° F. Gals.	Eastern New York and Northern Jersey ave. R. H. 68% ave. temp. 39.1° F Gals.	Eastern Penn. and Southern Jersey ave. R. H. 69.5% ave. temp. 40.8° F Gals.	Western New York State ave. R. H. 75. 5% ave. temp. 33.5° F Gals.	Western Penn. and Ohio ave. R. H. 70% ave. temp. 39° F Gals.	Washington, D.C. and Virginia ave. R. H. 69.9% ave. temp. 45.5° F Gals.
5,000	3¾	3¾	3	3¾	3¾	2½
6,000	4½	4	3½	4½	4	2¾
8,000	6¼	5¼	4¾	6	5¼	3¾
10,000	7½	6½	6	7½	6¾	4½
12,000	9	8	7¼	9	8	5½
15,000	11¼	10	9	11¼	10	7
20,000	15	13¼	12¼	15	13½	9¼
25,000	18¾	16¾	15¼	18¾	16¾	11½
30,000	22½	20	18½	22½	20	13¾
35,000	26¼	23½	21¼	26¼	23¼	16¼

The quantities listed herein are based on figures supplied by the United States Dept. of Agriculture Weather Bureau. These figures take into consideration the fact that a substantial amount of the evaporation necessary in the home will be obtained from cook stoves or open faucets, bathrooms, laundries, etc.



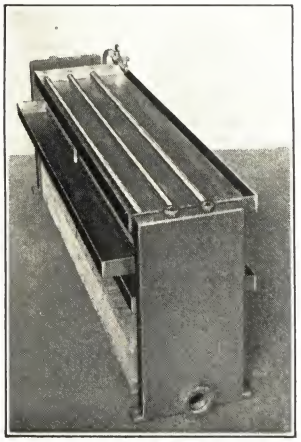
Interior View of Humidifying Radiator

RADIATION AND EVAPORATION SCHEDULES FOR STANDARD SIZES

Unit No.	Depth, in.	Width, in.	Height, in.	Radiation, sq. ft.	Evaporation, gal. Steam	Evaporation, gal. Hot water
21	9¾	24	30	40	9	6
31	9¾	24	48	45	10	7
41	9¾	32	30	45	12	8
51	9¾	32	40	55	13	9
61	9¾	40	40	70	15	10
71	9¾	40	48	80	16	11
81	9¾	48	48	100	19	13

Evaporation based on 24 hour performance.

Dimensions given represent the over-all body size of cabinets. Outside tapping to outside tapping dimension in each case will be ¾ in. greater than the width dimension.



Arrangement of Water Pans

HESS WARMING AND VENTILATING COMPANY

1211-1229 South Western Avenue, CHICAGO, ILL.

BRANCH—DETROIT, MICH., 3931 Grand River Avenue
BRANCH—MILWAUKEE, WIS., 1130 National Avenue
BROOKLYN, N. Y., Herrmann & Grace Co., 671-89 Bergen Street

For Hess Bathroom Cabinets and Mirrors, see Manufacturers' Index.

THE HESS INDOOR CLIMATE CONTROL SYSTEM

This system is more than mere heating equipment. Not only does it provide winter comfort but, in addition, air conditioning the year round.

The Hess Climate Master

Furnished with the system is a direct fired air heater, highly efficient, due to proper design, with coal, oil or gas as fuel. The steel radiator or inner body is one piece, all seams electrically welded. No smoke, gas, or dirt can escape into the air current that warms the rooms. The fire box is lined with fire brick to withstand high temperatures when oil or coal is used. Generally the lining is omitted with gas application. The Climate Master is fitted with a large humidifier filled automatically as evaporation takes place, or only as necessary to maintain a predetermined relative humidity. Dead air space outer casings are furnished with the smaller sizes while the larger heaters are equipped with paneled, mineral wool insulated casings. Hess Climate Masters are made in sizes up to 1,000,000 B.t.u. capacity.

How the Hess Indoor Climate Control System Functions

A powerful, quiet Hess centrifugal blower draws the air from the rooms and outdoors through filters for removal of dust, dirt and bacteria. It then forces this filtered air through the air chambers of the Climate Master for warming and humidification. After it has attained the proper temperature the air is sent under positive pressure to the rooms.

Ducts, which convey the air to the blower and from the Climate Master to the rooms, may be carried flat against the basement ceiling and are often concealed under the plaster. The plant may be located at practically any part of the basement, leaving much space for recreational or other useful purposes. Inconspicuous wall grilles are used for the outgoing and incoming air supply of the rooms. This saves considerable floor space.

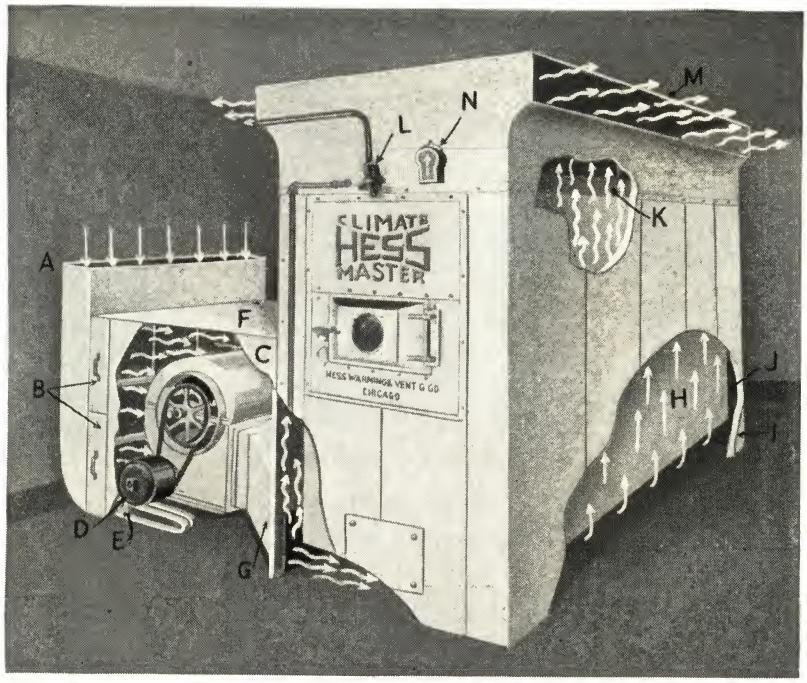
Economy and Efficiency with Cleanliness and Comfort

The Hess Indoor Climate Control System is extremely efficient and economical. The air is warmed directly. No water to be heated or steam to be generated before heating is accomplished. Only clean, low temperatured air in large volumes is employed to provide numerous air changes hourly. With this positive air motion floor and ceiling temperatures are practically uniform and the entire atmosphere is in a measure energized so as to be extremely refreshing, comfortable and healthful. The same system that supplies warmth in the winter delivers cooling air currents in the summer.

Designed for Each Individual Installation

The system is engineered and designed for each individual installation by the makers, with a background of more than fifty years experience, to insure successful results. Send us your plans, or get in touch with our nearest office for our recommendations.

A—*Return and fresh air supply duct.*
B—*Air filter units.*
C—*Hess centrifugal blower.*
D—*Motor.*
E—*Motor stand.*
F—*Blower and filter housing.*
G—*Blower discharge connection.*



H—*Welded steel radiator.*
I—*Outer casing.*
J—*Warm air plenum chamber.*
K—*Humidifier.*
L—*Solenoid valve to humidifier.*
M—*Outlet supply to warm air ducts.*
N—*Automatic blower control switch.*

Hess Climate Master with Air Filters, Blower, Humidifier and Automatic Controls

J. H. McCORMICK & COMPANY

Makers of Airtrol, Air Conditioning Equipment Which Provides Comfort Without Refrigeration

WILLIAMSPORT, PA.

Products

Complete AIR CONDITIONING EQUIPMENT, from the small wall or window and Cabinet Airtrols for stores and offices, homes and schools, restaurants and auditoriums, factories and other buildings, up to the complete installations for the largest of commercial, factory and public buildings.

Makers also of Fans and Blowers, Air Washer, Humidifying and Dehumidifying Devices and Controls, Air Filters and Filter Units; Quick-action Heating Boilers for gas and oil fuels; All-aluminum, Fin Type Heat Exchangers.

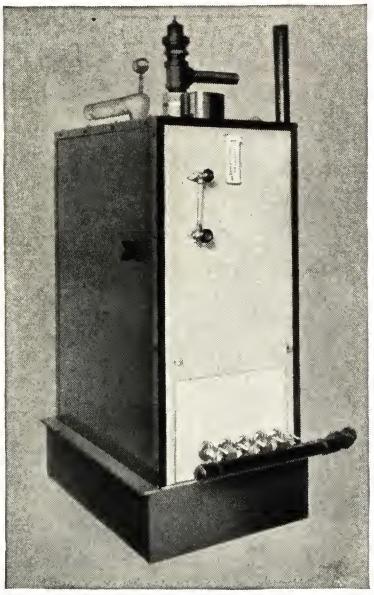
Airtrol Features

Exclusive Airtrol features are high velocity air flow and directional control. Quiet high velocity of air flow is secured by the use of a mixed-flow impeller instead of the conventional type of blower. By moving large volumes of air quickly and quietly at high velocities, ducts inside the room are unnecessary, adding economy of installation to greater efficiency and low cost of operation.

The Airtrol rifled nozzle gives directional control of conditioned air, for better distribution at high speed, over greater distance, without stratification and without draft. The rifled nozzle secures complete and uniform distribution of air that is washed or filtered—or both—and with temperature and humidity automatically controlled.

Controlled high velocities make it possible to secure correct cooling, except in highly special installations, without the use of refrigeration—another feature of economy in installation and operation. High velocities also build up pressure from within, making air flow out, and keeping out the dust and dirt that usually flow in through cracks and crevices and around doors and windows.

Complete—occupy less space—easily installed by any competent heating contractor.

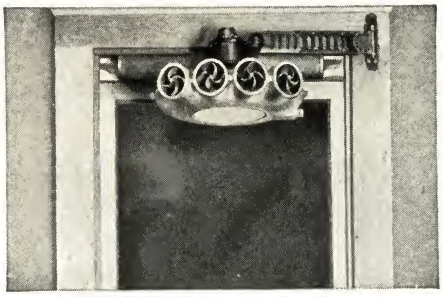


Airtrol Flash Boiler

All normal capacities. A quick steaming boiler of the "flash" type suitable for any heating installation using gas or oil fuels, especially adapted for air conditioning installations because of the short lag between time when heat is needed and when it is supplied. Engineering design produces available steam almost immediately after the application of fire.

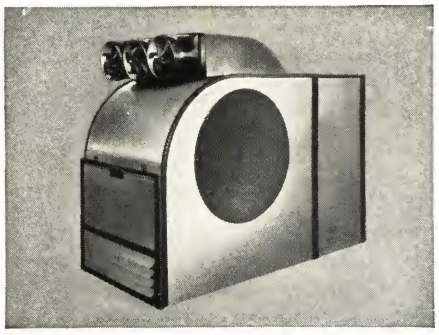
Airtrol Vortex Washer

Capacity, 5,000 to 50,000 c.f.m. Removes all dirt, soot, pollen and odors. It is a small size, high capacity air washer and de-humidifier, of rustless construction, equipped with both rain sprays and atomizer sprays. All spray heads are removable, and water pan has hand cleanout indicated by arrow. Inspection ports are built in and marine fixtures are provided for interior lighting. An automatic water supply valve by-passes fresh water to the pan on starting the washer after it has been standing, to prevent any odor from stagnant water. Features are low cost for high capacity and small floor space.



Wall and Window Airtrols

Capacity, 300 c.f.m. at nozzle velocity of 1000 f.p.m. Suitable for offices, kitchens, bedrooms, living rooms and all similar spaces. It provides a metered supply of fresh air and filters all air circulated. Humidification is automatically controlled, with an air tempering electric heater provided for chilly days. In winter, increased air circulation over radiators gives better heat and more uniform distribution of heated air. Installation is simple and easy, as the universal bracket and window filter fit anywhere.



Cabinet Airtrols

Capacities, 2,000 to 10,000 c.f.m., at nozzle velocities of 2,500 to 5,000 f.p.m., suitable for homes, stores, restaurants, auditoriums, schools, factories, offices, etc. It provides a metered supply of fresh air, filters all air circulated, and has an electric air tempering device for chilly days. Winter heating with steam, by means of the Airtrol all-aluminum fin type heat exchanger, is thermostatically controlled, and summer cooling is secured without refrigeration. It is a complete ventilating and humidifying, heating and cooling Airtrol, with air washer optional. Easily and quickly installed by any competent heating and ventilating contractor.

ESTABLISHED 1857

L. J. MUELLER FURNACE CO.

Mueller-Sturtevant Climator Air Conditioning Systems

337 South Second Street, MILWAUKEE, WIS.

BRANCH OFFICES

ST. LOUIS, MO., 4246 Forest Park Boulevard
MINNEAPOLIS, MINN., 715 So. Eighth Street
MEMPHIS, TENN., Medical Arts Building
CHICAGO, ILL., 211 W. Wacker Drive
DETROIT, MICH., 1321 Twelfth Street
SEATTLE, WASH., 2401-2405 Utah Street
BALTIMORE, MD., 909 Cathedral Street
SALT LAKE CITY, UTAH, 601 McIntyre Building
LOS ANGELES, CAL., 5450 West Boulevard

Product

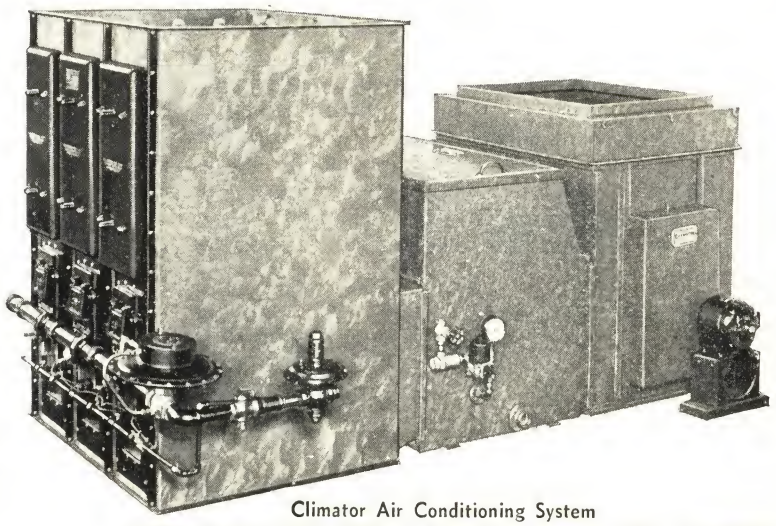
HEATING, VENTILATING and AIR CONDITIONING SYSTEMS.

For Mueller Gas-Fired Boilers, Warm Air Furnaces, Registers, Grilles and Ventilators, see Manufacturers' Index.

Climator Systems

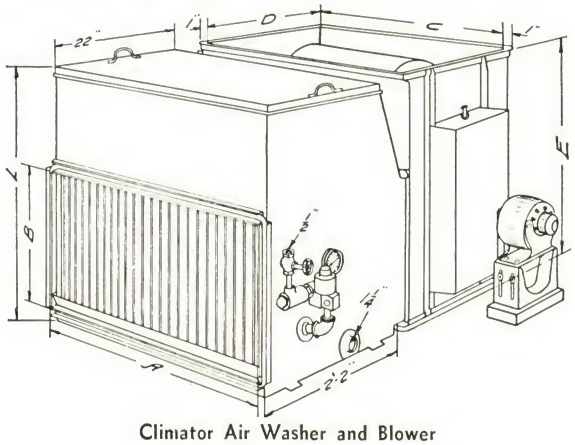
Climator Air Conditioning Systems are the joint product of L. J. MUELLER FURNACE CO., and B. F. Sturtevant Co., Hyde Park, Boston. As shown in the typical assembly at the right, this equipment comprises furnaces for use with hard fuels, oil or gas; blowers; a choice of two types of filters; air washers and humidifiers; motors and controls necessary for dependably automatic operation.

Performance data and dimensions of various Climator units are shown in the accompanying tables. Complete data and descriptive literature will be supplied upon request.



Climator Air Conditioning System

Gas-Era furnace with Climator blower, air washer, filter and motor connected

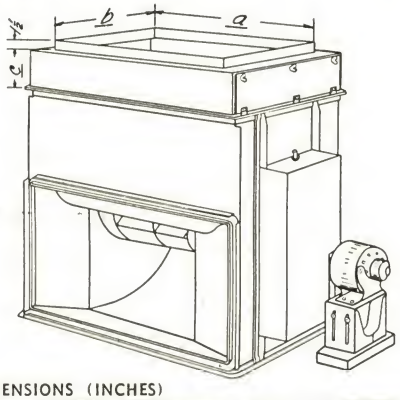


Climator Air Washer and Blower

Right:

Climator Blower with Midwest Filter

Can also be equipped with Airmat filters



RATINGS . . . . . CLIMATOR FANS

Fan Number	Speed Range	Motor H.P.	Wheel Diam.	R.P.M. Fan	CAPACITIES, CU. FT. PER MINUTE ⅛" S. P.*	¼" S. P.	⅜" S. P.	½" S. P.
15-A	350-500	⅙	15"	350	500			
				400	750			
				450	1000			
15-B	400-550	⅙		500	1200	600		
				550	1400	950		
18-A	350-500	¼	18"	350	1250			
				400	1600			
				450	1950	1250		
18-B	400-550	⅓		500	2250	1750	600	
				550	2550	2150	1500	
220-A	350-450	⅓	22"	350	2600	1500		
22-A	350-500	½		400	3300	2500		
220-B	400-525	½		450	3900	3200	2200	
22-B	400-550	¾		500	4400	3800	3100	2100
				525	4600	4100	3500	2800
				550	4800	4400	3900	3200
240-A	350-400	½	24"	350	3600	2400		
				400	4400	3500	2400	
24-A	350-500	¾		450	5050	4500	3500	2200
				500	5700	5200	4500	3700
24-B	400-550	1		525	6000	5500	5000	4250
				550	6300	5900	5400	4750

*Static Pressure.

⅙, ¼ and ⅓ H.P. Motors regularly supplied 110 V. 60 Cycle, Single Phase.
½ and ¾ H.P. Motors regularly supplied 220 V. 60 Cycle, Single Phase, or 110 V. if specified.

CAPACITIES . . . . . CLIMATOR FILTERS AND WASHERS

		CUBIC FEET PER MINUTE Resistance ⅛"—S. P.	⅛"—S. P.	¼"—S. P.	⅛"—S. P.
CLIMATOR AIR WASHERS					
Washer Number	Gal. per Hour, at 30°				
W-15	18	1200	2000		
W-18	27	1500	2500		
W-22	36		3300	5000	
W-24	54		5400	9000	
AMERICAN FILTER UNITS					
Filter Number	No. and Size of Cells				
R-15	2—14¾x23⅝	900	1600		
R-18	2—17⅞x27⅞		2300		
R-22	3—15⅞x33⅞		3600	5200	
R-24	3—19⅞x37 1/16		5000	7000	
AIRMAT CABINET FILTERS					
Filter Number	No. of Sheets				
A-15	12		1000		
A-18	20		2100		
A-22	24		2400	4050	
A-24	30		3300	5200	6900

Engineering Cooperation Recommendations for specific installations will be supplied upon receipt of plans and specifications.

DIMENSIONS (INCHES)

Size	Wheel diam.	A	B	C	D	E	L	a	b	c
No. 15	15	29¾	18⅛	29½	23 5/8	28 5/16	33	24	18	5½
No. 18	18	36	18⅛	35¾	27⅞	33¼	33	30	24	5½
No. 22	22	48	18⅛	47¾	33⅞	39⅞	33	36	30	5½
No. 24	24	60	23	59¾	37 5/16	43¼	43	48	30	5½

BARBER-COLMAN COMPANY

Manufacturers of Electric Systems of Temperature Control

ROCKFORD, ILL.

For our pages on Garage Doors and Garage Door Operators, see Manufacturers' Index

BARBER-COLMAN ELECTRIC SYSTEM OF TEMPERATURE CONTROL

Thermostats

Low-voltage, three-wire, open-contact type. Moulded phenolic resin base and cover. External or internal adjustment on room, two-temperature, duplex and compound types. With or without detents on all types. Differential without detent on all types except insertion and immersion, 1½° F.; with detent, 2° F. Ranges shown in table are ones most commonly used. Thermostats with special ranges supplied on order. Thermometer on cover optional for all types except insertion and immersion.

Type	Range degrees F.	Number of sets of contacts	Temperature limits degrees F.
Room thermostat	60–80	1	.....
Two-temperature thermostat	{50–70 / 60–80}	2	.....
Duplex thermostat	60–80	2	.....
Compound thermostat	60–80	2	.....
Insertion or immersion thermostat	20 or 120	1	0–250
Insertion or immersion thermostat (special)	120	1	250–500

Packless Valves

Globe pattern with screwed ends. Angle, straightway, right-hand and left-hand patterns with radiator union and nut. Rough body, finished trim, nickel plated all over. Two sizes: cYBa in ½ and ¾ in. only; YBa in ½ to 2 in. Locked covers, special disk for gas, special camshaft and spring assembly on order. Moulded or metal covers optional. Static and differential pressure capacity, 10 lbs. per sq. in. gauge on all types and sizes.

Type and sizes, in.	Rating		Input		Camshaft torque, lb. in.	Min. operating voltage	Pressure on seat, lbs.	Avg. secs. per stroke
	Volts	Cycles	Amps.	Watts				
cYBa ½, ¾	25	60	2.6	30	13	20	30	5
YBa ½, ¾, 1, 1¼	25	60	2	24	28	20	50	4
YBa 1½, 2	25	60	2	24	54	20	90	10

Packed Valves

Globe or angle pattern with screwed ends, flanged ends without companion flanges, or radiator union and nut. Rough body, finished trim, not plated (except radiator valves, which are nickel plated all over). Locked covers, special disk for gas, special camshaft and spring assembly on order. Moulded or metal covers optional.

Type and size, in.	Rating		Input		Camshaft torque, lb. in.	Min. operating voltage	Pressure on seat, lbs.	Avg. secs. per stroke
	Volts	Cycles	Amps.	Watts				
YBa ½ to 2	25	60	2	24	85	20	90	25

DIFFERENTIAL PRESSURE CAPACITIES OF PACKED VALVES
Static pressure—125 lbs. per sq. in. gauge

Size, in		½	¾	1	1¼	1½	2
Differential pressure lbs. per sq. in. gauge	Steamtight	125	75	65	45	30	10
	Watertight	125	90	75	55	35	15

Line Valves

Globe or angle pattern, screwed or flanged ends. Cast iron body, bronze seat, composition disk. Motor-operator either positive or reversing. The 5, 6 and 8-in. sizes in balanced or semi-balanced types, double disk, globe pattern only. Special camshaft and spring assembly on order.

Type	Rating		Input				Min. operating voltage	Shading coil current, amps.	Camshaft torque, lb. in.	Pressure on seat, lbs.	Avg. secs. per stroke
	Volts	Cycles	Running		Idle						
			Amps.	Watts	Amps.	Watts					
Positive	25	60	2.2	28.5	0	0	20	.....	370	260	75
Reversing	25	60	2.5	35	2.3	16	20	0.6	500	260	275

DIFFERENTIAL PRESSURE CAPACITIES OF LINE VALVES
Static pressure—150 lbs. per sq. in. gauge

Size in		2	2½	3	3½	4
Differential pressure, lbs. per sq. in. gauge	Tight	40	30	20	15	10
	Throttling service	60	40	30	20	15

Damper Controllers

Two sizes available: Type aYCg for dampers up to 15 sq. ft. in area; and Type eYCc, for dampers up to 50 sq. ft. in area. Positive or reversing. Metal case, filled with oil and sealed. Reversing types have either fixed or adjustable speed regulation. Type aYCg, positive, fixed speed, available air cooled (no oil). Two-position or multi-position styles in reversing models. Special camshaft assembly on order. Brackets, lever arms, couplings, switches, etc., available as required.

Type		Rating		Input				Shading coil current, amps.	Shaft torque, lb. in.	Secs. per 360° at no load
		Volts	Cycles	Running		Idle				
				Amps.	Watts	Amps.	Watts			
Type aYCg	Positive	25	60	2.0	29	0	0	.....	100	200
	Reversing	25	60	2.3	27	2.4	22	0.45	60	250 to 1100
Type eYCc	Positive	25	60	2.1	28	0	0	.....	150	120
	Reversing	25	60	2.5	36	2.0	15	0.60	220	280 to 3000

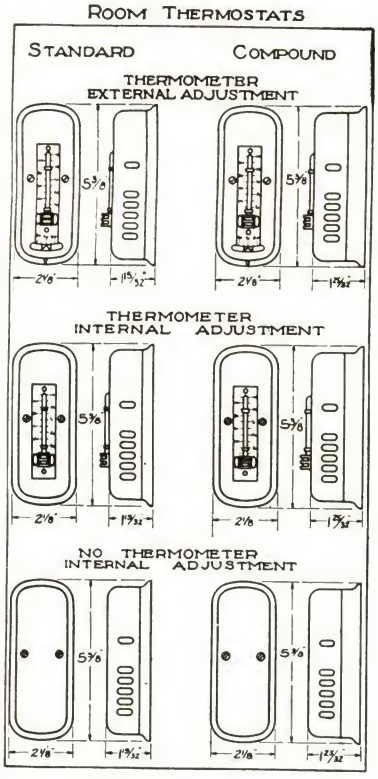
Accessories

All necessary accessories are available for any complete electric system of temperature control.

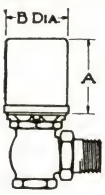
BARBER-COLMAN ELECTRIC SYSTEM OF TEMPERATURE CONTROL

Details of Equipment and Dimensions of Units

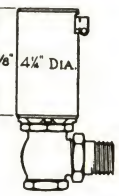
Room Thermostats



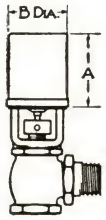
Packless Valve

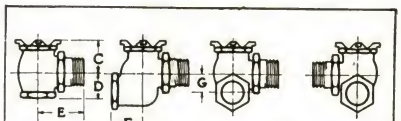


Packless Valve With Mercury Tube

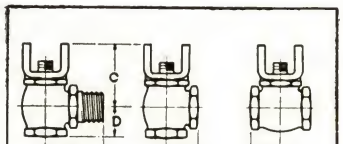


Packed Valve



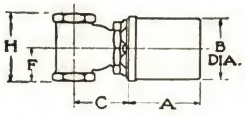


Nom. Size of Valve In Inches	DIMENSIONS (SMALL MOTOR) A	B	C	D	E	F	G
½	4⅜	3⅜	1⅝	1⅛	3	1⅜	⅝
¾	4⅜	3⅜	1¹⁵⁄₁₆	1¼	2⅞	1⅝	¾
	DIMENSIONS (STANDARD MOTOR)						
½	4⅞	4	1⅝	1⅛	3	1⅜	⅝
¾	4⅞	4	1¹⁵⁄₁₆	1¼	2⅞	1⅝	¾
1	4⅞	4	1¹⁵⁄₁₆	1½	3	1⅞	1
1¼	4⅞	4	2	1⅝	3½	2¹⁄₁₆	1⅛
1½	4⅞	4	2³⁄₁₆	1⅞	3¾	2⅝	1¼
2	4⅞	4	2³⁄₁₆	2¼	4⅜	2¹⁵⁄₁₆	1½



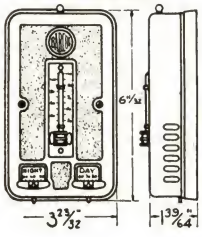
Nom. Size of Valve In Inches	DIMENSIONS (STANDARD MOTOR) A	B	C	D	E	F
½	4⅞	4	3¹⁵⁄₁₆	1¹³⁄₁₆	2³⁄₃₂	1¹³⁄₁₆
¾	4⅞	4	4⁵⁄₆₄	1¹⁵⁄₃₂	2⁵⁄₃₂	1¹⁵⁄₃₂
1	4⅞	4	4³⁄₁₆	1⅞	3	1⅞
1¼	4⅞	4	4¹³⁄₆₄	2¼	3³⁄₃₂	2¼
1½	4⅞	4	4¹³⁄₆₄	2⅛	3¾	2⅛
2	4⅞	4	5⁹⁄₃₂	2⅞	4⁵⁄₃₂	2⅞

Packless Globe Valve (Screwed Ends)

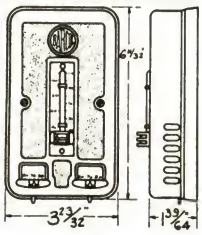


Nom. Size of Valve In Inches	A	B	C	F	H
1¼	4⅛	4	3⅛	2¼	4⅛
1½	4⅛	4	3⅝	2⅝	4⅝

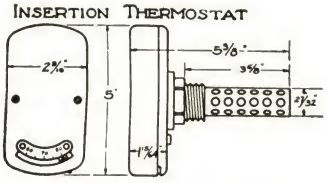
Two Temperature Thermostat



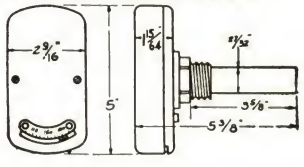
Duplex Thermostat



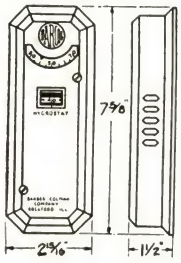
Insertion Thermostat



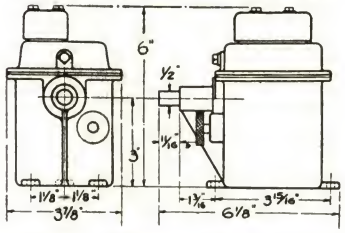
Immersion Thermostat



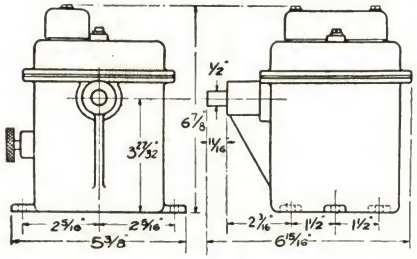
Hygrostat



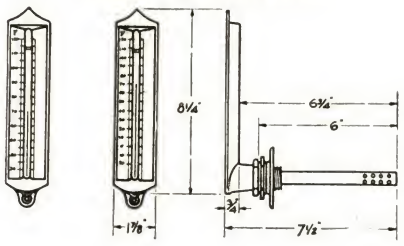
Small Damper Controller



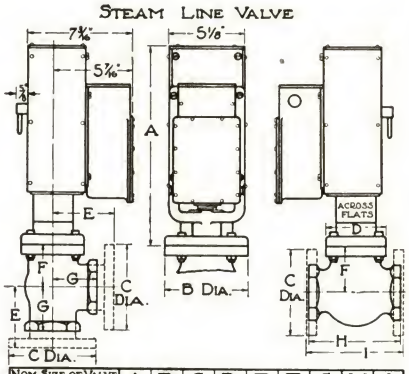
Large Damper Controller



Angle Thermometers

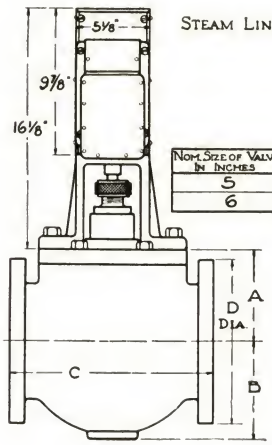


Steam Line Valve



Nom. Size of Valve In Inches	A	B	C	D	E	F	G	H	I
2	13¼	5⅞	6	4¼	4⅛	3	3	6	6½
2½	13½	6⅛	7	5	4⅜	3⅛	4¼	7⅛	8
3	13½	6⅞	7½	6¼	4¼	3½	4⅛	8⅛	8½
3½	12⅜	7½	8½	6½	5¼	4⅛	4½	9⅛	10⅛
4	12⅛	8	9	7⅛	5½	4⅜	5¼	10⅜	10¾

Steam Line Valve



Nom. Size of Valve In Inches	A	B	C	D
5	5¼	5½	12⅛	10
6	6¼	6½	13¾	11

JOHNSON SERVICE COMPANY

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JOHNSON TEMPERATURE REGULATING CO. OF CANADA, LTD.
97 Jarvis Street, TORONTO, ONT.

MONTREAL, QUE. WINNIPEG, MAN. CALGARY, ALB. VANCOUVER, B. C.

Products and Services

Engineers and contractors for the CONTROL of TEMPERATURE or HUMIDITY for any purpose and over every range used in manufacturing purposes or buildings, furnishing and installing:

Temperature Controlling Apparatus for any and all kinds of Heating and Ventilating Systems.

Temperature Controlling Apparatus for any Industrial Process requiring the medium of heat.

Control of Humidity in Industrial Processes requiring artificial humidification.

Pneumatic switches for operating valves or dampers in heating, ventilating and air conditioning systems.

Dual or Two-temperature Systems of Temperature Control for entire buildings.

Manufacturers of Thermostats and other apparatus for the control of temperature and humidity.

Johnson All Metal Thermostat

Every Johnson Thermostat is *all-metal* throughout, having no soft or hard rubber parts to deteriorate and become inoperative. Every thermostat exquisitely made and thoroughly tested for accuracy, efficiency and durability.

Room Thermostat

Johnson Intermediate Action Thermostat

This thermostat gives a true graduated motion to mixing dampers and valves. It holds them in an intermediate position to maintain the temperature of the room accurately within one degree above or below the setting of the thermostat.

Johnson Dual or Two-temperature Thermostat

Dual Thermostat

The dual, or two-temperature thermostat provides for a daylight temperature (usually 70°) and a night-time temperature (35° to 50°) as desired, for all or some of the rooms in a building, simply by the manipulation of a single push button by the engineer or other person in authority. It is an all-metal thermostat and operates valves and dampers with a gradual motion, holding them in an intermediate position to maintain the temperature of the room accurately within one degree above or below the setting of the thermostat. It is a factor for the greatest economy in school buildings, a number of rooms of which are occupied at night as well as day, and for buildings in which some of the rooms are occupied only at certain times, such as churches, auditoriums, Masonic temples and lodges.

Johnson Insertion Thermostat

Insertion Thermostat

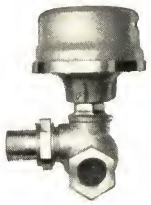
Designed to control temperatures within closed air chambers or ducts and tanks. The body of thermostat is a dustproof case containing the two working parts and extending outside the chamber. Designed, in the case of hot water tanks, for insertion through 1-in. tapped hole and controlling a diaphragm valve on the supply pipe to the steam coils in the tank. It can be used to control the temperature of any liquid, either hot or cold. It is especially adaptable for controlling the temperature of water in hot water heating plants by its control of the boiler draft doors.

Adaptable for use in bake ovens for enamels, japans, etc.; drying rooms for paints, varnishes, patent leather, etc.; storage rooms for tobacco, rubber or similar goods; sterilizers or pasteurizers, cold storage rooms, fur vaults, etc.; refrigerator machine control; humidity control for air washers; flue gas tempered control; hot blast heating plants; combination tempered ventilation and hot blast systems; greenhouses, Turkish bathrooms, etc.; tempered ventilation for buildings.

Multiple Insertion Thermostat

Similar to the insertion duct thermostat, excepting that one multiple thermostat takes the place of a number of separate duct thermostats set for different temperatures. A 4-point multiple thermostat will operate four separate diaphragm valves at as many different temperatures.

Humidostats and Humidifiers



Sylphon Valve

The humidostat automatically controls the supply of moisture delivered to the air by a humidifier and maintains a constant percentage of relative humidity. It operates a diaphragm valve on the steam coils in the pan humidifier. The pan is provided with float box to maintain constant water level and is located in the ventilating air duct leading throughout the building.

Steam jet and water spray types of humidifiers are also furnished.

Specifications and Service

The Johnson System of Temperature Regulation to be erected and assembled by trained mechanics employed by the manufacturer, the JOHNSON SERVICE COMPANY.

The JOHNSON SERVICE COMPANY maintains an engineering organization in each of its branch offices competent to render complete information regarding application of the equipment, location of thermostats, capacity of air compressors, humidifiers, etc., and layouts of air piping. Our engineering department should be consulted regarding specifications.

RAYMOND DUO-STAT

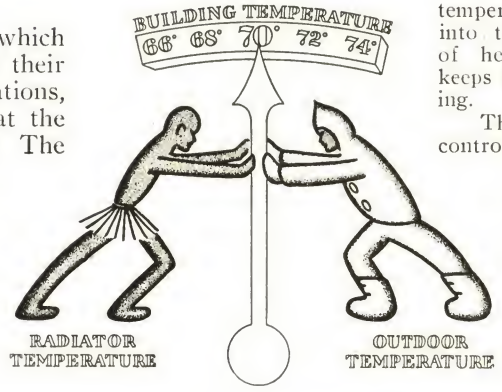
For Controlling Automatic Heating Systems by the Outdoor Temperature

MANUFACTURED BY
THE F. I. RAYMOND COMPANY
629 West Washington Boulevard, CHICAGO, ILL.

Purpose

Systems of heat regulation which depend on indoor temperature for their control have two inherent limitations, namely, time lag and the fact that the control is upset by open windows. The time lag causes fluctuating heat and the upset by open windows causes waste of fuel.

It is because of these limitations that the Raymond Duo-Stat has been developed to control any automatic heating plant from the *combination of radiator temperature and outdoor temperature.*

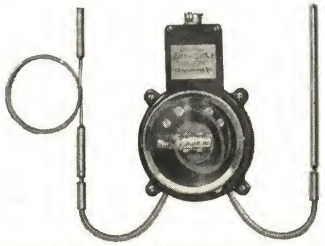


Applications

Duo-Stats are now installed in more than 700 buildings in various cities of the United States, Canada, England, Germany and Holland, including homes, apartment buildings, apartment hotels, office buildings, hospitals, stores, factories and schools. In most of these buildings, the Duo-Stat controls the oil burner, gas burner or coal stoker or the automatic steam supply valve. In large office buildings, a separate Duo-Stat controls the valve which supplies steam to each zone.

Operation

The Duo-Stat operates from the combination of the temperatures in *two* temperature elements or "bulbs," one placed outdoors and the other attached to the heating plant. In steam heating systems the heating plant bulb is attached to the last radiator on the longest steam line. In hot water heating systems the heating plant bulb is attached to a large flow main.



Type C-2 Duo-Stat for Steam

When the outdoor bulb and the radiator bulb are both at 70°, the switch in the Duo-Stat is open and the fire is off or the steam valve is closed. Cooling the outdoor bulb below 70° withdraws liquid from the Duo-Stat and closes the switch which starts the fire or opens the steam valve and thereby heats the radiators. When the radiator bulb of the Duo-Stat is heated as much as the outdoor bulb was cooled, the expansion of its liquid replaces the liquid withdrawn by the outdoor bulb and opens the switch in the Duo-Stat which stops the fire or closes the steam valve, thereby allowing the radiators to cool. When the radiator bulb of the Duo-Stat cools 10°, the switch is closed again, which starts the fire or opens the steam valve.

In this way the Duo-Stat starts and stops the fire frequently, putting small batches of steam into the radiators at frequent intervals, which keeps the radiators at a steady temperature proportional to the outdoor temperature.

The following table gives the schedule of outdoor and radiator temperatures for the average heating systems in the United States. These schedules may be changed for heating systems requiring a different schedule.

Outdoor temperature.....	70	60	50	40	30	20	10	0	−10
Radiator temperature in steam heating systems.	70	90	110	130	150	170	190	210	230
Water temperature in hot water heating systems..	90	102	115	127	140	152	165	177	190

Advantages

Duo-Stat control of a heating plant provides a steady flow of warmth into a building in exact proportion to the outdoor temperature. By keeping the flow of heat into the building balanced against the flow of heat from the building, the Duo-Stat keeps the proper temperature *inside* the building.

The steady input of heat under Duo-Stat control is more comfortable than an intermittent inflow because it eliminates the chilly feeling that accompanies cold radiators even though the inside temperature may be correct.

Fuel Saving

There is a definite minimum amount of fuel required to heat any building comfortably. Duo-State control insures the closest approach to this minimum, with any given heating plant, because it never supplies an excess of heat to be wasted in overheating, yet it always supplies enough for comfort. No system of control can use less fuel than Duo-Stat control and keep the building comfortably heated.

In Steam Heating Systems

Besides its advantage from the standpoint of uniform inflow of heat, the Duo-Stat has an especial advantage in steam heating systems because it provides a method whereby *all* the radiators of the system may be kept partially filled with steam to provide regulated heat in mild weather. This partial filling can be most perfectly obtained in a vacuum return line heating plant but it can also be obtained in a vapor system or in a one-pipe steam system to a highly satisfactory degree.

No Special Heating System Is Required

Duo-Stat control gives this desirable performance without any specially designed heating system. In large buildings, the standard vacuum return line heating plant should be used for best results. In smaller buildings, the standard vapor systems may be used and, where cost is paramount, a one-pipe steam system may be used.

Zoned Heating Systems

In large buildings, it is desirable to divide the steam lines into zones supplying the different exposures of the building. In such cases, a separate Duo-Stat is used to control an automatic steam valve which supplies steam to each zone. The outdoor bulb of each Duo-Stat is then located on the face of the zone controlled so that the amount of heat supplied to each zone is proportional to the outdoor temperature on the face of the zone. Under Duo-Stat control, due to the partial filling of the radiators, there will never be a high vacuum in one zone and low vacuum in another so that all zones may be interconnected to the same vacuum pump.

Points to Be Remembered

The Duo-Stat must be attached to the last radiator on the longest steam line of a steam heating system and this radiator cannot be turned off. In new buildings, it is desirable, therefore, to so arrange the steam lines that the last radiator will come in a hallway or in a living room where there will be no occasion to turn the radiator off. It is preferable also to have the last radiator come on the north side of the building so that the outdoor bulb of the Duo-Stat can be located on the coldest face. There is 20 ft. of tubing between the Duo-Stat and the radiator bulb and 10 ft. of tubing between the Duo-Stat and the outdoor bulb.

Engineering Service and Catalogues

Our engineering department and our representatives in principal cities will be pleased to give engineering assistance on any project. Complete catalogues and engineering manuals can be obtained from our home office.

THE POWERS REGULATOR CO.

Manufacturers of Automatic Temperature Controlling Apparatus

GENERAL OFFICES AND FACTORY
2720 Greenview Avenue
CHICAGO, ILL.
TELEPHONE, Buckingham 7100

GENERAL EASTERN OFFICES
231 East 46th Street
NEW YORK, N. Y.
TELEPHONE, ELdorado 5-2050

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(See Telephone Directory for Local Addresses)

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For Safety Shower Mixers and Thermostatic Water Controllers, see Manufacturers' Index

Products

THE POWERS REGULATOR CO. manufactures a very complete line of COMPRESSED AIR OPERATED and SELF-OPERATED TEMPERATURE CONTROLLING APPARATUS. While some firms make only one type, we can furnish both and so are free from the selfish necessity of stressing one type of control above the other and can give unbiased advice. Our products consist of:

Systems of automatic temperature and humidity control for heating, ventilating, and air conditioning equipment in new and old buildings.

Temperature regulators for hot water heaters.

Mixing Valves: Safety shower mixers, and thermostatic water controllers for mixing hot and cold water and delivering a mixture at a predetermined temperature.

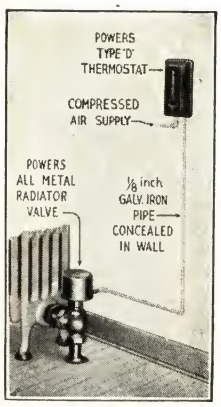
Also a complete line of regulators to control the temperatures of industrial processes, steam traps, dial thermometers, etc. (all covered in special bulletins sent upon request).

This Book Sent upon Request—"Shop and Office Temperatures," a 52-page book showing proof of fuel savings, experiences of users, and applications to different types of heating systems.

Powers Pneumatic System of Temperature Control for Schools, Offices, Factories, Theatres, Hospitals, Churches, Residences, Etc.

The accuracy and dependability of Powers Systems of Automatic Temperature Control is demonstrated by the fact that they are used by this country's largest air conditioning companies to control their equipment.

Type D Thermostat
Size: 6 inches high, 3 inches wide

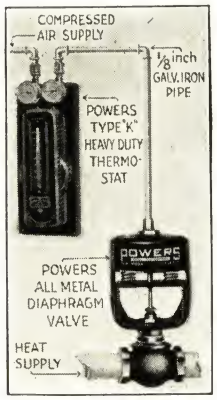


Powers "D" Thermostat Controlling Radiator Valve

Powers thermostats need no annual adjustments or overhauling. Their dependability is shown by the many installations that have given 15 to 25 years of accurate service without repairs of any kind.

Service—With competent engineers in principal cities, we are able to render prompt and intelligent service whenever it is required.

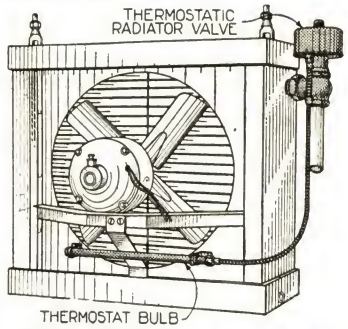
Specifications—Heating systems and the requirements of temperature control vary widely in detail. Because of this, we believe that each case deserves special study. After making this study, our engineers will be glad to recommend the type of control which will give the best results and furnish a detailed specification covering the installation.



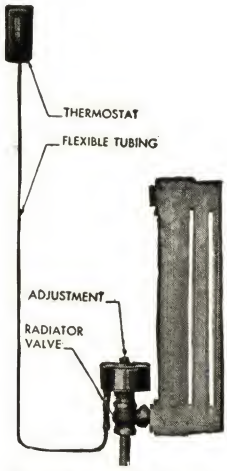
Powers "K" Thermostat Controlling Diaphragm Valve on Steam Supply

Powers Thermostatic Radiator Valve

This thermostatic radiator valve is a self-operating regulator, employing the same principle of operation which has been used so successfully for many years in thousands of Powers regulators. It is designed to control the temperature of rooms heated by direct, indirect, or concealed radiation of vapor or vacuum heating systems.



Powers Thermostatic Radiator Valve with Bulb Type Thermostat Controlling Unit Heater

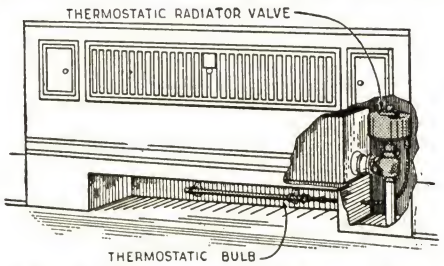


Powers Thermostatic Radiator Valve with Wall Type Thermostat Controlling Radiator

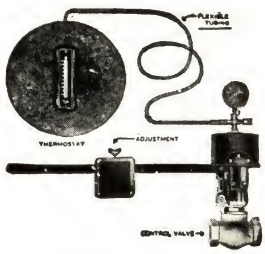
It requires no compressed air, is easy to install, and affords an economical means of applying temperature control to heating systems already in operation.

However, it should not be confused with radiator control valves that operate on a radiator temperature differential, that is, a control that is influenced principally by the radiant heat from the radiator. The Powers Thermostatic Radiator Valve has a sensitive thermostat that can be located outside of the radiant heat zone of the radiator, and where it will be influenced by the actual room temperature.

Write for Bulletin No. 260 which shows many different types of applications, dimensions, prices, etc.



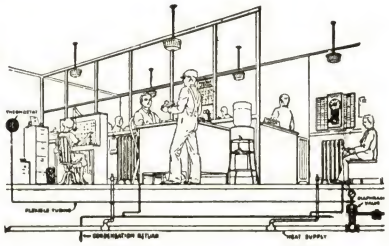
Powers Thermostatic Radiator Valve with Bulb Type Thermostat Controlling Concealed Radiator



At Right: Applied to direct heating system.

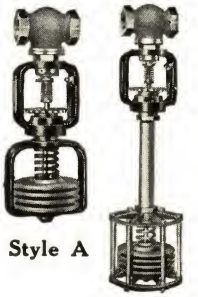
Powers No. 18 Self-contained Regulator—For factories, offices, warehouses, storage rooms, greenhouses, etc. Capable of good control between 60° to 80° F.

Write for Bulletin No. 245.



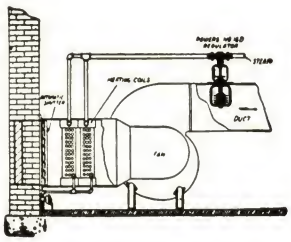
Powers No. 16 Self-contained Regulator—For unit heaters, ventilating ducts, storage rooms, brine coil control. *Write for Bulletin* No. 246.

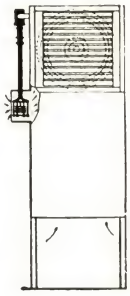
Below: Applied to ventilating duct and unit heater.



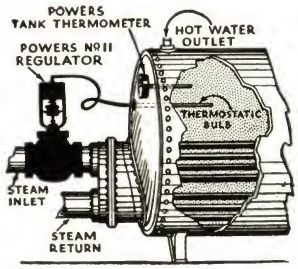
Style A

Style B





Powers Tank Regulators



Powers No. 11 Regulator

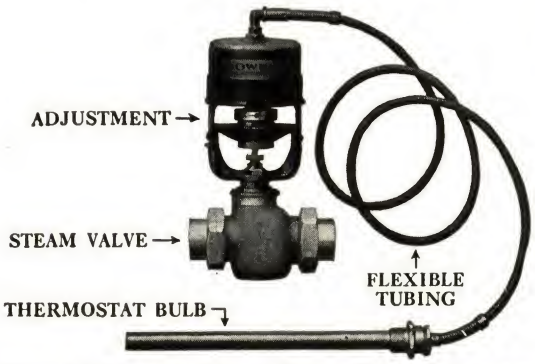
Used on steam heated hot water service in hotels, apartment buildings, offices, schools, shops, hospitals, factories, laundries, etc. Because this regulator prevents overheated water, it saves fuel and prolongs the life of valves and packing. Self-operating; easily installed. Of great durability, guaranteed accurate and positive in action.

In ordering, always give size of tank, steam pipe size, steam pressure, and temperature wanted.

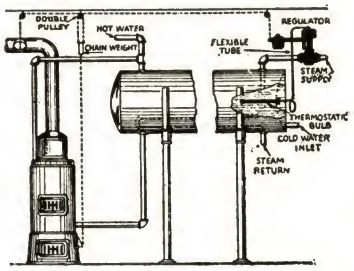
The spring type regulator is commonly used for this work except in sizes larger than 4-in., when the lever type is used. Smaller sizes will be furnished in lever type if preferred.

The regulator will be furnished to operate at 160° F., with adjustability 20° above and below that point, unless otherwise specified.

Flexible connection tube is 6 ft. long for sizes 1½ in. and smaller; 8 ft. for 2 to 4 in. inclusive, and 10 ft. for larger sizes. Additional lengths of tubing will be furnished at 30 cents per foot net. A net charge of $2.00 is made for flexible tubing shorter than standard.



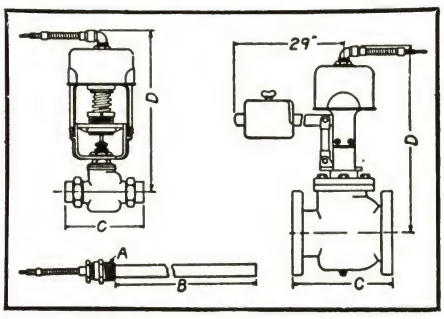
No. 11 Tank Regulator—Spring Type Adjustment



The valve in all sizes is of the double seated balanced type. Companion flanges will be furnished, if desired, at market prices. Flanged valves will be drilled standard unless otherwise ordered.

Specify standard valve for steam pressures up to 100 lb. and monel fitted valve for steam pressures above 100 lb.

Specification—In connection with the (steam heated) hot water storage tank, furnish and install Powers No. 11 Tank Regulator with .... inch [standard] [monel fitted] valve with standard length of flexible tubing. Regulator shall maintain the temperature of the water at .... degrees with steam pressure at .... lb.



Powers Nos. 12 and 13 Regulators

Where installation is to control steam coil and auxiliary coal burning heater, specify Powers No. 12 Regulator with chains, pulleys, etc., for the control of dampers on auxiliary heater.

For coal burning heaters without steam coils, use Powers No. 13 regulator.

PRICES AND PRINCIPAL DIMENSIONS OF NO. 11 TANK REGULATOR

Valve size ..... in.	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
List price: Standard valve	$60.00	65.00	70.00	75.00	80.00	90.00	95.00	100.00	110.00	120.00	175.00	225.00	275.00
Monel valve	$67.00	72.00	78.00	83.00	92.00	104.00	110.00	118.00	135.00	150.00	215.00	.....	.....
Style of body	Union	Union	Union	Union	Union	Screwed	Screwed	Screwed	Flanged	Flanged	Flanged	Flanged	Flanged
Material of body	Brass	Brass	Brass	Brass	Brass	Iron	Iron	Iron	Iron	Iron	Iron	Iron	Iron
Dimension A ..... in.	1	1	1	1	1	1	1	1	1	1	1¼	1¼	1¼
B ..... in.	10	10	12	14	14	16	16	18	20	20	20	20	24
C ..... in.	5⅝	6	6 11/16	6⅞	7⅞	8	9	9½	10⅜	10¾	12	13⅛	16⅞
D ..... in.	11	11 1/16	11½	11 11/16	12⅛	14 11/16	15¼	15¼	15⅜	15⅜	21⅛	23	24

GENERAL ELECTRIC HEAT REGULATOR

PENN HEAT CONTROL COMPANY
NATIONAL DISTRIBUTORS

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CANADA: THE CANADIAN GENERAL ELECTRIC COMPANY
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Product

GENERAL ELECTRIC HEAT REGULATOR is a new, improved heat regulator for the automatic control of temperature, in homes, apartments, schools, churches, business establishments, factories and other buildings equipped with some form of heating apparatus.

Uses

For all hand-fired furnaces, oil burners, gas heaters, and central plant heat.

Mechanics

There are two principal parts of the General Electric Heat Regulator—a thermostat, installed in the upper quarters of the home or building, and a regulator, installed with the heating apparatus in the basement. The thermostat is comprised, essentially, of a bimetallic blade, or blades, with an adjustable dial for temperature setting. Adjustment can be made over a range of thirty degrees—from 50 to 80 degrees Fahrenheit. The regulator differs in construction depending upon the type of heat employed.

For hand-fired furnaces it is equipped with two arms, from which chains are run to the damper doors. The regulator, controlled by responses of the thermostat, operates these arms, so that they open the damper and close the check-draft when heat is required, and close the damper, opening the check-draft when the temperature selected on the thermostat has been reached.

With gas heaters these arms operate the gas valve and air supply adjusting the flame to the temperature requirements.

With central plant heat the amount of steam fed into the basement from the main supply is regulated according to temperature requirements.

The General Electric Heat Regulator *for oil burners* differs entirely in mechanical construction and operation. It governs the ignition and combustion of the oil in the burner, and regulates starting and stopping cycles to conform exactly with temperature requirements.

Improvements

General Electric Heat Regulator for Hand-fired Furnaces—Devices hitherto on the market have controlled heating only insofar as they have taken the actual regulation of the furnace out of the hands of a human attendant. When a need for heat was transmitted from the thermostat to the control unit the damper was opened entirely and the furnace set to generating heat to its full capacity. This was continued until the room temperature had reached the degree indicated on the thermostat, at which point the control unit completely shut the damper. But the excess heat, resulting from full operation of the furnace, continued to raise the temperature and consequently overheat the house. Since this additional heat demanded an excessive amount of fuel a loss in economy was inevitable.

In the new General Electric Heat Regulator, this uneven heating has been eliminated by a "floating" damper control. This does away with extreme operation; the doors are moved to positions between open and closed—three-quarters, a half, a quarter, a tenth open—at which full value is derived, every hour of the day and night, from every bit of fuel used. Draft is graduated, and once the furnace has generated enough heat to raise the temperature to the desired degree, it is given only sufficient draft to keep it there. This assures even heating and economy.

In the room thermostat is a small resistance coil, termed a pre-heat coil, which receives energy when the thermostat calls for heat and builds the temperature within the thermostat two degrees higher than the actual room temperature during draft periods. Thus, as the temperature approaches the degree selected on the thermostat it is anticipated, and the furnace is slowed down. This prevents overshooting of the room temperature, within its consequent waste of fuel—and eliminates subsequent temperature fluctuation.

A special safety device, called the fail-safe, closes the damper if the electric current supply fails and the regulator is thus rendered powerless to operate. With ordinary heat controls, such a power failure exposes the owner to the danger of an excessive generation of heat in his furnace or of steam in his boiler, for, if the thermostat is calling for heat and the damper door has been opened the regulator is powerless to close it and the fire continues at full blast.

With General Electric Heat Regulator the damper door can be regulated by hand until the power is restored—when, without further attention the regulator again assumes control. The chains from the control box to the damper doors do not, at any time, have to be removed.

For Oil Burners

The control unit for oil burners has the advantage of an electric timer—as in the G-E Clock—for the control of day and night temperature changes and the starting operation of the burner.

A positive recycling mechanism, driven by the electric timing motor, repeats itself five times if the flame is not established, and then shuts itself off.

A supersensitive ignition cut-off works with two to four-second operation, insuring absolute safety under all operating conditions.

65 oil-burner manufacturers already are using General-Electric Heat Regulator. 12 are standardizing on it.

Installation

General Electric Heat Regulator is easily installed on any present heating system. No intricate wiring is necessary. The installation of the cable between the thermostat in the living quarters and the regulator in the basement is the major operation required. The regulator is then put in operation simply by plugging into the regular electric house current.

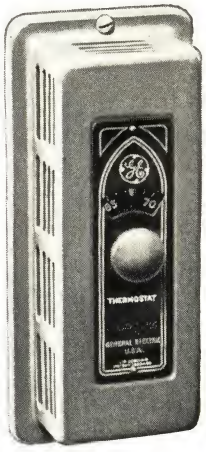
General Electric Consultation

Specialists in the installation and use of this equipment are available at any time. They will gladly co-operate with you in arranging for satisfactory heat regulation in homes, schools, churches or business establishments.

Standard Models

General Electric Heat Regulator comes in two models, a single-range model, selling for $85, installed, and a double-range model, with electric timing, for making day and night temperature changes automatically—at $125, installed. With the single-range model, manual attention is necessary whenever the temperature is to be changed. The double-range model, as explained, is regulated by an electric timer, operating in the control box in the basement. The two dials on this thermostat, one for day, the other for night temperature, are set at the desired degrees and, without further attention, the regulator secures the right temperatures morning and night.

GENERAL ELECTRIC HEAT REGULATOR

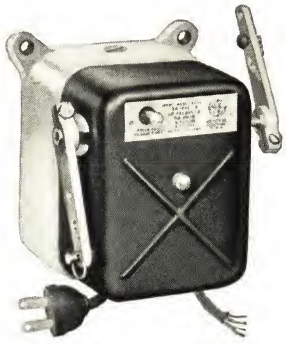


Single-range Model

Single-range thermostat, with $85 model of damper regulator. Radio-type dial. Rugged, compact. Neatly unobtrusive on any wall. This price includes cost of installation and all necessary equipment.

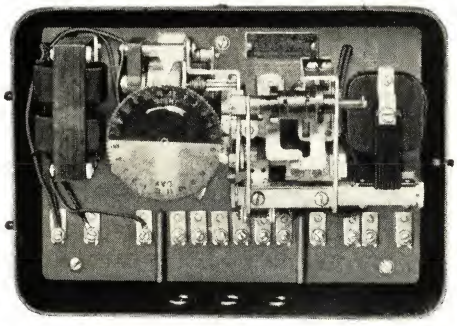
Double-range Model

Double-range thermostat, with $125 model of damper regulator. Day and night dials. Same size and finish as single-range thermostat. Price includes cost of installation and all necessary equipment.



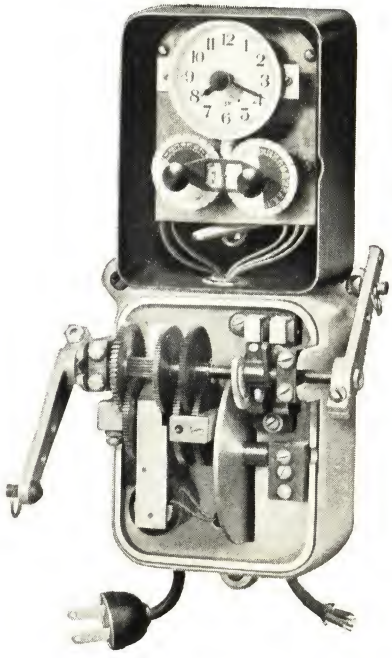
Control Unit with Single-range Model

Above is a closed view of control unit with single-range model of damper regulator. Chains extend from the arms to furnace dampers (or heat supply valves, with gas or central plant heat).



Oil Burner Type Control Unit

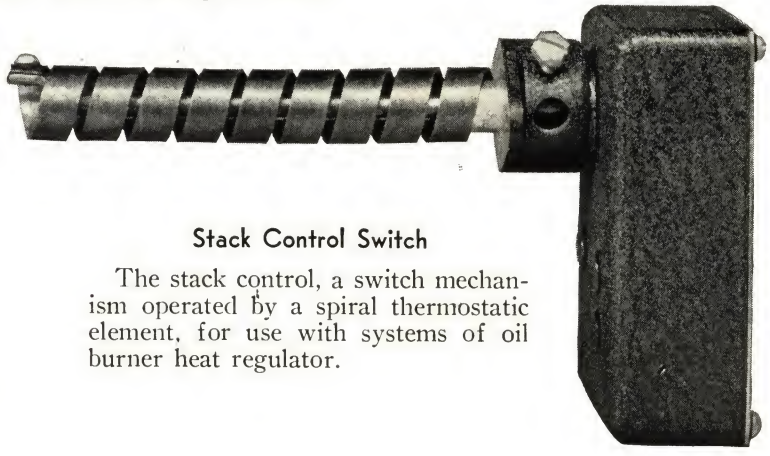
A special type of General Electric Heat Regulator is made for oil burners. Above illustration shows control unit of oil burner regulator with cover removed. G-E Electric Timer—same as used in G-E Electric Clocks—at upper left of panel.



Control Unit with Double-range Model

Open view of control unit with double-range model, covers removed. (Upper section—the time switch—has a hinged cover.) Electric timer makes day and night temperature changes automatically.

Note the simplicity of making day and night regulation adjustments, and of setting the timer.



Stack Control Switch

The stack control, a switch mechanism operated by a spiral thermostatic element, for use with systems of oil burner heat regulator.

AUTOMATIC GAS-STEAM RADIATOR CO.

Manufacturers of "Pittsburgh Automatic" Gas-Steam Radiators and Industrial Gas Unit Heaters

301 Brushton Avenue, PITTSBURGH, PA.

REPRESENTATIVES IN PRINCIPAL CITIES

"Pittsburgh Automatic" Gas-steam Radiators

Steam heat—no boiler, no waste, no labor.

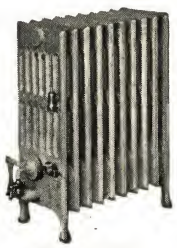
The "Pittsburgh Automatic" consists of a cast iron radiator of standard appearance. Steam is generated separately in each radiator by gas (automatically controlled) making each radiator a complete low-cost steam heating plant.

Our patented automatic steam pressure regulator insures a steam pressure between 2 and 6 lbs. at all times. This regulator has proved itself over a period of years to function properly at all times. The service calls on "Automatics" are negligible.

Our New Vented Filling Cup is another patented feature found only on "Automatics." It enables the radiator to be filled quicker and does not require a funnel or other apparatus for this operation.

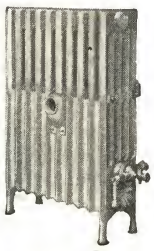
"Automatics" are approved by the American Gas Association and listed as standard by the National Board of Fire Underwriters.

The "Pittsburgh Automatic" allows as much heat as desired, whenever wanted. Houses and apartments, offices or stores, churches or schools may have a radiator for each room in the usual way, but the "Pittsburgh Automatic" can be operated separately. Individual requirements, to the maximum or minimum of heat may be supplied day and night.

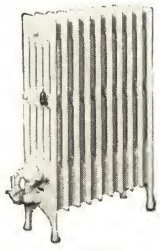


Seven-tube Unvented

Absolute Safety — "Automatic" radiators are tested to a cold water pressure of 100 lbs. to the square inch before leaving the factory. As an additional factor of safety, each steam radiator is equipped with a safety valve to automatically release any pressure higher than 20 lbs. No part of the system can become overheated either through accident or carelessness.



Vented Type



Unvented Type

Used in Combination with Boiler Plant—"Automatic" radiators can be connected with central plant or boiler supplying regular steam radiators and operated in the usual way.

When boiler is not fired the "Automatic" can be used separately under its own steam generated within the radiator. This combination makes a very flexible system and can be used in mild weather before boiler is started.

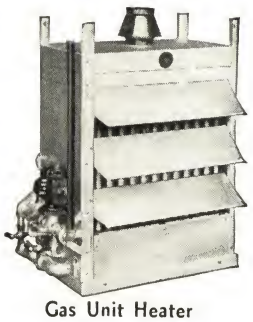
Pittsburgh Industrial Gas Unit Heater

Designed for ceiling suspension for use in buildings of large cubical content and high ceilings—especially recommended for factories, garages, stores, etc.

Capacity 116,000 B.t.u. per hour or equivalent to about 400 ft. direct cast iron radiation.

An automatic electric gas valve shuts off the gas when the fan is not running, thus the unit cannot become overheated. Thermostatic control can be attached.

Important—When ordering be sure to specify voltage and current desired. Standard equipment is 110 volts, alternating current, 60 cycles.



Gas Unit Heater

"PITTSBURGH AUTOMATIC" GAS-STEAM RADIATORS

Number of sections	Capacity, ft.	Length, in.	Weight, lb.	Code word	List price	Number of sections	Capacity, ft.	Length, in.	Weight, lb.	Code word	List price
Five-tube—38 Inches High						**Seven-tube—32 Inches High**					
EH— 4	32	15	130	Hale	$ 55.00	HW— 5	62½	17½	190	Dale	$ 72.00
EH— 5	40	17½	155	Hemp	64.00	HW— 6	75	20	220	Dean	82.00
EH— 6	48	20	180	Herb	72.00	HW— 7	87½	22½	260	Dial	91.00
EH— 8	64	25	240	Hipp	90.00	HW— 8	100	25	290	Doric	100.00
EH—10	80	30	300	Holm	100.00	HW— 9	112½	27½	330	Dray	110.00
EH—12	96	35	348	Hull	115.00	HW—10	125	30	370	Ducat	120.00
EH—15	120	42½	435	Hyper	136.00						
Five-tube—26 Inches High						**Five-tube—38 Inches High—Vented Radiators**					
EL— 4	20	15	100	Fain	$ 48.00	EV— 4	22	15	146	Babe	$ 60.00
EL— 5	25	17½	120	Ferro	54.00	EV— 5	27½	17½	175	Beam	69.00
EL— 6	30	20	138	Flax	59.00	EV— 6	33	20	205	Bice	83.00
EL— 8	40	25	184	Folio	70.00	EV— 8	44	25	272	Blade	95.00
EL—10	50	30	230	Foray	80.00	EV—10	55	30	340	Boer	105.00
EL—12	60	35	276	Franc	90.00	EV—12	66	35	396	Bran	120.00
EL—15	75	42½	345	Furl	110.00	EV—15	82½	42½	495	Buck	141.00
Five-tube—22 Inches High						**Five-tube—26 Inches High—Vented Radiators**					
ELL— 4	18	15	80	Earl	$ 46.00	ELV— 4	12	15	120	Able	$ 53.00
ELL— 6	27	20	120	Ebony	56.00	ELV— 5	15	17½	140	Acme	59.00
ELL— 8	36	25	160	Echo	67.00	ELV— 6	18	20	162	Adorn	64.00
ELL—10	45	30	200	Eden	78.00	ELV— 8	24	25	216	Aero	75.00
ELL—12	54	35	240	Elder	88.00	ELV—10	30	30	270	Agate	85.00
ELL—15	68	42½	300	Elate	102.00	ELV—12	36	35	324	Alum	95.00
						ELV—15	45	42½	410	Arena	115.00

Five-tube—8¾ in. wide.

Seven-tube—12 in. wide.

JAMES B. CLOW & SONS

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SHREVEPORT, LA., Barrow Heating Co., 664 Herndon
TOLEDO, OHIO, H. E. Turner, 5838 Lakeside Ave.
TULSA, OKLA., The Gasteam Radiator Co., 329 E. Fourth St.

Steam Heat with Gas—For a Single Room or an Entire Building

A unit steam heating system, using gas fuel, suitable for heating a single small room or an entire large building.

Clow Gasteam radiation combines the advantages of gas fuel and steam heat with greatest operating efficiency.

Each Gasteam radiator is a complete heating unit in itself. There is no central boiler, steam piping, or water piping. Below the steam columns is a gas burner, completely enclosed in cast iron. An automatic regulator maintains a running steam pressure of approximately 5 lbs. A filling cap permits periodic replenishing of the water chamber, necessary every two to four weeks.

Independent operation of each Gasteam radiator makes possible large fuel economies not possible with a centrally operated heating plant.

Only those Gasteam radiators need be used *when* and *where* heat is needed. Quick steam heat is always ready for short periods, or for continuous operation, without starting up the whole heating system. No heat is wasted in an unused basement, or in long steam transmission lines. Furthermore, because no central boiler, or fuel storage space must be provided, the need for a basement is largely eliminated. Or, in buildings already built, this basement space can be used to much better advantage for other purposes.

Approved

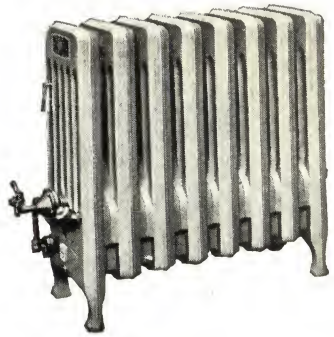
Clow Gasteam is listed as standard by the Underwriters' Laboratories, Inc., and approved by the American Gas Association Testing Laboratory.

Vented and Unvented

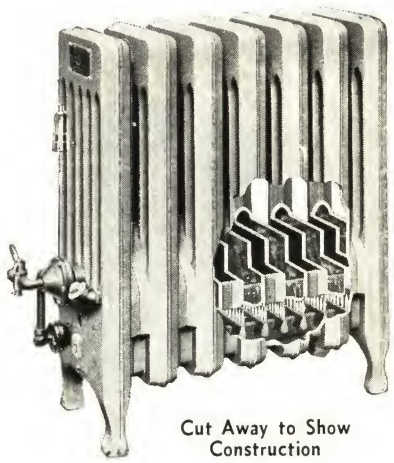
Unvented Clow Gasteam radiators deliver the moisture produced by the combustion of gas directly into the room air. This is highly desirable in dry climates, making additional humidification unnecessary.

In relatively damp or cold climates this additional moisture is undesirable. Vented Clow Gasteam radiators dispose of the moisture they produce through a vent connection and stack to the outside air. Generally it is not necessary to provide for all vented radiators in an installation. Except in very damp or very cold climates, where all vented radiators should be provided, a combination of vented and unvented Clow Gasteam radiators will prevent excess moisture.

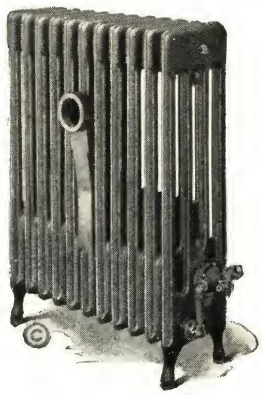
	Number of Sections	Equivalent sq. ft. steam radiation	Length less gas cock, in.	Price
Six-tube: Unvented 31 in. high 10 in. wide	2	28	10	$ 37.00
	3	40	13¾	44.00
	4	53	17½	50.00
	5	65	21¼	58.00
	6	77	25	66.50
	7	89	28¾	73.00
	8	101	32½	82.00
	9	113	36¼	88.50
	10	125	40	97.00
	11	137	43¾	104.50
	12	150	47½	112.00
Six-tube: Unvented 26 in. high 0 in. wide	2	22	10	35.00
	3	32	13¾	41.50
	4	43	17½	48.00
	5	53	21¼	54.50
	6	63	25	61.00
	7	72	28¾	67.50
	8	82	32½	74.00
	9	91	36¼	80.50
	10	100	40	87.00
	11	110	43¾	93.50
	12	120	47½	100.00
Six-tube: Unvented 22 in. high 10 in. wide	2	17	10	33.00
	3	23	13¾	39.00
	4	30	17½	45.00
	5	37	21¼	51.00
	6	44	25	57.00
	7	50	28¾	63.00
	8	57	32½	69.00
	9	63	36¼	75.00
	10	70	40	81.00
	11	77	43¾	87.00
	12	84	47½	93.00
Four-tube: Vented 38 in. high 10 in. wide	5	28	15½	50.00
	7	39	20½	62.00
	9	50	25½	73.00
	11	61	30½	84.00
	13	72	35½	95.00
	15	83	40½	106.00
	20	110	53	133.00
	25	137	65½	158.00
Four-tube: Vented 26 in. high 10 in. wide	5	15	15½	45.00
	7	21	20½	53.00
	9	27	25½	62.00
	11	33	30½	71.00
	13	39	35½	80.00
	15	45	40½	87.00
	20	60	53	108.00
	25	75	65½	130.00



Six-tube
Unvented
31 Ins. High



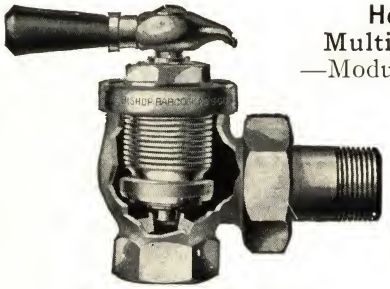
Cut Away to Show
Construction



Four-tube
Vented
31 Ins. High

THE BISHOP & BABCOCK SALES CO.

GENERAL OFFICES
4901-4915 Hamilton Avenue N. E.
CLEVELAND, OHIO
BRANCHES, DISTRIBUTORS OR JOBBERS IN PRINCIPAL CITIES
Consult Telephone Directory for Local Representative

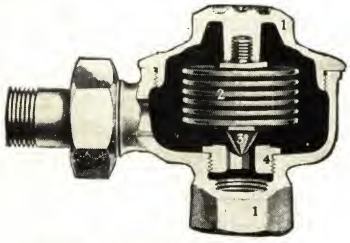


Special Modulation Valve

Heating Specialties

Multiflex Radiator Valves—Modulation (lever handle), full opening (wheel handle), lock shield, chain pull.

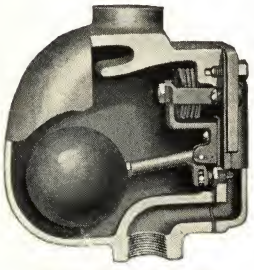
Multiflex Radiator Traps—No. 6. General purpose low pressure radiator trap, in sizes for all requirements. A six-fold Multiflex bellows, non-adjustable. Renewable valve seat.



B. & B. Multiflex Trap No. 6

No. 3: Low and medium pressure radiator and drip trap. Twelvefold Multiflex bellows. Adjustable valve. Renewable seat.

No. 3-A: Medium pressure trap, for process equipment. Twelvefold Multiflex bellows with high temperature filling. Adjustable valve. Renewable monel metal valve and seat.



Blast Traps No. 00

Blast Traps—Large capacity traps for use on blast heaters and industrial equipment. For pressures of 0 to 40 lbs. per sq. in.

Other Heating Specialties—Boiler return traps; return line air vents; damper regulators. Gauges: pressure; vacuum; compound.

Unit Heaters

Type "H": Propeller fan type, for low and high pressure. Ceiling suspended, with louvers; or floor mounted, with recirculating boxes. Four sizes, with various speed combinations.

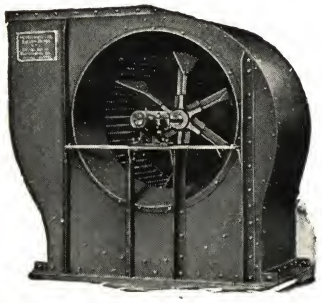
Type "C": High velocity type, with from one to four centrifugal fans, for ceiling suspension.

Type "V": High velocity type, similar to the Type "C," for floor mounting.

Ventilating Equipment

Fans—Propeller fans. Squirrel cage fans, slow speed, forward pitched.

Streamline power fixed fan, high speed, backward pitched.

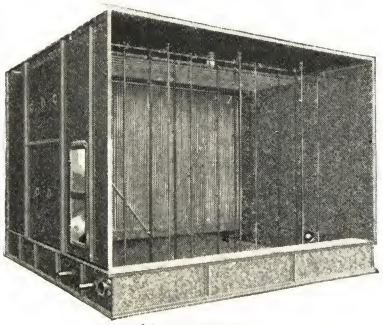


Single Width Squirrel Cage Fan

Air Washers—Type "A": General purpose washer, 7-ft. length, with scrubbers and eliminators.

Type "B": High saturation washer, 9-ft. length, double sprays, scrubbers and eliminators.

Type "C": Cooling type washer, with space for Baudolet refrigerating coils. Length as required. Double sprays, scrubbers and eliminators.



Air Washer

Type "D": Humidifying washer, 5-ft. length, with single row of sprays, eliminators only.

Temperature and Humidity Regulation Equipment

Pneumatic temperature control equipment, completely installed and serviced.

Thermostats—positive acting, graduate acting.

Duplex Stat (day and night).

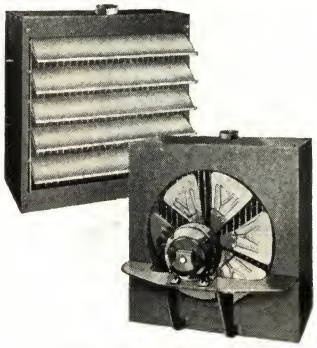
Hygrostats.

Utilostats (duct type thermostats).

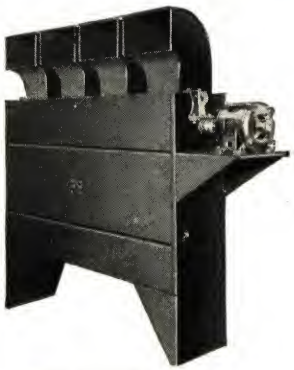
Pneumatic valves, direct and reverse acting.

Dampers.

Single Type



Type H Unit Heater
For ceiling suspension



Type V Unit Heater

Pneumatic Valve

D. G. C. TRAP & VALVE CO., INC.

ESTABLISHED 1898

Makers of Cryer Steam and Condensation Traps, Radiator Valves, etc.

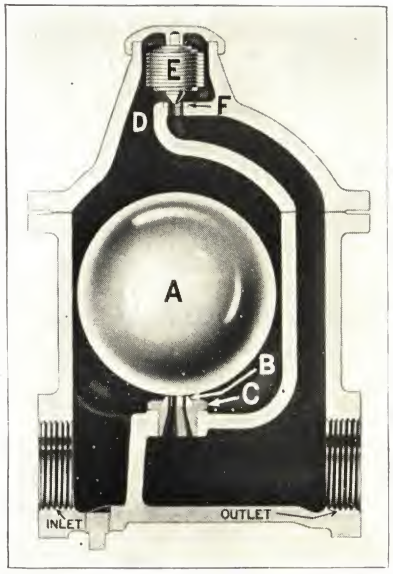
TELEPHONE
MUrray Hill 2-7320

1 East 43rd Street, NEW YORK, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES

Cryer Condensation Traps Nos. 10 and 12

Water, air and steam enter the trap at the inlet. The ball valve (A) on the seat (B) closes the water orifice, until the water level rises above the seat and floats the ball valve up from the seat, allowing water to discharge.



A. Seamless copper ball valve, nickelplated
B. Stainless steel seat of water port
C. Bronze orifice bushing
D. Large air passage to vent chamber
E. Air-releasing thermostatic bellows
F. Stainless steel seat of air port

When the water level falls, the ball valve drops onto the seat and again closes it.

Air and steam only, not water, rise through the air passage (D) into the vent chamber, where the steam condenses and air accumulates and slightly cools.

The thermostat (E) then opens, permitting the air to escape through the by-pass, but closes again as soon as steam from the trap reaches it.

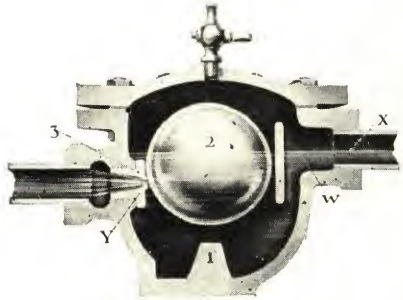
Pressure limit 10 lbs.

J-M Ball Steam Trap (Industrial)

When condensation flows into the trap the ball float floats up to and is held against the discharge bushing.

The discharge orifice is completely sealed until the water level in the trap begins to rise. Then the buoyant force of the water rolls the ball upward on the face of the discharge bushing (3), exposing discharge orifice and the trap discharges both air and water.

When the quantity of water entering the trap decreases, its level drops to the point where the ball again covers the discharge orifice and is held tightly against the face of the bushing. In this way a water seal is provided between the steam in the top of the trap and the discharge orifice, eliminating all possibility of steam leakage.

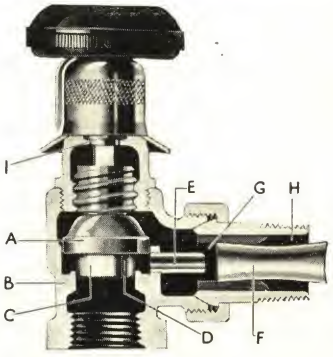


W. Water level
X. Inlet
Y. Discharge
(2). Ball Float
(3). Discharge bushing

Cryer Radiator Control Valve

As the handle is turned and the disc (A) is raised, the slot (D) is gradually exposed, allowing a *little* steam to flow into the nozzle (E) and the modified venturi tube (F), into the radiator. This creates a partial vacuum at (G), drawing some of the contents of the radiator back to (G), from which they are again forced into the radiator by incoming steam through the nozzle and tube. Thus contents of radiator are continuously circulated.

When the handle is turned past the ¾ point, the entire seat of the valve is exposed, allowing a full flow of steam direct into the radiator through the large port over the nozzle (E). Thus, when needed, the radiator can be filled quickly with steam at full pressure.



A. Valve disc holder
B. Rounded seat
C. Sleeve, attached to valve disc
D. Slot for entrance of steam
E. Nozzle for directing steam
F. Modified venturi tube
G. Vacuum chamber
H. Spud
I. Tight upper seat

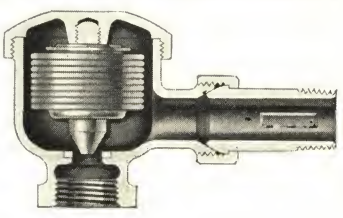
The difference in pressure at the two ends of the venturi tube in the valve causes a rapid increase in the velocity of the steam, which shoots it across the top of the radiator, whence it descends to the bottom, being mixed with the air in the radiator. The partial vacuum created at (G) causes the steam and air in the section nearest the valve to be drawn upward and around the venturi tube, from which it is again ejected when it comes into contact with the jet of incoming steam.

Any desired radiator temperature from about 95° F. up to 212° F. can be maintained steadily, provided operating conditions do not change.

Cryer Thermostatic Radiator Trap

Condensate surrounds a metallic bellows in the trap containing a volatile liquid. If only condensed water and gases are in the trap, at a temperature less than that of steam, the bellows expands slightly, but not enough to close the opening between the plug on the end of the bellows and the seat through which the contents flow into the return line.

As soon as steam enters the trap, its higher temperature causes a greater expansion in the bellows, sufficient to close the opening between the plug on the end of the bellows and the seat, thus preventing steam from flowing into return line.



DIRECT CONTROL VALVE COMPANY

Manufacturers of Thermostatic Control Devices

GENERAL OFFICES
8 South Michigan Boulevard
CHICAGO, ILLINOIS

DISTRICT SALES OFFICES

ATLANTA, GA.
BOSTON, MASS.
DES MOINES, IOWA
DETROIT, MICH.
INDIANAPOLIS, IND.
LITTLE ROCK, ARK.
MILWAUKEE, WIS.
MONTREAL, QUE.
NEWARK, N. J.
NEW YORK, N. Y.
OKLAHOMA CITY, OKLA.
PHILADELPHIA, PA.
PITTSBURGH, PA.
ROCHESTER, N. Y.
ST. LOUIS, MO.
ST. PAUL, MINN.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
TORONTO, ONT.
TULSA, OKLA.
VANCOUVER, B. C.
WASHINGTON, D. C.
WATERLOO, IOWA

The Product

THERMOSTATIC RADIATOR CONTROL VALVES, automatically regulating room temperature.

The Company

The Direct Control Valve Company was founded in 1927 and is incorporated under the laws of Delaware. It has established a financial standing and reputation sufficient to guarantee its integrity and responsibility, and to assure efficient and dependable service.

Sales and Service

The sales organization consists of experienced sales engineers, familiar with the heating industry and thoroughly equipped by experience to intelligently handle any sales problems pertaining to the application of the company's products.

An important part of the organization is the Service Department with an unusually high-calibered personnel to render efficient service.

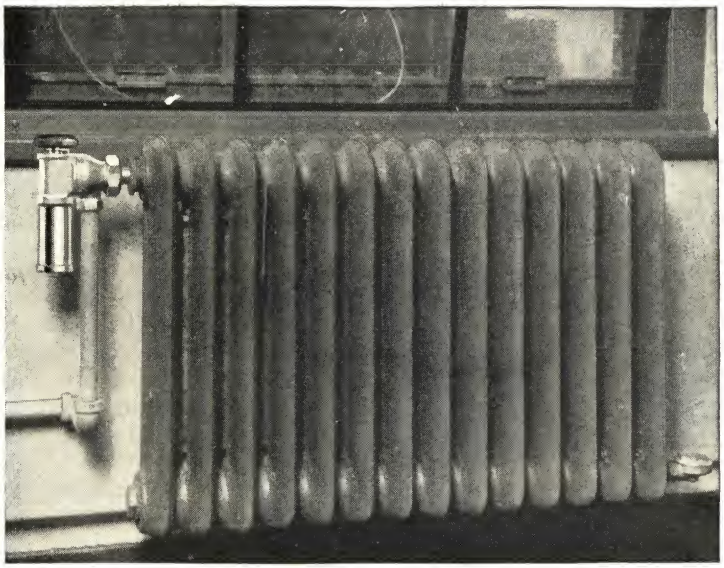
This is available, at no charge, to architects and engineers in all parts of the country.

THE DIRECT CONTROL SYSTEM OF AUTOMATIC TEMPERATURE REGULATION AND STEAM ECONOMY

What Is Satisfactory Heat?

Satisfactory heat is, from the tenants' viewpoint, that degree of heat which keeps him feeling comfortable, and from the owner's viewpoint, the heat necessary to keep his tenants comfortable without waste of steam. It is practically impossible to meet these requirements with any method except by control of the steam flow to each radiator. The demands for heat vary so greatly with different individuals, and for different types of occupancy, that to maintain "satisfactory heat" (considering owner and tenant) the logical method is to install such equipment as will enable the building to maintain each heated space in the building at the minimum temperature that will be demanded by the space occupant on that particular day. Any steam savings beyond this point represents under-heating and any steam consumed in excess of this point represents waste.

The Direct Control Valve offers to the operator the opportunity of heating the building to the exact temperatures required by each room or floor occupant and at the same time while satisfying the occupancy demand, the Direct Control Valve automatically compensates for variations in climatic conditions—hence *maximum in steam economy consistent with comfort for each tenant.*



The Valve on the Radiator Is the Entire Temperature Control—
No Outside Attachments

The Direct Control System

The Direct Control System merely involves the attachment to each radiator of a direct control unit. Each direct control unit is a self-contained automatic regulating device which *satisfies the demand of each room occupant for heat but prevents the waste of steam beyond that point.*

Outstanding Advantages

(1) Control room temperature within one degree Fahrenheit of any pre-determined temperature between 60 degrees and 80 degrees Fahrenheit.

(2) Offer the tenant the option of closing the radiator valve by hand.

(3) Make it impossible to overheat the room.

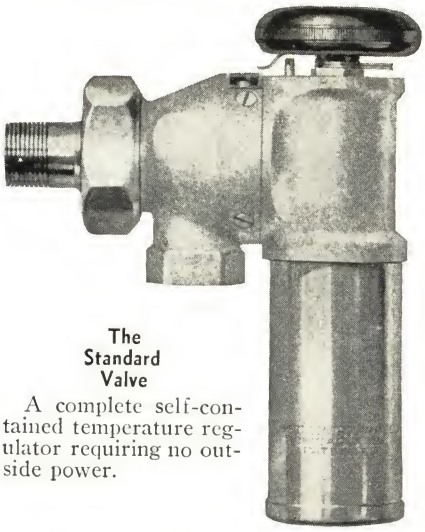
(4) Require no air lines, piping, electrical connections, or other outside or auxiliary equipment.

(5) Allow changing of radiator locations without tearing out plaster, tile, trim, etc.

(6) Conserve all of the steam possible after satisfying the heat demands of the building occupants.

(7) Guarantee minimum maintenance cost.

(8) Increase the rental value of your building by offering temperature control with resultant room comfort, better working conditions, with increased efficiency and added health.



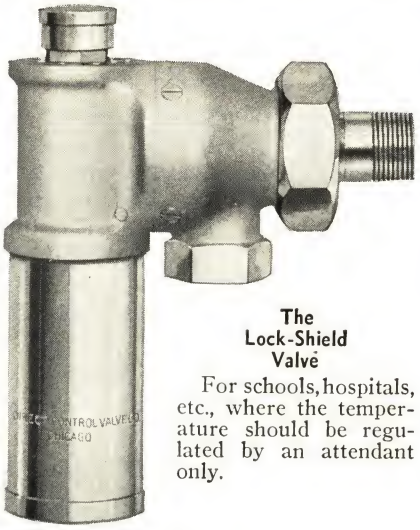
The Standard Valve

A complete self-contained temperature regulator requiring no outside power.

Applicable to Two-Pipe Systems Only

The Direct Control Valve may be applied to any building, new or old, which is equipped with a two-pipe vacuum, vapor, or atmospheric steam heating system. Any good standard make of vacuum radiator trap may be used on a radiator in combination with the valve.

Direct Control Valves are being successfully used on enclosed cast iron radiators, enclosed copper and brass radiators, and various types of newly designed cast iron radiators used in connection with special recesses or covers which form a part of the window sill, and in controlling various types of unit heaters and unit ventilators.



The Lock-Shield Valve

For schools, hospitals, etc., where the temperature should be regulated by an attendant only.

Installation

The direct control valve is installed in the same manner as any ordinary radiator valve and adds nothing to the installation cost over the usual hand valve.

The direct control valve does not involve the use of air lines, electrical connections, etc., and being self-contained, is always available for inspection and adjustment.

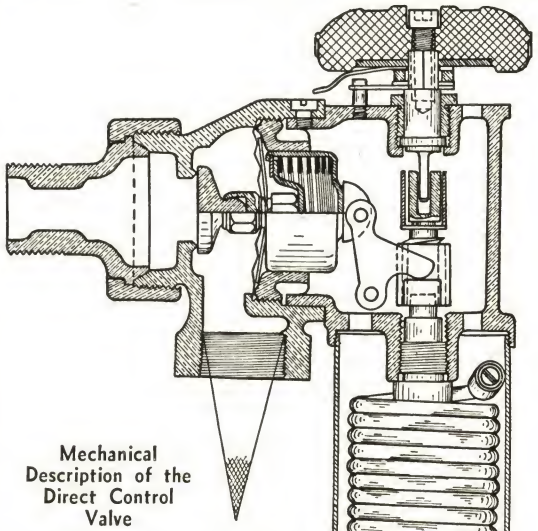
Savings Repay Investment in a Few Years

The direct control valve reduces installation cost enormously, costing no more to install than a simple hand valve. It does away with maintenance cost entirely. It involves but a fraction of the cost of pneumatic systems. This, coupled with its remarkable savings in fuel cost, enables the Direct Control System to repay the initial investment in a very brief period of time —usually about three years.

Maintains Even Temperature

Direct Control Valves are installed with the guarantee to maintain the temperature of the room to within one degree of the required point. The degree of temperature at which the room is to be maintained may be changed by turning the valve wheel, to eight degrees above or below the point at which the valve is originally set.

The valve can be manually operated without the thermostat. In new buildings it can therefore be installed without the thermostat, and operated as a hand valve until the building is ready for occupancy, when the thermostat can be attached. Should occasion arise the thermostat can be removed without removing the valve or shutting off steam from the radiator, and the valve can be manually operated.



Mechanical Description of the Direct Control Valve

The Direct Control Valve is operated by a hydraulic thermostat, powerful and positive in action. The thermostat through the lever mechanism shown on the drawing opens or closes the valve. This action is independent of the hand adjustments. All valve parts are the best materials, are properly designed, accurately made, and carefully tested before and after assembly.

Modulating in Action—Hydraulic

The valve is operated by a thermostat which is strictly hydraulic (not gas and liquid) in principle and very powerful, tested to a minimum pressure of 2500 lbs. to the square inch. Hydraulic pressure—the tremendous expansion force of a liquid when heated—makes the thermostat positive in action and gives the valve a constant power always adequate to seat the valve and assure its successful operation. The thermostat once filled and sealed is never affected by evaporation or leakage, or by structural fatigue of metal. The valve is protected against excessive temperatures by a relief spring.

Trouble-free Service—Packless

The valve is constructed for long life. It is packless. It will stand use and abuse, and deliver a practically indefinite period of service. The assembly drawing at left shows its substantial construction. Parts are few, strong and durable.

Tried and Proved

Direct Control Valves are used and specified by all of the outstanding architects and engineers in the United States and Canada. Its use is not limited to large office buildings, but to schools, hospitals and buildings of all types and sizes.

Direct Control Valve Table of Capacities

Up to 80 sq. ft..... ¾-in. valve
81 to 140 sq. ft.....1 -in. valve
140 to 250 sq. ft.....1¼-in. valve
250 sq. ft. and above.....1½-in. valve

This schedule applies to Direct Control Valves used on direct steam radiation operating on a vacuum steam heating system, with a minimum outside temperature of 10 degrees F. and an inside temperature of 60 to 80 degrees F. For the capacities of Direct Control Valves operating on vapor heating systems and under other temperature conditions, apply to the Direct Control Valve Company.

Standard Guarantee

The Direct Control Valve Company guarantees that a Direct Control Valve or Valves when installed on sufficient radiation to properly heat the room will maintain a room temperature within the limits of 1 degree F. above and 1 degree F. below the point of adjustment subject to the following conditions:

(a) A sufficient and continuous supply of steam to be available for each radiator.

(b) A sufficient and continuous circulation maintained for properly draining each radiator.

(c) No other uncontrolled radiator or heating element shall be installed in the space to be regulated.

The determination of the room temperature shall be made by means of a test thermometer hung free at approximately the center of the room and 5 feet above the floor but not within 8 feet of the heating elements or outside walls.

The Company agrees to repair or replace without expense to the owner, any defective valves or valve parts which may, with normal use, develop defects within a period of three years from date of installation upon written notification by the owner. The Company is to be given the right of inspecting the valves on the premises. This guarantee will become null and void if valve or valves, which to the owner appear to be defective, have been removed from the radiator or have been taken apart or adjusted by others than the Company's representative.

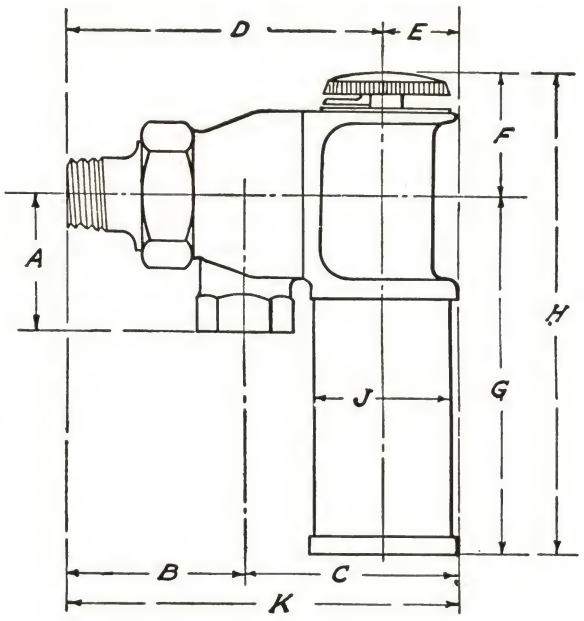


TABLE OF DIMENSIONS

SIZE OF VALVE	A	B	C	D	E	F	G	H	J	K
¾"	1 15/16	2 7/8"	3 1/8"	4 15/16	1 1/16"	2 1/8"	5 1/2"	7 5/8"	1 15/16"	6"
1"	2 1/16	3 1/8	3 1/4	5 5/16	1 1/16	2 1/8	5 1/2	7 5/8	1 15/16	6 3/8
1¼"	2 1/2	3 1/2	3 3/8	5 7/8	1 1/16	2 1/8	5 1/2	7 5/8	1 15/16	6 7/8
1½"	2 5/8	3 3/4	3 5/8	6 3/8	1 1/4	2 5/16	5 3/8	7 11/16	2	7 3/8

Specifications

The Heating Contractor shall provide and install at the supply connection to each direct radiator (which connection shall be made to the top of the radiator) a temperature regulating valve, as made by the Direct Control Valve Company, Chicago, Illinois, which valve shall so operate as to automatically maintain the room temperature at any required point between — degrees and — degrees.

These valves shall contain a thermostat operating upon a strictly hydraulic principle, shall be of nickel plated finish, and shall be of the following sizes:

For radiators up to 80 sq. ft..... ¾-in. valve
For radiators 80 to 140 sq. ft.....1 -in. valve
For radiators 140 to 250 sq. ft.....1¼-in. valve
For radiators 250 sq. ft. and above....1½-in. valve

Make run-outs to the valves one size larger than valve size to a point directly under the valves.

These valves shall be guaranteed to maintain room temperatures within one degree above or below the point of adjustment so long as a supply of steam is available at the radiators. Should any defect appear in any of these valves within a period of three years from the date of delivery, other than that due to normal wear and usage, the same shall be made good without expense to the owner.

Note to Architects and Engineers: (Use only one of the three paragraphs next below.)

(a) Each valve shall be provided with an approved adjustment by the room occupant at any temperature between the points above specified, and it shall be also possible to shut the valve entirely off by hand, if desired.

(b) Each valve shall be provided with an approved operating wheel and with a locking device by means of which the range of adjustment of temperature control may be limited as required.

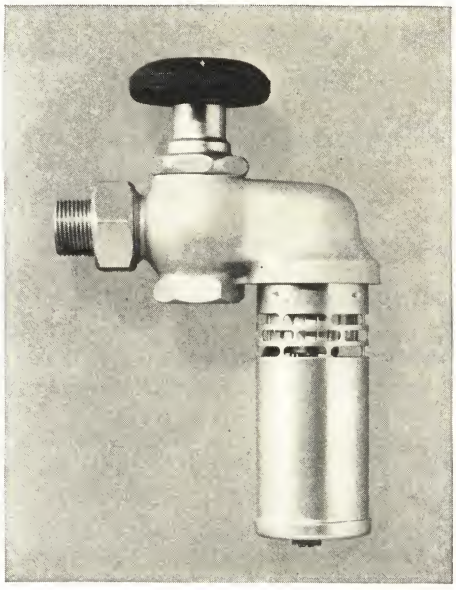
(c) Each valve shall be provided with a lock shield device and six operating keys shall be provided.

Note to Architects and Engineers: (Not to be included in specifications.)

Direct Control Valves can be furnished to operate at any desired room temperature, and in other finishes than nickel plate.

Note especially that Direct Control Valves may be used only on two-pipe vacuum, vapor, or atmosphere steam heating systems.

THE DIRECT CONTROL VALVE—MODEL "B"

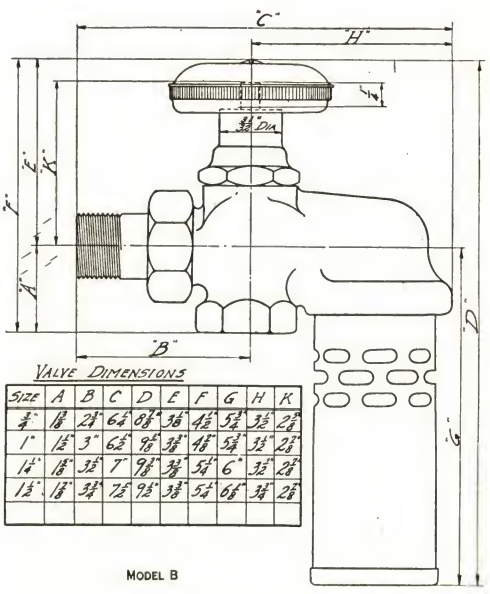


Model B

This is essentially the same as the Standard Valve in purpose, design and performance. A slightly different arrangement of the hand shut-off feature and of the thermostatic adjustment feature, however, makes it more desirable than the Standard Valve for certain types of installations.

Direct Control Valve Sales Representatives will be glad to explain the operating details of the Model "B" valve and will recommend it for use on certain types of installations.

The Model "B" valve carries the same guarantee as to performance and mechanical perfection as for the Standard Valve.



VALVE DIMENSIONS

SIZE	A	B	C	D	E	F	G	H	K
¾"	1⅛"	2¼"	6¼"	8⅛"	3⅛"	4½"	5¼"	3⅛"	2⅛"
1"	1⅛"	3"	6½"	9⅛"	3⅛"	4⅛"	5¼"	3½"	2⅛"
1¼"	1⅛"	3⅛"	7"	9⅛"	3⅛"	5¼"	6"	3⅛"	2⅛"
1½"	1⅛"	3¼"	7½"	9½"	3⅛"	5¼"	6⅛"	3¼"	2⅛"

MODEL B

Installed in Many Outstanding Buildings in the United States and Canada

The Direct Control System of automatic temperature regulation has been severely tested for a period of over seven years. Thorough investigation by any architect, contractor, engineer or owner, to prove the claim that it is the most economical and reliable form of room temperature control is welcomed. We list a few notable installations:

Building	Location	Architects
Department of Commerce	Washington, D. C.	York & Sawyer
Lefcourt Colonial	New York, N. Y.	Bark & Djorup
One La Salle Street	Chicago, Ill.	K. M. Vitzthum & Co. Inc.
Foreman National Bank	Chicago, Ill.	Graham, Anderson, Probst & White
Irving Trust Co.	New York, N. Y.	Voorhees, Gmelin & Walker
Rand Building	Minneapolis, Minn.	Holabird & Root
Arnold Constable Co.	New York, N. Y.	Ludlow & Peabody
Daily News Building	New York, N. Y.	J. M. Howells—Raymond Hood
Fuller Building	New York, N. Y.	Walker & Gillette
Chicago Civic Opera House	Chicago, Ill.	Graham, Anderson, Probst & White
Penn Mutual	Philadelphia, Pa.	Ernest J. Matthewson
Medinah Athletic Club	Chicago, Ill.	Walter W. Ahlschlager
Reynolds Tobacco Co. (General Office Building)	Winston-Salem, N. C.	Shreve, Lamb & Harmon
Empire Building	New York, N. Y.	Shreve, Lamb & Harmon
Chrysler Building	New York, N. Y.	Wm. Van Alen
Willoughby Tower	Chicago, Ill.	S. N. Crowen & Associates
City Bank-Farmers Trust Co.	New York, N. Y.	Cross & Cross
County Trust Co. of New York	New York, N. Y.	W. Whitehill
New York Telephone Co.	New York, N. Y.	Voorhees, Gmelin & Walker
21 West Street Building	New York, N. Y.	Starrett & Van Vleck
500 Fifth Avenue Building	New York, N. Y.	Shreve, Lamb & Harmon
R.C.A. Victor Building	New York, N. Y.	Cross & Cross
Home Telephone Building	Spokane, Wash.	
Genesee Valley Trust Co.	Rochester, N. Y.	Voorhees, Gmelin & Walker
Insurance Exchange Building	Chicago, Ill.	Graham, Anderson, Probst & White
Philadelphia Building	Pittsburgh, Pa.	Byllesby Engineering and Management Corp.
Aetna Life Insurance Building	Hartford, Conn.	James Gamble Rogers
American Bankers Insurance Co.	Chicago, Ill.	Childs & Smith
Price Bros.	Quebec, Canada	Ross & MacDonald
Canada Life Building	Toronto, Canada	Sproatt & Rolph
22 East 40th Street	New York, N. Y.	Kenneth Franzheim
Empire State Building	New York, N. Y.	Shreve, Lamb & Harmon

C. A. DUNHAM COMPANY

Manufacturers of Dunham Differential Heating, Dunham-Built Dwyer Unit Heaters and Dunham Concealed Radiators

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LIVERPOOL, ENGLAND, 847 India Buildings, Water Street
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MUNICH, GERMANY, Sonnenstrasse 6
NEWCASTLE-ON-TYNE, ENGLAND, 12 Eldon Square
PARIS, FRANCE, 47 Rue Fontaine-au-roi (Dist.), Munzing & Co.
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WELLINGTON, N. Z., 94-100 Featherstone Street

Dunham Heating Service

Over eighty sales offices in the United States, Canada and the United Kingdom bring Dunham Heating Service as close to you as your telephone. Dunham Heating Engineers are available for counsel at every one of these offices and the accumulated knowledge of the entire Dunham organization is put at the disposal of the architect or engineer in scientifically and economically laying out any Dunham Heating System.

THE DUNHAM SYSTEMS OF HEATING

The Dunham Systems of Heating may be described in their several adaptations to different classes or types of building as follows:

The Dunham Differential Vacuum Heating System.

The Dunham Vacuum Return Line Heating System.

The Dunham Return Heating System.

The Dunham Home Heating System.

The Dunham Differential Vacuum Heating System and individual parts of the apparatus used in that system are fully protected by United States Patents Nos. 1,644,114, 1,706,401, 1,802,383, 1,802,384, 1,792,213, 1,727,965, 1,761,819 and 1,771,077 and Canadian Patents Nos. 282,193, 282,194, 282,195, 292,558, 308,-943 and 291,134 (British). Additional patents in the United States, Canada and foreign countries are now pending.

Each of these several designs is a complete two-pipe system, the great efficiency of which is made possible by the use of the Dunham Radiator Trap installed at the return outlet of each radiator or pipe coil, where it stands guard against waste of steam and constantly relieves the radiation of the enemies of heating efficiency—air and water.

The Dunham Differential Vacuum Heating System

This system is a two-pipe system in which steam is supplied to the radiators at vacuums and in quantities varying with the need for heat. It is so designed that a relatively constant difference in vacuum is maintained automatically between the radiators and the return piping (the vacuum in the return line being slightly higher), thereby assuring a circulation of steam to and within the radiators whenever there is demand for heat.

It is simple in its component parts, requiring practically the same equipment as a vacuum return line system with the exception that:

(1) A properly controlled vacuum pump having capacity to create high vacuums economically must be provided.

(2) The traps must function under vacuums as high as 25 inches.

(3) The radiator valves must be of the all-metal packless type and be equipped with regulating plates having the proper size orifice for the amount of radiation.

(4) The temperature controlling equipment must be selected to meet the requirements of each individual installation.

The system is flexible in operation resulting in comfortable and economical warmth for occupants in the milder months of early Fall and Spring as well as the extreme cold months of Winter. This is accomplished by increasing the vacuum (which is synonymous with "cooler steam") during the mild weather and by lowering the vacuum or if necessary operating under slight pressure (which is synonymous with "hotter steam") during the extreme cold weather. During very mild weather the radiation is filled only partly with steam under high vacuum.

The average system of heating is designed with sufficient radiation to heat a building to 70 degrees when the outside temperature is at the lowest for the season. However, since the low or minimum temperature is reached or approached only on a few days during the heating season it follows that the system has too much capacity during the average weather condition, and since no provision is made to vary sufficiently the temperature of the steam supplied to the radiators, the rooms become uncomfortably overheated.

The Dunham Differential Vacuum Heating System prevents this heat waste which amounts to 25 to 50 per cent of the steam consumption for the heating season.

The Dunham Vacuum Return Line Heating System

The system of steam mains and piping supply all radiation, and the return piping carries away the air and water of condensation. A vacuum is mechanically maintained in the return piping. Steam may be supplied direct from boiler plant, or through reducing valve, or exhaust steam may be used, supplemented by live steam through a reducing valve.

The Dunham Home Heating System

The system is simple in design, efficient in operation, and especially designed for the home or small building. It uses steam at very low pressure, not over 8 ounces, for distribution of heat. The air is released by the Dunham Air Eliminator. The Dunham Air Check on the eliminator permits the system to produce a strong vacuum under a declining fire, thereby causing the water in the boiler to continue to vaporize on vacuum pressures, so that heat is held in the radiators for a considerable period. No troublesome air valves are used on the radiators. It is necessary that the steam pressure on the boiler be automatically regulated by a sensitive damper control.

The Dunham Return Heating System

This system comprises the simplicity in arrangement and design of the Dunham Home Heating System, and it is accompanied by the same maximum efficiency. It differs from the systems already described having the added feature of a positive automatic return trap for returning water to the boiler and releasing air to atmosphere when it is desired to raise the steam pressure.

The feature of a positive operation under varying steam pressures up to 15 lbs. makes this system particularly adaptable to apartment houses, small hotels and medium sized commercial buildings, schools and churches.

The system also produces a high vacuum under a declining fire, so that heat is supplied to the radiators for a considerable period.

This system makes possible the modernizing of old one-pipe and two-pipe gravity flow systems, materially increasing their efficiency by the introduction of the Dunham Radiator Trap at each radiator, insuring positive circulation without loss of steam, and permitting the removal of all sputtering, leaking air valves which are such trouble makers in these old heating installations.

Important Factors in the Design of Modern Heating Systems

There are four important factors to consider when designing any heating system as well as any Dunham Heating System:

(1) The radiation must be ample to heat the building to the specified temperature in severe weather.
(2) The boiler must be of proper size for this load with a tight chimney of proper height and size, so as to obtain required draft.
(3) The piping, mains, risers and spring pieces must be of proper size, and properly planned.
(4) The appliances must be properly selected for the service they are to perform and they should be properly installed.

If these factors are thoroughly considered, according to accepted methods, the results should be satisfactory, but it must be remembered that even with ample and well-designed heating equipment, objectionable and chilling drafts cannot be avoided unless the building is reasonably tight.

Satisfactory Heat

A comfort giving temperature maintained within a building, irrespective of outside weather, is *satisfactory heat*. This heat must be delivered noiselessly, economically and be quickly available in the quantity desired wherever and whenever wanted. A satisfactory heating system will supply through the radiators an amount and degree of heat which will balance heat loss from the building and maintain constant inside temperature.

It is equally important that a modified heat be supplied during the milder weather which exists in most localities for fully 95 per cent of the heating season, as well as that an adequacy of heat be available for the most severe weather.

Overheating has long been an engineering problem. The Dunham Differential Vacuum Heating System solves that problem and gives consistently *satisfactory heating.*

During the greater part of the heating season this system heats the building with steam at subatmospheric pressures; this means steam at temperatures less than 212 degrees which results in a pleasant, comfortable and healthful heat.

The system provides all the advantages of ordinary kinds of heating systems but with the added advantage of greater economy, increased responsiveness, flexibility and comfort. The several types of steam heating systems available today resolve themselves into two principal classes; variants of the vacuum return line system, and the Dunham Differential Vacuum System.

Heating with Steam at Variable Temperatures

Cool Steam (133° F.) Warm Steam (133° to 212° F.) Hot Steam (above 212° F.)

It is generally agreed that there is a large amount of heat wasted because buildings are overheated. The cause is that the heating system is operated on and limited in its operation to pressures above atmospheric, even in mild weather. Steam pressures ranging from a few ounces to 2 or 3 lbs. afford but a small operating range of steam temperatures to meet changes in weather conditions. That is, steam at a relatively constant pressure is usually supplied to the radiators regardless of what the outside weather may be. The heat output of the radiators will therefore be entirely too high in mild and moderate weather, when only a fraction of the radiation installed would actually be required to balance the heat loss of the building and maintain the desired comfort giving room temperature.

In designing a heating system sufficient radiation must be provided to heat the building to a specified temperature during extreme weather. The base temperature for designing the radiation is selected accordingly, usually with an assumed operating pressure of 1 to 5 lbs. This results in more radiation than is needed for moderate weather and an excessive amount for mild weather. Consequently, with steam circulating on pressures at atmospheric or above, overheating occurs during both mild and moderate weather, if steps are not taken to control the loss. Government weather reports show that extreme weather prevails during about 5 per cent of the average heating season when the system must be operated at full rating. This leaves 95 per cent of the heating season when the heat output of the system must be reduced if uniform room temperature is to be maintained.

Daily weather reports show that the temperature rises and falls quite rapidly over the greater portions of the country. Temperature changes of 40 degrees per day occur each winter in the Chicago area, while daily changes of 20 degrees are but slightly higher than normal. To this variation in head demand must be added the cooling effect of wind, if a true picture of the great fluctuations in heating requirements is wanted.

The graph shows the official maximum and minimum temperatures at Chicago for each day of the heating season of 1928-29. It clearly shows the temperature fluctuations for that season and also the extreme limits of temperature recorded in the previous 54 years.

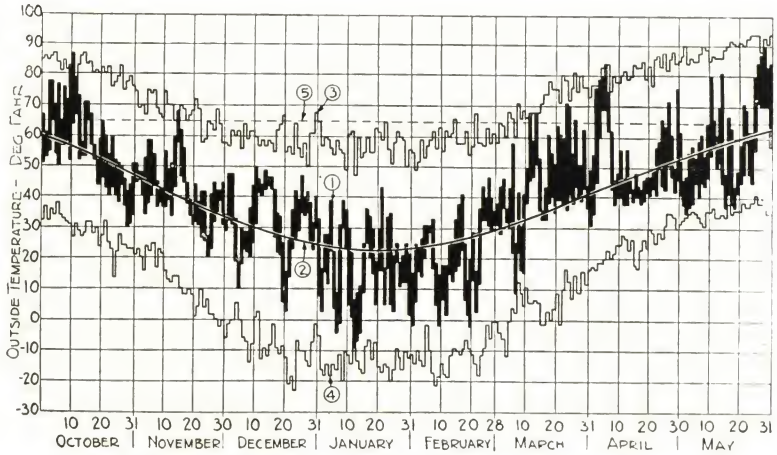


Fig. 1288. Average Temperature for Chicago Heating Season 1928-29=40.2°

(1) Maximum and minimum daily temperatures for 1928-29.
(2) Normal daily temperature from 54-year record.
(3) Highest temperature on record.
(4) Lowest temperature on record.
(5) 65° temperature base for degree day calculation.

This statement of the great variation in weather conditions from day to day is simply to point out that the ideal in heating is to have output of the system just equal to the heat loss from the building if uniform room temperature is to be maintained and heat waste through overheating is to be eliminated, and the accompanying excessive open window heat loss is to be prevented.

The Dunham Differential System accomplishes this without a complicated or delicate equipment, or any greater variety of appliances than is used by the ordinary vacuum return line heating system.

Easily Adaptable to Change Over from Existing Vacuum Return Systems

An ordinary, well-designed, vacuum return line system can be changed over to the Dunham Differential System. Radiation does not have to be disturbed and in most instances existing piping may be used with only slight changes.

Steam Furnished at Variable Temperatures is the Secret of Comfortable Economical Heat

The system uses steam as a heating medium. This steam is supplied from the boiler direct or through controlled valves to the radiators at variable temperatures ranging 133 up to 212 degrees and higher if so required. The 133 degrees temperature corresponds to 25 ins. of vacuum (at sea level), and 212 degrees to zero on the gauge. By furnishing steam at this wide range of temperatures, it is possible to vary the heat output of the radiation, thus preventing overheating. For instance, in mild weather, steam is supplied at a low temperature, therefore the radiator will give off only a slight amount of heat (in fact one can hold his hand on the radiator). As the weather gets colder higher temperature steam is furnished until finally in severe weather there may be a pressure on the radiation instead of the high vacuum used in mild weather.

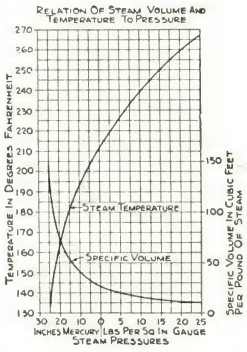
The fundamental differences of operation that distinguish the Differential Vacuum Heating System are the use of high vacuum on supply as well as return side of the system, and the accurate control of steam pressures and vacuum.

DUNHAM DIFFERENTIAL VACUUM SYSTEM OF HEATING

The Differential System meets the practical requirements of temperature control effectively and efficiently because it is designed to operate on the wide range of sub-atmospheric steam pressures from 25 ins. of vacuum to 0 or 1 or 2 lbs. gauge, supplying steam at a temperature, volume and quantity that meets the heat requirements of the moment. This flexibility, sufficient to meet all variations in weather, provides constant room temperature control, eliminates overheating, and thus delivers uniform comfort and remarkable economy.

Design Based on Bedrock Laws of Physics

No new principle is used to attain the long sought combination of comfortable heat at all times, with real economy. The temperature of steam depends upon the pressure. By lowering the pressure the temperature is lowered over a wide range as is shown by the accompanying curve. As the temperature decreases the specific volume increases.



For example, at 2 lbs. gauge pressure 1 lb. of steam will occupy 23.78 cu. ft. The temperature of the steam will be 218.5° F.

By reducing to a pressure of 10-in. vacuum the same pound of steam will now have a temperature of 191.19° F. and will fill 39.16 cu. ft. of space.

Further reducing the pressure to 15-in. vacuum the pound of steam will have a temperature of 178.91° F. and will have a volume of 51.3 cu. ft. The volume of the pound of steam at this pressure (vacuum) is more than double the volume of the pound of steam at 2 lbs. gauge pressure.

This relation of steam temperatures and volume may be carried on up the range and at 25-in. vacuum it will have a temperature of 133.22° F. with a volume of 145 cu. ft. or over six times greater than that at 2 lbs.

The same pressure conditions are duplicated in the boiler and system of the Differential Vacuum Steam Heating System. The temperature of the steam is governed by the Dunham Control Equipment and the Dunham Differential Vacuum Pump, which removes the air from the system, thereby reducing the pressure on the water in the boiler, or causing the steam to expand through reducing valves when they are used.

The term "Differential" is applicable because a relatively constant difference in pressure between the supply lines, the radiator and the return is maintained, so that the air and water will constantly flow out of the radiators. Due to this "Differential" complete circulation is obtained and the radiators throughout the building are heated uniformly.

Heat Emission from Radiation Under Varying Pressure and Temperatures

Heat given off by the radiator is proportional to the difference in temperature between room and radiator. By varying the temperature of the radiator, the building temperature can be kept constant, and heat given off by the radiator kept in proportion to heat loss from the building. By operating the system at varying degrees of pressure or vacuum the temperature of the steam supplied to the radiators is varied to suit changing weather conditions. This is the basic principle of the Dunham Differential Vacuum Heating System.

Fuel Saving of 25 Per Cent or More Compared with Ordinary Types of Steam Heating Systems

On buildings changed over to the Dunham Differential Vacuum System the owner's performance records show actual fuel saving of 25 per cent or more compared with previous system. Thus the heat from 75 tons of fuel results in heating comfort for the same space as required 100 tons or more under the old method. This saving is accomplished with greater heat comfort to the occupants of the space heated with a resultant greater rental value to the owner.

General Description of Parts and Operation

The Dunham Differential Vacuum Heating System is a two-pipe system using steam at pressures less or greater than atmospheric pressure. The parts are very similar to the well-known vacuum return line heating system of which this is a further development. The system may be controlled manually or automatically, as described on this and the following pages.

A typical layout of a manually controlled system will have a steam source with Dunham Sub-atmospheric Reducing Valves to supply steam at the desired temperature in the radiation; a properly designed system of steam piping; a Dunham Packless Radiator Valve, with regulating plate in the inlet of each radiator; a Dunham Thermostatic Trap on the outlet of each radiator; a system of return piping; a Dunham Differential Vacuum Pump with Differential Controller. This controller is governed by the pressure difference existing between the radiation and return piping.

Any Good Piping Job Is Sufficient

Piping is assembled so as to remain tight over a long period of years, *just the same as is required for any other good job.* The same quality of workmanship which is used to assemble the hot water supply piping is easily sufficient if proper provision is made for slightly greater expansion.

Control of Steam Supply

In smaller installations steam is supplied at the same vacuum (absolute pressure) at which it is to be used in the heating system by controlling the rate of

heat generation at the boiler. On larger installations and on central station installations steam is furnished at a higher pressure than is required by the system, and is reduced by means of pressure reducing valves to the desired vacuum or absolute pressure. These valves may either be manually or thermostatically controlled.

Wide Range of Flexibility

Heating systems are seldom operated for 24 hours per day except in very severe weather, so the building is usually below the required temperature when the heating plant is started up each morning. The building may be brought up to temperature slowly, or rapidly, as desired, by circulating steam, at say a 10-in. vacuum or even on pressures above atmosphere. When the building is up to the desired temperature on manually controlled systems the engineer can set the pressure reducing valve for the vacuum required to maintain the room temperature; on automatic installation the thermostat will govern. The amount of steam to be supplied under this vacuum will, naturally, depend on the rate of heat loss from the building at the time.

Regulating Plate at Each Radiator Assures Uniform Steam Distribution

By careful design and installation of a piping system, it is possible to get a distribution of steam at pressures which are fairly uniform throughout the piping. The use of a regulating plate in each radiator inlet valve assists steam distribution at all periods of the heating cycle. They interpose a small resistance to the flow of steam and create a reservoir condition within the supply piping, thus equalizing the pressure conditions at the entrance of each and every radiator.

How the Radiator Trap and Regulating Plate Prevent Excessive Heat Loss

During the heating-up period and while the radiators are filling with steam, the radiator traps are open to the return pipe and they remain open until steam reaches the trap, when they close.

When the radiators are completely filled with steam and under normal operation, the regulating plates, as already stated, produce a semi-reservoir condition in the steam mains as compared with the condition when filling, by supplying an area for the flow of steam that is in proper relation to each size of radiator; if through some abnormal condition the condensing rate of some radiator would be increased, the regulating plate will tend to prevent such a radiator from condensing an excessive amount of steam, notwithstanding the demand for it. This is of value in reducing heat loss through excess window ventilation.

Exact Heat Control for Mildest Days

Radiators completely filled with steam under varying degrees of vacuum meet the average heat loss required during a season, but early autumn and late spring days with very much higher outside temperatures, require such a small heat output that even with a high vacuum, a radiator full of steam at a temperature corresponding to that pressure (vacuum) might under such conditions overheat the building if the system was not capable of further heat reduction. In the Dunham Differential System the quantity of steam supplied during such periods is reduced under a high vacuum, and the regulating plate controls its admission to each radiator so that each remains partly filled, balancing the heat input to the radiator with the heat loss of the building.

Thermostatic Radiator Traps

The thermostatic radiator trap on the outlet of each radiator is of importance, for by its use a positive differential can be maintained between the pressure (vacuum) in the radiator and the pressure (vacuum) in the return pipe, thus securing satisfactory heating.

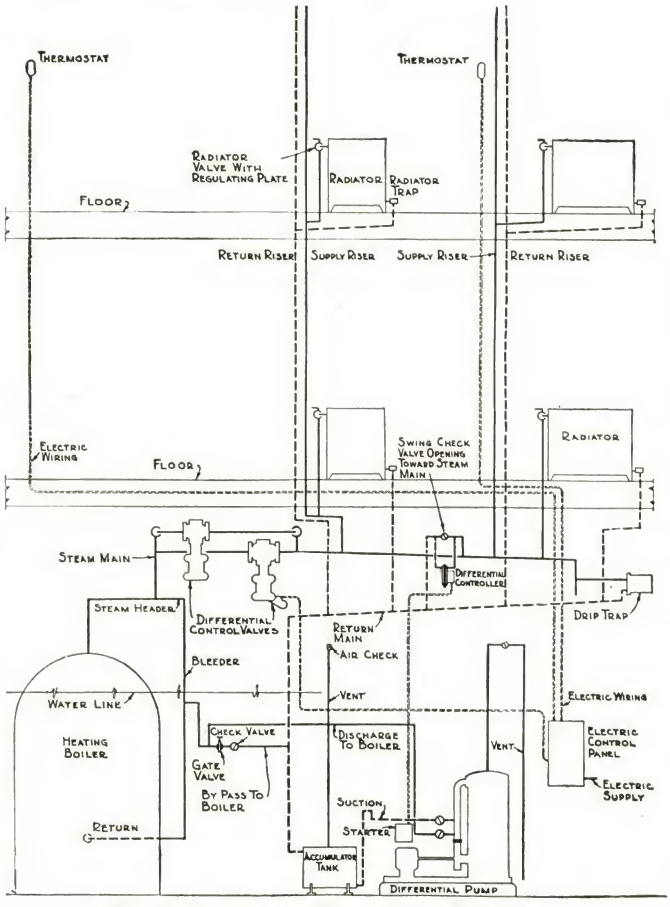


Fig. 1461. Schematic Illustration of "D" Series Dunham Differential System

Drawing does not give actual piping details, but shows principles of application

Steam Circulation Is Maintained by Jet Exhauster Type Vacuum Pump

Steam circulation is maintained by the Dunham Differential Vacuum Pump capable of producing a high vacuum. The pump motor is controlled by the Dunham Differential Controller which is an entirely automatic electric switch actuated by the pressure difference in the radiation and return piping. The function of this controller is to automatically start or stop the pump so that a small but substantially constant pressure difference is maintained. This differential will furnish a head sufficient to maintain steam flow toward the returns.

System May be Manually or Automatically Controlled

There are three distinct methods of heat control:

(a) Manual control, using Dunham Sub-atmospheric Reducing Valves, adjusting these so as to furnish a uniform and sufficient flow of sub-atmospheric steam.

(b) Automatic control, by the function of Dunham Sub-atmospheric Control Valves controlled from one or more room thermostats.

(c) Automatic operation, as used in the "DH" series system for heating residences and small types of buildings.

Automatic Control by Thermostat

The room thermostats are electrically connected to the motor of valve through a control panel, arranged so that the steam in the system may be either automatically controlled or manually controlled when special conditions may demand it.

In buildings where varying wind conditions cause different demands for heat on the windward side, the use of several thermostats located on different sides of the building in separate key rooms has been the practice. The heating system may be under the control of any one of these thermostats.

The Zoning System

In large buildings or where the use of their several parts is varied, it has been found that more economical means of satisfactory heating will be obtained by using a multiple system called zoning.

Note: This system is described in detail on page 7.

THE "D" SERIES DIFFERENTIAL SYSTEM

The "D" series Dunham Differential Vacuum System is for the heating of office buildings, hotels, apartment houses, schools and groups of buildings with more than 3,000 sq. ft. of equivalent direct radiation.

In this system the boiler serves as a heat storage unit from which steam is supplied according to the demand of the Sub-atmospheric Pressure Reducing Valves.

Pipe Sizes

The tables show steam mains and steam risers slightly larger than a vacuum return line system, because of the larger volume of steam to be circulated in mild weather, although a smaller weight of steam is circulated. Ample grade of all pipes must be provided to insure free circulation. Experience proves that a Differential System using vacuum return line pipe sizes will secure a fuel saving up to 25 per cent over vacuum return line operation. Experience also proves that a system using Differential pipe sizes will secure fuel savings from 25 to 40 per cent or more.

Drips

The steam mains are dripped direct to boiler return header and drip mains vented through a "D" Series Trap to the return main on systems operating without reducing valves. The pressure in the boiler, radiators and supply piping will in such cases be the same, permitting condensate to enter boiler by gravity. Should a higher pressure be carried in boiler than in the system (where a reducing valve is used for admitting sub-atmospheric steam into the system) then "D" Series Float and Thermostatic Traps are used on mains and connected to returns leading to Differential Pump. The same applies when steam piping is too low for gravity return to boiler. No lift connections can be used.

Central Station Heating

The Dunham Differential Vacuum Heating System is especially adapted to central station steam supply, both from the standpoint of the central station company and the consumer. It offers great economy of steam consumption, low condensate temperatures, complete circulation even though the pressure carried on the distributing mains from the boiler plant is low.

Exhaust Steam

Exhaust steam may be circulated under vacuum, thus saving steam formerly wasted. Greater economy

TABLE 15. STEAM MAINS

Pipe sizes, in.	Capacities in square feet of direct cast iron radiation for each length										
	*Length of runs in feet										
	100	200	300	400	500	600	800	1000	1500	2000	3000
2	820	580	470	420	370	330	290	260	220	180	150
2½	1530	1070	880	770	670	610	540	470	400	340	280
3	2780	1940	1580	1380	1220	1110	970	860	720	600	500
3½	4400	3080	2510	2200	1940	1760	1530	1360	1140	970	790
4	6200	4320	3520	3120	2720	2480	2160	1920	1600	1360	1120
5	11000	7730	6240	5520	4880	4400	3840	3440	2880	2430	1980
6	17750	12400	10200	8800	7850	7130	6240	5520	4560	3920	3200
8	41400	28800	23600	20700	18400	16600	14500	12800	10800	9100	7470
10	72600	51000	41400	36200	32000	29000	25400	22500	18900	15900	13100
12	114000	80000	65300	57200	50400	46000	40000	35400	29700	25200	20700
14	148000	104000	84200	73800	64900	59000	51600	45900	38300	32500	26500
16	210000	148000	120000	105000	92700	84000	73800	65400	54900	46400	37800

TABLE 16. RETURN MAINS

Pipe sizes, in.	Capacity in square feet of radiation									
	1	1¼	1½	2	2½	3	3½	4	5	6
* 400 ft.	800	1600	4000	11000	21000	38000	55000	78000	138000	220000
*1000 ft.	500	1000	2500	7000	13000	23500	34000	48000	86000	138000
*2000 ft.	350	800	1800	5000	9000	16000	24000	34000	60000	98000
*3000 ft.	300	600	1500	4000	7500	13500	20000	28000	50000	80000

TABLE 18. RISER SIZES

Pipe size, in.	Capacity in square feet of radiation											
	Supply									Return		
	¾	1	1¼	1½	2	2½	3	3½	4	¾	1	1¼
* 200 ft.	40	80	174	270	550	905	1600	3080	4320	1000	2000	4500
* 400 ft.	28	57	126	195	392	650	1140	2200	3120	800	1600	3400
* 600 ft.	23	46	99	156	315	520	912	1760	2480	640	1200	2500
*1000 ft.	18	35	77	120	246	402	708	1360	1920	500	1000	2100
*2000 ft.	12	25	55	86	174	285	498	968	1360	350	700	1500

TABLE 17. STEAM MAIN DRIPS

Pipe sizes, in.	1¼	1½	2	2½
Capacity in sq. ft	1000	2000	4000	6000

TABLE 19. RADIATOR CONNECTIONS, TOP INLET
Valve Types 105 or 145 with Regulating Plates

Square feet of direct radiation	Supply			Return		
	Size inlet valve, in.	Vertical pipe to inlet valve, in.	Horizontal runout to riser, or spring piece to main from a first floor radiator, in.	Trap No.	Stub to trap and size of trap, in.	Horizontal runout to riser or first floor radiator, in.
1— 25	½	½	¾	D1	½	¾
26— 80	¾	¾	1	D1	½	¾
81—100	¾	¾	1¼	D1	½	¾
101—140	¾	¾	1¼	D2	½	¾
141—170	¾	¾	1½	D2	½	¾

TABLE 20. ALLOWANCES FOR RESISTANCE TO FLOW
In Feet of Pipe

Pipe size, in.	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16
For elbows	2	2	2	3	5	6	9	10	14	19	24	35	47	59	70	82
For globe valves	2	3	3	5	7	9	14	15	21	28	36	53	70	88	106	124

*In sizing pipes length of piping must be ascertained and frictional resistance of fittings and valves considered. It is customary to reduce resistances to equivalent length of straight pipe, which must be added to actual length. In table 20 these resistances are given in feet of pipe.

Length equals distance along piping from source of supply (boiler or reducing valve) to top of riser, plus allowance for elbows, valves (Table 20) and plus 25-ft. allowance for last radiator connection.

Do not reduce any steam main below 2 ins. in size at its end.

Spring pieces, that is, connections from steam main to riser must always be made one size larger than the riser. Make return spring pieces same size as return riser.

Use pipes two sizes larger than vertical pipe for supply spring-pieces and radiator runouts over 8 ft. long.

This data is thoroughly reliable if properly used.

Our engineering department is available for the checking of plans.

and greater capacity of engines or pumps is also secured. The application of this system reduces the back pressure to a vacuum and greater power output will be obtained at reduced steam consumption.

Process Work

In installations where high steam pressures and temperatures are necessary for process work the building heating system can be operated more economically by applying the differential principle. By reducing the high steam pressure through reducing valves the heat input may be controlled and the overall economy of the plant improved.

Dunham Differential Vacuum Pump

The Dunham Differential Vacuum Pump operates on the jet exhauster principle. The exhauster is of special design and has great air and vapor handling capacity. Under high pressures water is supplied from the receiving tank to the exhauster by a motor driven enclosed impeller type centrifugal pump of high efficiency. The pump exhausts air and water from return piping under very high vacuums and discharges condensate to the boiler. It is a complete assembled compact unit ready for piping and wiring connections.

Dunham Thermostatic Radiator Traps and Drip Traps

All traps used in connection with the Dunham Differential Vacuum Heating System are known as "D" Series. They function uniformly over a wide range of pressures and temperatures from 25 ins. of vacuum to 25 lbs. gauge pressure.

Dunham Packless Radiator Valve

Dunham Packless Radiator Valve equipped with Regulating Plate is used on all radiators to secure proper balance. The valve is made packless by means of the bellows construction. The plate orifice is calibrated to the number of feet of radiation in each radiator.

Zoning—Individual Temperature Control for Sections of Buildings or Groups of Buildings

Different parts of buildings require different quantities of heat at different times due to class of occupancy of various parts of building, sun and wind effect on the different sides, and buoyancy of the heated air as in very tall buildings. All large buildings should therefore be "zoned" to secure maximum conservation of steam and correct heating of all sections.

The Dunham Zone Temperature Control in conjunction with the Dunham Differential Vacuum Heating System provides remote electrical control of the steam supply as required by each zone.

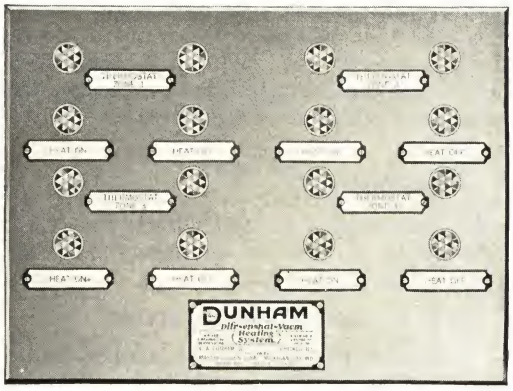
General Description of the System—Each zone operates from its own thermostat located at a suitable control point or "key-room." Furthermore, each zone must be served by its own Differential Pump where the building is divided into two or more independent zones.

A building may be divided into any number of zones but an average size building could conveniently be divided into two zones—one set of piping caring for the west and south sides, the other set for the north and east sides. Usually in ordinary heating, duplex pumps are specified. This, in the Differential System, will allow a pump on each zone. The heating will be more uniform and fuel costs less.

Simplicity of Operation—A building is divided into the necessary zones by having each zone supplied from its own steam main. The supply of steam from each main is controlled by a Dunham (electrically operated) Sub-atmospheric Pressure and Temperature Control Valve. One or more thermostats are located at the proper points in the zone and set to a predetermined degree.

Manual Remote Control—The control valves for each section being electrically operated can also be remotely controlled independently of the thermostats. A Dunham Zone Control Panel in the boiler room shows the operating engineer at a glance the temperature conditions in the various zones and he can, by simply throwing a switch, accelerate or decelerate the rate of steam flow to the particular zone.

Signal Panel for Superintendent's Office—When desired, a signal panel can be provided to be located in the building superintendent's office enabling him



Type 392 Signal Panel

to observe temperature conditions and operation of the temperature controlled valves in the various zones.

This panel will indicate simultaneously with the panel in the boiler room the range of temperature existing in the building and the position of the temperature controlled valves.

Controlling Factors in Designing a Zoning System—(1) *Buoyancy*—Heated air rises within the building due to flue effect. This causes the upper floors of tall buildings to be overheated after the system is full of steam. (2) *Exposure* — Sunshine, wind and other weather conditions cause variable heat demands on different sides of buildings. (3) *Type of Occupancy* — Sections of the same building may require different degrees of heat due to their particular uses, such as storage, manufacturing, office space, etc., or periods of occupancy.

No particular rule can be given for the zoning of a building, as each is an individual problem and should be studied as such. The experience of Dunham Engineers is at the service of architects and engineers when heating system layout for a zoned system is being studied. A general description of the problem will enable the Dunham Engineering Staff to advise you.

Heating Specifications "D" Series, Dunham Differential Vacuum Heating System

(1) General Conditions—The general conditions governing this work shall be those established as standard by the American Institute of Architects which shall apply hereto.

(2) Construction and Material—The heating apparatus, proposed herewith includes the furnishing, delivery and erection on the premises of all necessary material and labor, which shall be first class in all particulars, and in accordance with the specifications and plans.

(3) Inspection—The Heating Contractor must at all times allow the C. A. DUNHAM COMPANY'S Representative to come on the job for the purpose of inspection and must lend any assistance necessary to expedite and complete the work. Any instructions given by the C. A. DUNHAM COMPANY'S Representative and confirmed in writing regarding changes to make system conform to plans or specifications and details shall be considered a part of this specification.

(4) Boiler—The steam boiler shall be a.....with guaranteed rating for.....sq. ft. of radiation installed upon suitable foundation, and equipped with all necessary connections and trimmings, including a safety valve set to blow at 10 lbs. pressure, a Dunham Compound Gauge 15 lbs. x 30-in. vacuum and a 7-in. Dunham Damper Regulator. (Omit regulator on gas fired and automatic oil fired installations.)

(5) Smoke Pipe—Connect boiler to chimney with suitable black iron smoke pipe gauge..... Size to be as recommended by boiler manufacturer. Smoke pipe must be provided with hand stop damper. (Omit stop damper on gas fired installation.)

(6) Pressure and Temperature Control—On all systems not equipped with full automatic control of fire, install Dunham Sub-atmospheric Control Valves of size shown on plans, with necessary gate valves. Install Dunham 15-lb. x 30 in. compound gauges where directed. If thermostats and Dunham Control Panels are to be used, Heating Contractor shall furnish, install and wire these, all in accordance with manufacturer's details and instructions, and local regulations.

(7) Pipe and Fittings—Furnish and erect with tight connections all necessary piping of sizes shown on plans and run as indicated, supported and properly graded to insure free and noiseless circulation. Use fittings of cast iron of standard quality. Ends of all pipes shall be reamed or filed. Proper provision must be made for expansion. Use graphite and oil for making up all pipe joints applied to male thread only. Provide for expansion of mains and risers by loop type expansion joints and swing connections in mains wherever possible. In other cases provide approved all-metal packless expansion joints. Piping to be properly anchored.

(8) All steam tappings in boiler shall be connected full size of tapping into a steam header which shall be dripped to the return header through a bleeder. All spring pieces to steam and return mains shall be taken off the top of mains at 45 degrees. On down-feed systems, take the spring pieces from the bottom of steam main at 90 degrees.

(9) The end of each steam main and each drip point shall be drained, through a gate valve, Dunham Strainer, and "D" Series Dunham Trap as indicated on plans.

No lift connections shall be used at drip points.

(10) Grade steam mains, return mains and drip mains, ½ in. in 10 ft. All steam supply branches, such as spring pieces, offsets in steam risers and runouts to radiators, shall in each case be installed one size larger than the vertical pipes to which they connect and shall be given as much grade as possible ½ in. per ft. is preferable.

(11) Return mains shall be connected together into the accumulator tank of Dunham Differential Vacuum Pump as shown in detail furnished by manufacturer. Lift connections must not be used except between pump and accumulator tank.

(12) Risers are to be run concealed or in the open as directed by the architect. Each down-feed steam riser must be dripped into the return through a "D" Series Dunham Trap. Install traps as instructed by manufacturer. All concealed piping must be tested and made tight at 15 lbs. water pressure before being concealed and covered.

(13) All union connections, flanges, packing nuts on gate and globe valves and on gauge glass of boiler must be drawn up tight so as to prevent air leaking into system when under a high vacuum. This work must be performed after system is completed and while it is working with a vacuum in both steam and return lines.

(14) Floor Plates, Sleeves—Furnished approved floor and ceiling plates, protecting sleeves on all pipes passing through floors or finished partitions.

(15) Differential Vacuum Pump—Furnish and install one or several (as indicated on plans) Dunham Differential Vacuum Pumps of "D" series size.....having a differential rating of ..... sq. ft. of equivalent direct radiation. Pump (or pumps) shall be installed, connected and wired in accordance with manufacturer's instructions and local regulations.

(15A) Domestic Hot Water and Blast Heater—Condensation from this equipment shall be returned to boiler by other means than Dunham Differential Vacuum Pump.

(16) Check Valves—Check valves shall be horizontal swing type with brass disc, best grade obtainable. They shall be installed where called for by the plans, and in accordance with accompanying details. They shall be tested for tightness.

(17) Radiation—Furnish and install radiation as shown on the plans. There shall be.....sq. ft. of direct radiation of approved make.

(18) Radiator Traps and Valves—Each radiator shall be provided with a Dunham "D" Series Radiator Trap of suitable capacity. A Dunham Packless Radiator Valve with Dunham Regulating Plate shall be installed at inlet connection according to manufacturer's instructions.

(19) Painting—All exposed piping in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed by architect. Radiators shall be painted as directed by architect. All pipe joints and all uncovered piping in basement, front and other exposed parts of boiler shall be painted one coat of black asphaltum when the system is hot and under a vacuum. The finishing coat of paint must be applied when the entire system is under vacuum, so that paint will fill up small leaks.

(20) Covering—Cover all steam mains and spring pieces with four-ply, 1 in. thick asbestos sectional covering and fittings with asbestos cement. Cover all steam and return risers and other piping run concealed in outside walls with two-ply, ½ in. thick asbestos sectional covering. Cover boiler as specified by boiler manufacturer.

(21) Finishing Up—After system has been in operation two weeks, thoroughly blow down and clean out system as follows:

Remove safety valve and connect a temporary blow-off pipe to the safety valve tapping, extending it outside or to some suitable drain. Shut off all radiator valves or valves in main. Fill boiler with water to top of gauge glass. Build a very hot fire and blow steam and water out through safety valve tapping and pipe connected thereto. Fire hard with not more than 10 lbs. pressure on the boiler. Supply cold water constantly in at bottom of the boiler. Continue this for six hours. At the end of the period, close water feed valve, draw fire quickly, open blow-off at bottom of boiler and entirely drain boiler, replace the safety valve. Fill boiler slowly after it becomes cold. Remove cover of each trap and wipe off grease and dirt accumulation. Replace trap cover tightly on body.

(22) Test—The System when finished and cleaned shall be tested for tightness as directed by C. A. DUNHAM COMPANY'S Representative. Contractor shall furnish labor and material for performing test.

(23) Guarantee—The Heating Contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise, with a vacuum of 15 ins. in steam main. If apparatus shall fail to accomplish this guarantee by reason of any defect developing within period of one full heating season and that defect is due to faulty material or poor workmanship, the Heating Contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

(24) Finally—Nothing herein contained can be construed to relieve the Heating Contractor from making good and perfect work in all usual details of construction, and he will be held responsible to provide and furnish necessary material and to perform all necessary labor and to bear all expenses incidental to the satisfactory completion of the work.

"DH" SERIES DIFFERENTIAL SYSTEM

Description

The "DH" Series System is for residences and other small installations with gravity returns to boiler having a total equivalent direct radiation load of not more than 3,000 sq. ft. (excluding piping). It is entirely automatic in operation.

It will furnish heat properly without the usual fuel and heat waste caused by overheating and resultant excessive window ventilation. It furnishes steam to the radiators at sub-atmospheric pressures with correspondingly low radiator temperatures, causing a uniform, mild and healthful heat to be distributed throughout the building. This gives the occupants a comfort heretofore unknown, with healthier living conditions. In most severe weather the steam can be furnished at, or above, atmospheric pressure. The system is simple in design, durable and exceedingly flexible to meet varying weather conditions. The outstanding feature of economy of operation is accomplished by:

(1) Regulating the amount of pressure, or the degree of vacuum, at which the steam circulates in the supply piping and radiators.

(2) Controlling the vacuum in the return piping so that a substantially constant difference is maintained between the radiator and return piping pressures.

Advantages

The advantages of the operation of the Dunham Differential Heating System are particularly evident in the heating of residences. Mild heating, entirely without the periodic overheating that characterizes ordinary systems, insures uniform comfort and maintains more healthful conditions during the entire heating season. The control of the Differential System is effective over so wide a range, to compensate for all the variations of outside weather, that heating of the home is carried on without any wide swings of temperature. The ideal of home heating, the maintenance of uniform comfort so controlled that occupants are never conscious of the operation of the heating system, is consistently maintained by the Dunham "DH" Series System.

Operation

When the system starts up initially cold, the room thermostat starts both the fire and the Differential Vacuum Pump.

With the system cold the radiator traps will be opened and the vacuum created by the pump will be carried through the return piping, radiators and steam piping to the boiler. Vaporization will start in the boiler and steam will be circulated to the radiators at a lower temperature than if the boiler was at atmospheric pressure. The pump continues to function until the desired room temperature is reached, when it is stopped by the thermostat. In mild weather the heat demand will be small, requiring higher vacuums and lower steam temperatures, but in cold weather the fire will be accelerated for longer periods resulting in lower vacuum and high steam temperatures.

Pump Equipment

The pump is made in two sizes, DH2A for 2,000 sq. ft. capacity and DH3 for 3,000 sq. ft. capacity. It uses the Jet Exhauster principle same as the "D" Series Pump. Typical drawings giving application of this pump on gas, oil or coal fired boilers will be furnished on request.

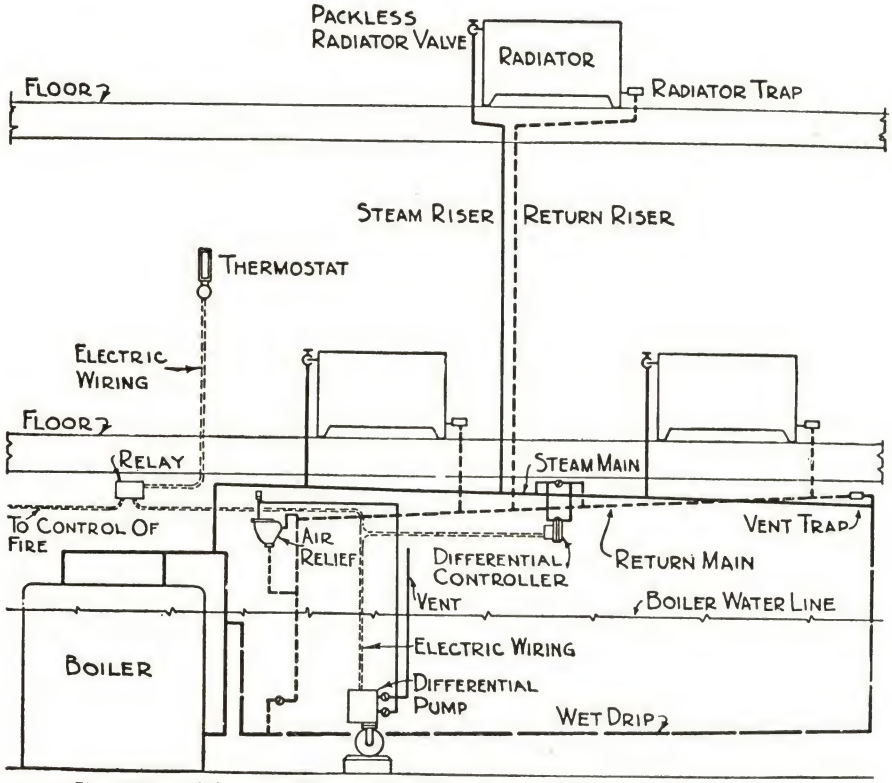


Fig. 1076A. Schematic Illustration of "DH" Series Dunham Differential System
Drawing does not give actual piping details, but shows principles of application

Heating Specifications "DH" Series, Dunham Differential Vacuum Heating System

(1) General Conditions—The general conditions governing this work shall be those established as standard by the American Institute of Architects.

(2) Construction and Material — The heating apparatus proposed includes the furnishing, delivery, and erection on the premises of all necessary material and labor, which shall be first class in all particulars and in accordance with specifications and plans.

(3) Inspection—The Heating Contractor must at all times allow the C. A. DUNHAM COMPANY'S Representative to come on the job for the purpose of inspection and must lend any assistance necessary to expedite and complete the work. Any instructions given by the C. A. DUNHAM COMPANY'S Representative and confirmed in writing regarding changes to make system conform to plans or specifications and details shall be considered a part of this specification.

(4) Boiler—The steam boiler shall be a.....with guaranteed rating for.....sq. ft. of direct radiation installed upon suitable foundation and in accordance with manufacturer's setting instructions. It shall be equipped with all necessary connections and trimmings, including a safety valve set to blow at 10 lbs. pressure, a Dunham Compound Gauge 15 lbs. x 30-in. vacuum and a 10-in. Dunham Damper Regulator. (Omit regulator on gas fired and automatic oil fired installations.)

(5) Smoke Pipe—Connect boiler to chimney with suitable iron smoke pipe same size as boiler smoke outlet. Smoke pipe must be provided with approved Dunham Check Damper and hand stop damper between check damper and boiler. (Omit Dunham Check Damper on automatic oil fired installations.) (Omit check damper and hand stop damper on gas fired installations.)

(6) Pipe and Fittings—Furnish and erect with tight connections all necessary piping of sizes shown on plans and run as indicated, supported and properly graded to insure free and noiseless circulation. Use fittings of cast iron of standard quality. Ends of all pipes shall be reamed or filed. Proper provision must be made for expansion. Use graphite and oil for making up all pipe joints applied to male thread only.

(7) All steam tappings in boiler shall be connected full size of tapping into a steam header which shall be dripped to the return header through a bleeder. All spring pieces to steam and return mains shall be taken off the top of mains at 45°.

(8) The end of each steam main shall be dripped as indicated on the plans by means of a drip line to boiler, properly vented through Dunham "D1" Trap in accord with details furnished by manufacturer.

(9) Grade steam main ½ in. in 10 ft. Grade return mains and drip mains 1 in. in 10 ft. All steam supply branches, such as spring pieces, offsets in steam risers and runouts to radiators, shall in each case be installed one size larger than the vertical pipes to which they connect and shall be given as much grade as possible. ½ in. per ft. is preferable.

(10) Return mains shall be connected to the Dunham Differential Vacuum Pump as shown in detail furnished by manufacturer.

(11) Risers are to be run concealed or in the open as directed by the architect. All concealed piping must be tested and made tight at 15 lbs. water pressure before being concealed and covered.

(12) All union connections, flanges, packing nuts on gate and globe valves and on gauge glass of boiler must be drawn up tight so as to prevent air leaking into system when under a high vacuum. This work must be performed after system is completed and while it is working with a vacuum in both steam and return lines.

(13) Floor Plates, Sleeves—Furnish approved floor and ceiling plates and protecting sleeves on all pipes passing through floors or finished partitions.

(14) Thermostatic Control—Contractor shall furnish and install where shown on plans a Special Series 10 Minneapolis Honeywell Thermostat according to manufacturer's instruction. (If this thermostat is being supplied with oil or gas burner under another contract, then the Heating Contractor shall connect Differential Vacuum Pump to the Thermostatic Control.)

(15) Differential Vacuum Pump and Air Eliminator—Furnish and install a "DH" Series Dunham Differential Vacuum Pump. The pump shall be installed and connected in accordance with manufacturer's instructions and details. Necessary electric wiring between pump and differential control, shall be connected to thermostatic equipment in accordance with manufacturer's instructions and in conformity with all local regulations.

Furnish and install on return main in accordance with manufacturer's instructions a Dunham Air Eliminator. Install a Dunham Air Check on vent opening of eliminator.

(16) Check Valves — Check valves shall be horizontal swing type with brass disc, best grade obtainable. They shall be installed where called for by the plans and in accordance with accompanying details. They shall be tested for tightness.

(17) Radiation—Furnish and install radiation as shown on the plans. There shall be.....sq. ft. of direct radiation of approved make.

(18) Radiator Traps and Valves—Each radiator shall be provided with a Dunham "D" Series Radiator Trap of suitable capacity. A Dunham Packless Radiator Valve with Dunham Regulating Plate shall be installed at inlet connection according to manufacturer's instructions.

(19) Painting—All exposed piping in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed by architect. Radiators shall be painted as directed by architect. All pipe joints and all uncovered piping in basement, front and other exposed parts of boiler shall be painted one coat of black asphaltum when the system is hot and under a vacuum. The finishing coat of paint must be applied when the entire system is under vacuum, so that the paint will fill up small leaks.

(20) Covering—Cover all steam mains and spring pieces with 4-ply, 1 in. thick asbestos sectional covering and fittings with asbestos cement. Cover all steam and return risers and other piping run concealed in outside walls with two-ply, ½ in. thick asbestos sectional covering. Cover boiler as specified by boiler manufacturer.

(21) Finishing Up—After system has been in operation two weeks, thoroughly blow down and clean out system as follows:

Remove the safety valve and connect a temporary blow-off pipe to the safety valve tapping, extending it outside or to some suitable drain. Shut off all radiator valves or valves in main. Fill boiler with water to top of gauge glass. Build a very hot fire and blow steam and water out through safety valve tapping and pipe connected thereto. Fire hard with not more than 10 lbs. pressure on boiler. Supply cold water constantly in at bottom of the boiler. Continue this for six hours. At the end of the period, close water feed valve, draw fire quickly, open blowoff at bottom of boiler and entirely drain boiler, replace the safety valve. Fill boiler slowly after it becomes cold. Remove cover of each trap and wipe off grease and dirt accumulations. Replace trap cover tightly on body.

(22) Test—The System when finished and cleaned shall be tested for tightness by filling it with water to its very top. The water shall be left standing in the system at least four hours after all leaks have been made tight, when final test and inspection in presence of Dunham Representative shall be made for leaks. The contractor must take precaution to guard against damage from freezing during test.

(23) Guarantee—The Heating Contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise, with a vacuum of 15 ins. in steam main. If apparatus shall fail to accomplish this guarantee by reason of any defect developing within period of one full heating season and that defect is due to faulty material or poor workmanship, the Heating Contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

(24) Finally—Nothing herein contained can be construed to relieve the Heating Contractor from making good and perfect work in all usual details of construction, and he will be held responsible to provide and furnish necessary material and to perform all necessary labor and to bear all expenses incidental to the satisfactory completion of the work.

DUNHAM CONCEALED RADIATORS

Type "L" Concealed Radiator

Type "L" Concealed Radiator replaces the bulky, antiquated, cast iron heater, so unsightly in any room. Installed behind the walls of a home or office building, it allows the space formerly occupied (and made unusable) by the cast iron radiator to become as utilitarian as the other parts of a room.

Radiators are made in a complete range of sizes, to meet every condition. They are designed throughout along the most advanced scientific lines. A choice of grille designs and radiator enclosures will appeal to the architect and builder.

Orifice regulation of steam supply is a necessity for modern circulation systems, so a special *adjustable* regulating fitting is available for the Type "L" Concealed Radiator. This fitting is easily adjusted, and may also be used as a valve to close off steam supply when trap is being cleaned. Pipe connections are greatly simplified, and every precaution has been taken to aid the steamfitter in his work.

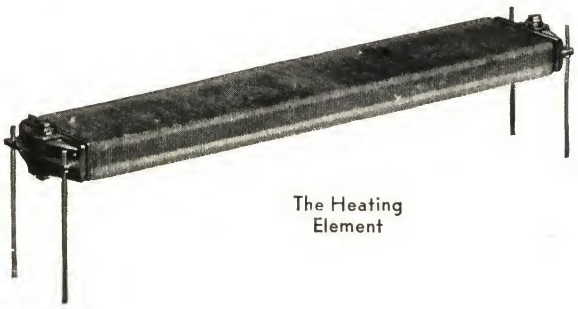
The Heating Element

The heating element is built for lifetime service. It consists of seamless drawn copper tubes and pure copper fin sheets metallically attached. This feature assure permanence of heating capacity as no dirt, dust, or oxidation can insulate the contact between tube and fin.

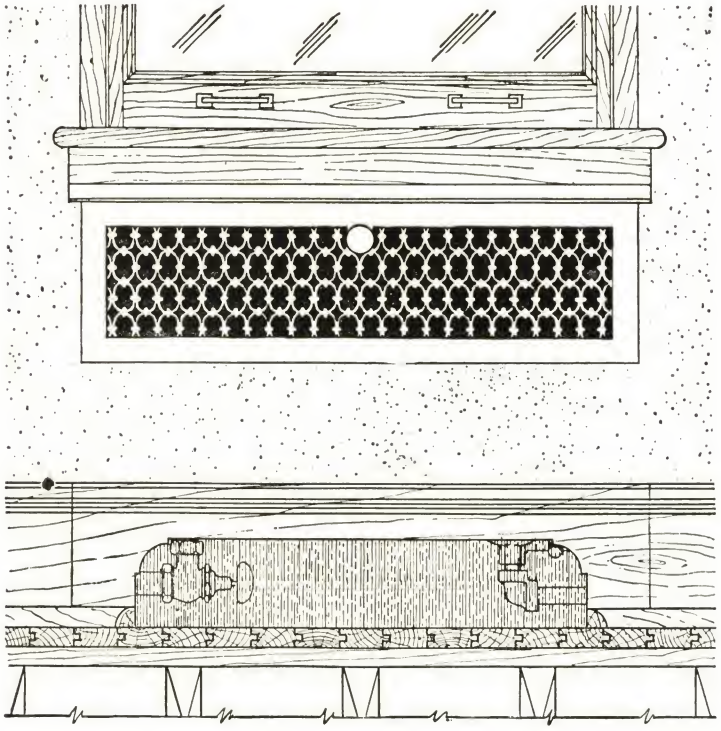
The tubes are airfoil in shape, to offer the least resistance to the convection of air. They are individually brazed into an extra heavy die-pressed copper tube sheet which is swaged and then brazed over a one-piece reinforced bronze casting. The result is a homogeneous structure.

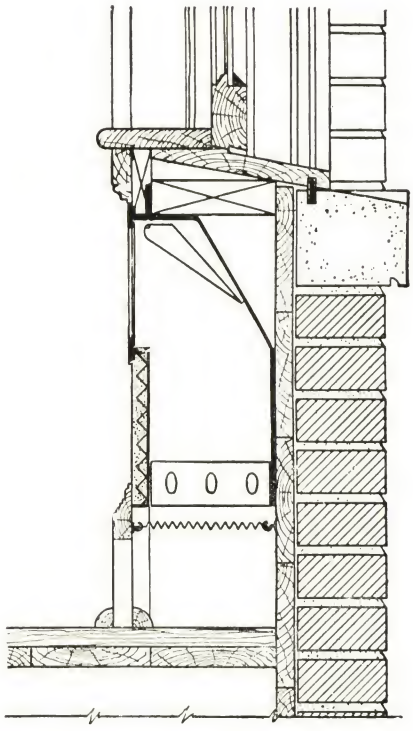
Each element is given careful inspection and a steam and hydraulic test before shipment from the factory.

Heating elements are removable from the enclosure (in case of necessity) through the air inlet opening.



The Heating Element





Enclosures

Enclosures are built of heavy sheet steel, substantially reinforced, and of proper design to offer the least impedance to air flow.

Metal panel fronts of highly finished furniture steel, and panels for plaster front are available with or without recess linings.

Grilles are of heavy perforated metal welded to one-piece bar frames.

Dampers to control the air flow as desired are optional.

The drawing above indicates the appearance of the complete installation, and the sectional view illustrates the application of the panel for plaster front, with recess lining and damper. An inlet grille may be substituted for the cut-out removable baseboard section shown.

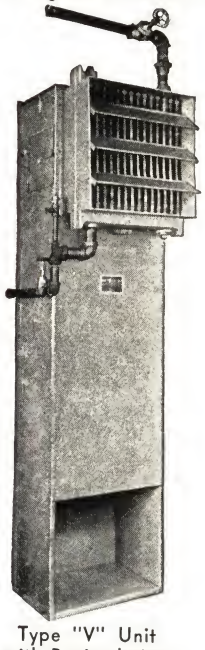
DUNHAM-BUILT DWYER UNIT HEATERS

Dwyer Unit Heaters are manufactured in four distinct types in a range of sizes broad enough to meet all requirements.

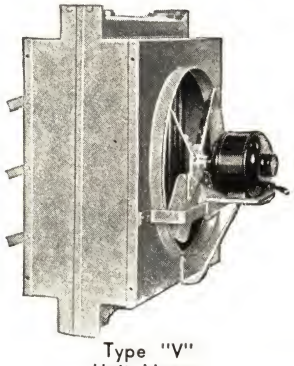
Type "V"

A simple compact design, in sizes up to 1,132 sq. ft. of equivalent direct radiation. The all-aluminum fan mounted directly on the motor shaft forces the room air through the radiator, and the warmed air is deflected up or down by individually adjustable louvres.

Light in weight, the unit may be hung from the roof joists by ordinary pipe hangers, from the wall with wall brackets, or from a column or post. When equipped with a recirculating duct the heating efficiency is greatly increased. The cooler air near the floor is drawn into the unit allowing the warmer air to settle down into the working zone.



Type "V" Unit with Recirculating Duct

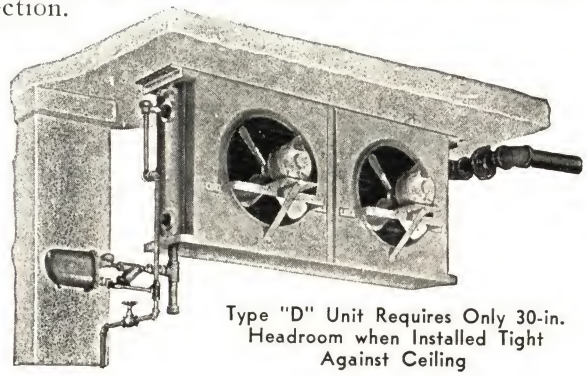


Type "V" Unit Heater

Speed control of the electric motors, which is available for all current characteristics, particularly adapts the Type "V" Unit to retail stores, offices, showrooms, etc., in addition to an unlimited application for small factories, garages, and lofts.

Type "D"

This is equipped with two fans and two motors, although having but one radiator. It is really two units in one. Motors may be connected, if so desired, to operate independently instead of simultaneously. With only one motor in operation, the capacity of the unit is approximately 60 per cent of the full rated capacity. Type "D" units are manufactured in sizes up to 2,360 sq. ft. of equivalent direct radiation, yet require only one steam supply and one return connection.

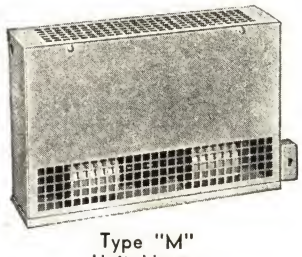


Type "D" Unit Requires Only 30-in. Headroom when Installed Tight Against Ceiling

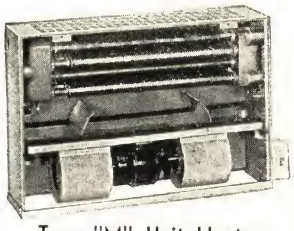
Every Dunham-built Dwyer Unit Heater is built around the time-proven Dwyer Radiator, constructed of seamless drawn copper tubes to which continuous helical copper fins are metallically attached. The tubes are assembled into semisteel cast headers at each end by means of brass clamping nuts, forming screwed ground joints. This feature permits of the removal and replacement of any tube or number of tubes (in the event of damage) without breaking any piping connections.

Type "M"

A compact cabinet-type heating unit, quiet in operation, efficient and soundly constructed for lifetime service. Its pleasing appearance and self-contained operating parts, its silent yet positive action, adapt it to offices, stores, showrooms and basements, where a maximum quantity of heat is required in a minimum amount of space available.



Type "M" Unit Heater

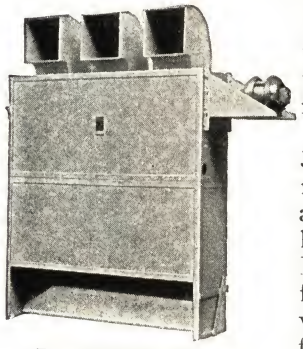


Type "M" Unit Heater with Front Panel Removed for Inspection

The unit is universal in application, and may be installed on the floor, inverted and attached to the wall, or it may be installed behind the walls, breathing the air through grilles. Type "M" Unit Heaters range in sizes from 100 to 300 sq. ft. of equivalent direct radiation.

Type "R"

This heater utilizes backward pitched, centrifugal housed fans in tandem formation to draw air through the radiator, and to discharge it, usually at a high velocity, over the heads of the occupants of the building.



Type "R" Unit Heater, Floor Type

Ranging in size up to 3,350 sq. ft. of equivalent direct radiation, these units are primarily intended for larger industrial buildings. By controlling the speed of fans, they become ideal for ventilating and heating offices, auditoriums, and gymnasiums.

All parts are instantly accessible. The electric motor, self-aligning, dustproof ball bearings, and flexible coupling, are installed outboard. The radiator slides in and out through either end, like a drawer. The complete fan assembly is removable through the top of the unit.

Discharge cowls are square and may be set in any of the four directions. The unit may be installed on the floor, hung on the wall upright, or inverted, or flat against the ceiling. Only one steam supply and one return connection are required.

GRINNELL COMPANY, INC.

MANUFACTURERS AND CONTRACTORS

Grinnell Equiflo Valve for Forced Hot Water Heating

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CLEVELAND, OHIO (Branch)
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LOS ANGELES, CAL. (Branch) SAN FRANCISCO, CAL. (Branch) OAKLAND, CAL. (Branch) SEATTLE, WASH. (Branch)

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Products

EQUIFLO VALVE.

The Grinnell Company Products also include Sprinkler Systems, Thermolier Unit Heaters, Thermoflex Heating Specialties, Pipe Fittings, Fabricated Pipe, and Pipe Hangers—for these products, see Manufacturers' Index.

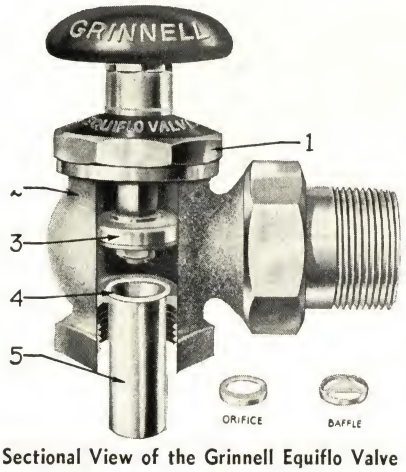
Grinnell Service

A half century of experience stands in back of all Grinnell Products, the benefits of which we offer freely as consultants in any matter pertaining to the use of our products. At each of our sales offices will be found an engineering staff ready to aid in the solution of problems in the various fields of industry covered by the Grinnell Company.

GRINNELL EQUIFLO VALVE FOR FORCED HOT WATER HEATING

The designing of forced circulation hot water heating systems is so simplified by the Grinnell Equiflo Valve that they can be laid out and installed as easily as vapor or steam systems. This valve consists of a regular type packless radiator valve, with a cartridge or tube made up of a series of orifices and baffles capable of setting up any required frictional resistance. This method of establishing any desired resistance does away with elaborate calculation of pipe sizes.

This unit should not be confused with any type of throttle valve, because the resistance established in each Equiflo Valve is carefully predetermined and is non-adjustable. This simple method of establishing proper frictional resistance does away entirely with the elaborate calculation of pipe sizes which previously has limited the use of forced hot water systems in spite of their unquestioned superiority over other types of systems in certain classes of buildings. More than this, the Grinnell Equiflo Valve gives more exact equalization than was humanly possible through pipe sizing.



Sectional View of the Grinnell Equiflo Valve

Guarantee — Grinnell guarantees perfectly balanced circulation to each and every radiator where these valves are installed throughout the system.

A Few Equiflo Valve Installations

Installation	Location	Number of Valves
Walter Reed Hospital	Washington, D. C.	1900
Governor's Island Barracks	New York, N. Y.	676
Girard College	Philadelphia, Pa.	1000
Ann Manor Apts.	Toledo, Ohio	307
St. Edwards Seminary	Seattle, Wash.	253
St. Francis Hospital	Jersey City, N. J.	380
Packard Motor Car Co.	Detroit, Mich.	226
Christian R. Holmes Hospital	Cincinnati, Ohio	224
Evangelical Deaconess Hospital	Cleveland, Ohio	236

Thermoflex

HEATING SPECIALTIES

GRINNELL COMPANY INC.

GRINNELL COMPANY, INC.

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BOSTON, MASS.	DALLAS, TEX.	MINNEAPOLIS, MINN.	ST. LOUIS, MO.
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GRINNELL COMPANY OF THE PACIFIC

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Thermoflex

● Thermoflex Specialties

Thermoflex Heating Specialties consist of Radiator Traps, Blast Traps, Packless Radiator Inlet Valves, Alternators, Vent Traps, Damper Regulators, Lift Adapters, Compound Gauges and Strainers.

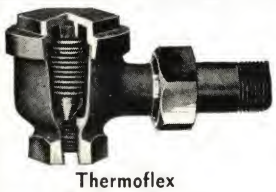
They are used on all forms of pressure steam heating, vapor and vacuum systems, and on steam systems for the generation of heat for industrial purposes of great variety.

The uses and adaptability of Thermoflex Heating Specialties are set forth in the following pages by diagrams and descriptions together with full information as to sizes, capacities, etc.

● Application of Thermoflex Specialties to Heating Systems

In the control of heat in steam heating systems, heat is being transmitted at points where condensation takes place, heat transmission and condensation vary in a certain proportion, and condensation in a system tends to create a vacuum and this tendency, under proper control, accelerates the flow of steam to replace it. Conditions which facilitate the flow of steam and cause it to condense only where heat is required, effect heating efficiency and economy of fuel consumption.

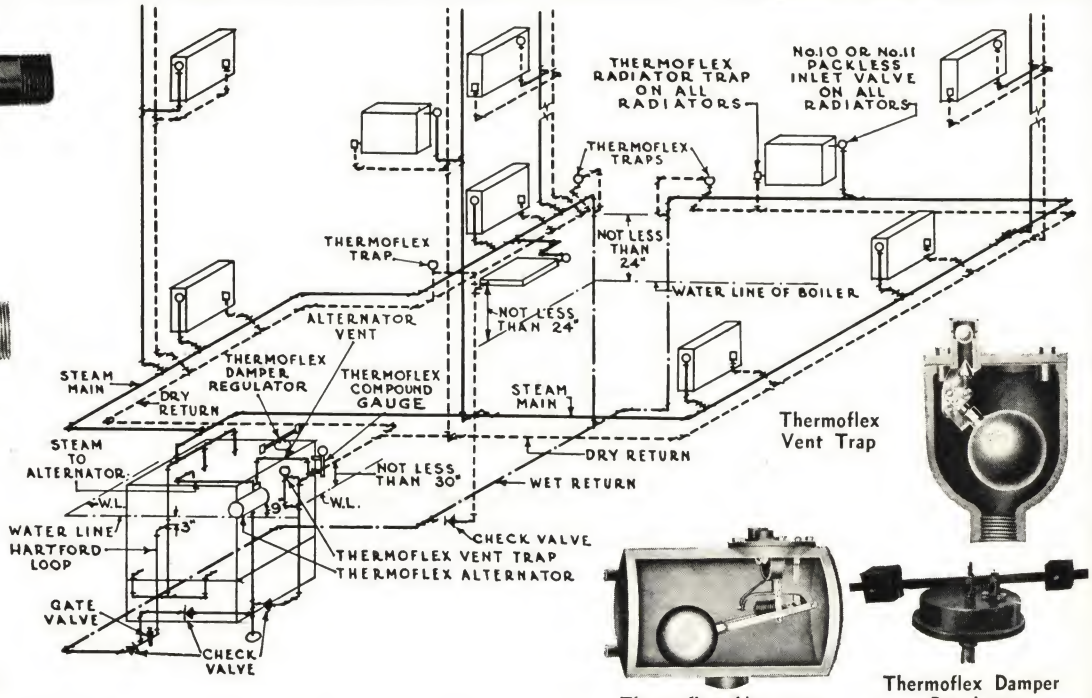
Thermoflex Specialties are designed to meet these conditions. Accompanying drawings show correct application to vapor, vacuum and pressure heating systems.



Thermoflex Radiator Trap No. 12

Thermoflex Radiator Inlet Valve No. 10

Thermoflex Compound Gauge



Thermoflex Vent Trap

Thermoflex Alternator

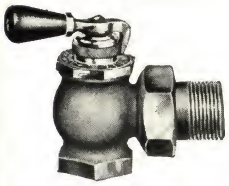
Thermoflex Damper Regulator

TYPICAL VAPOR HEATING SYSTEM USING THERMOFLEX SPECIALTIES

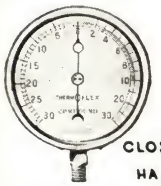
Thermoflex

TYPICAL LAYOUT OF VACUUM HEATING SYSTEM

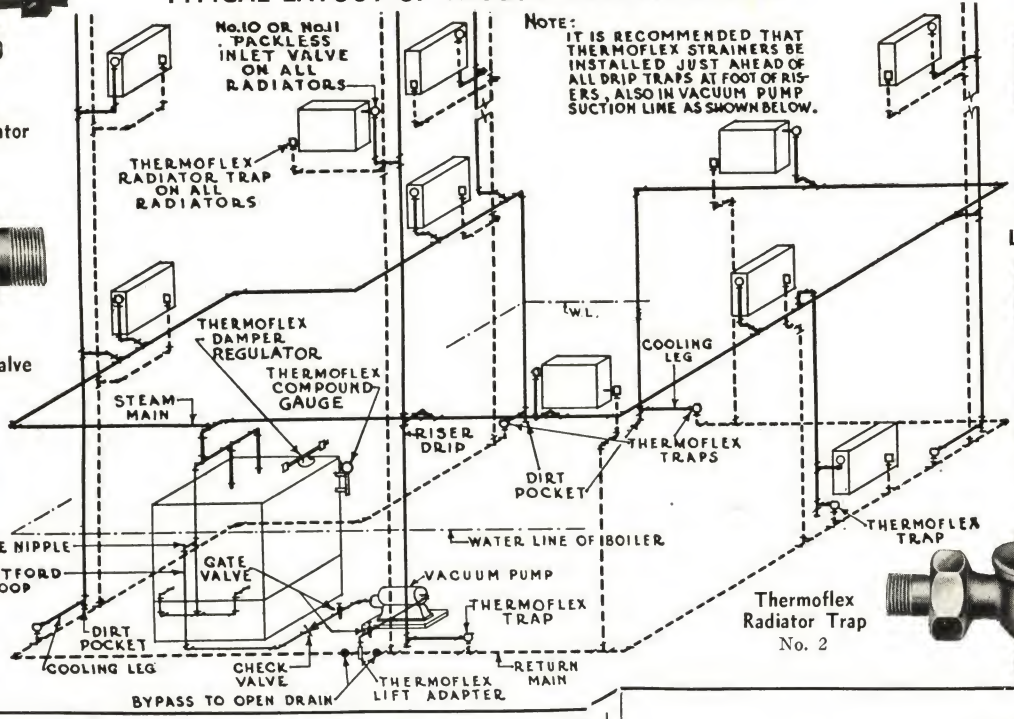
Thermoflex Damper Regulator



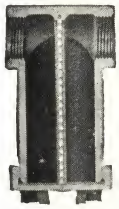
Thermoflex Radiator Inlet Valve No. 10



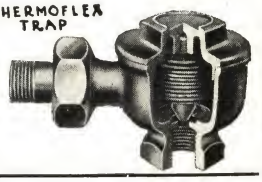
Thermoflex Compound Gauge



Thermoflex Lift Adapter



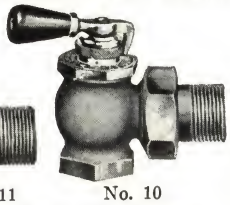
Thermoflex Strainer



Thermoflex Radiator Trap No. 2

TYPICAL LAYOUT OF PRESSURE HEATING SYSTEM

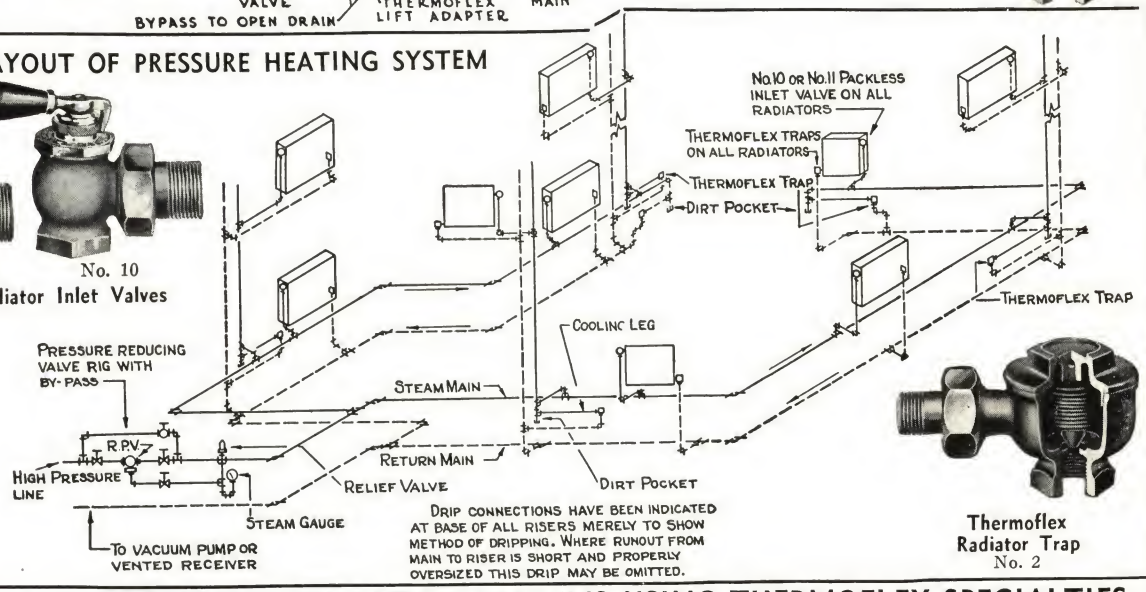
No. 11



No. 10

Thermoflex Radiator Inlet Valves

Thermoflex Strainer



Thermoflex Radiator Trap No. 2

TYPICAL VACUUM & PRESSURE HEATING SYSTEMS USING THERMOFLEX SPECIALTIES

TRAPS AS APPLIED TO GRINNELL THERMOLIERS

Typical Connections for Thermoliers for Vacuum and Vented Return Gravity, Heating Systems.

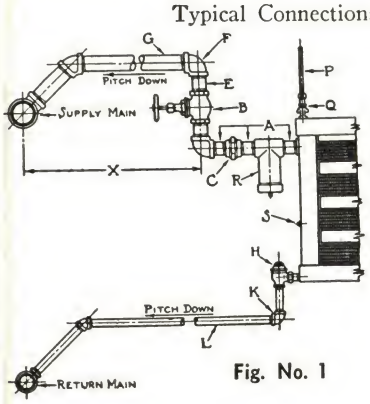


Fig. No. 1

Fig. No. 1

For equipments where distance "X" is less than 10 ft.

Fig. No. 2

For equipments where distance "X" is more than 10 ft.

*SCHEDULE OF TRAPS "H" FOR THERMOLIERS

Thermolier		100 100-A	200 200-A	300 300-A	400 400-A	600 600-A	800 800-A	1200 1200-A	1600 1600-A
Trap	Size	½ in.	½ in.	¾ in.	¾ in.	¾ in.	¾ in.	1 in.	1¼ in.
	No.	2	2	2	2	3 or 4	3 or 4	4	4

*Due to patented Internal Cooling Leg in the Thermolier, the above recommended trap sizes when used with Thermoliers have greater capacity than their standard rating would otherwise allow.

Note: Trap "J" should be ½ in. in all cases.

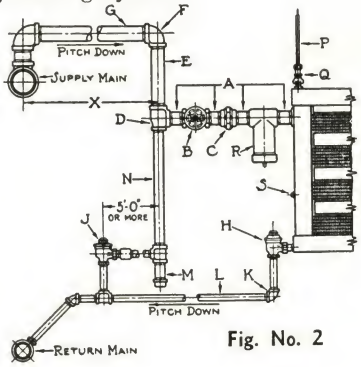


Fig. No. 2

Thermoflex
THE MANUFACTURE OF THERMOFLEX TRAPS

Exacting Standards

After fifty years of varied heating experience with both low and high pressure systems, in which every known type of trap has been employed, Grinnell Company has discovered the one trap which meets its exacting standards of manufacture and performance. This trap, together with other heating accessories employing the same principles, is now offered by Grinnell Company as exclusive distributor. This assures Grinnell service and engineering co-operation to those who wish to avail themselves of it.

The Vital Part of Thermoflex Traps—The Bellows

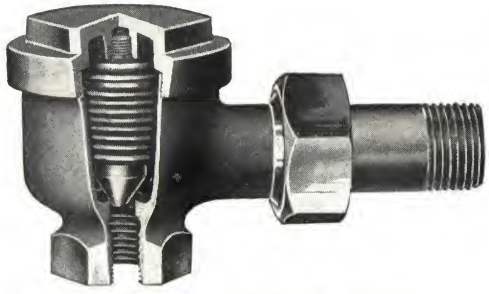
● Description

The Thermoflex is distinguished from all others by its Hydron Bellows—the heart of the trap. The bellows are formed by internal hydraulic pressure only. Hence it is tested automatically in the process of making to several hundred pounds pressure—many times the recommended working pressure. The outstanding advantages in construction and operation of the Hydron Bellows are discussed below.

The Hydron Bellows

● Operation

The principle in the operation of the Hydron Bellows is the opening and closing of the port by thermostatic action. When air or water is present in or enters the trap the bellows contracts, thus opening the outlet port, permitting the air and water to escape into the return line. Upon the entry of steam into the trap the bellows expands, seating the valve and preventing the escape of steam into the return line. The automatic action assures free and rapid venting and a radiator filled with steam at all times.



Showing Position of Bellows in Trap

Structural Features

With the Hydron process, the end fittings are attached to the tubing before the hydraulic forming of the bellows so that not only is the tubing itself proof-tested in the making, but the same thing is true of the one soldered joint. Any weakness of any nature whatever, either in the tubing or in the soldering of the fittings, will permit the internal pressure to rupture the tubes and break open, thereby destroying the defective unit before it ever becomes a bellows.

Filling with Volatile Liquid—Another advantage of the Hydron Bellows lies in the development of a new and efficient patented method of filling and sealing, which renders practically impossible any loss of the volatile liquid through the filling passage.

High Quality of Tubing Used—Owing to the patented hydraulic manufacturing process, tubes of exceptionally high quality are necessary. Tubes which are suitable for the average bellows cannot be used in making the Hydron, as the hydraulic method requires that the walls of the tubes be uniform in wall thickness and entirely free from surface imperfections, impurities, hard spots, pin holes, or other hidden defects.

Such tubing has been developed only by the rigid control of every manufacturing operation, from the melting and casting into the ingot of the virgin metals, to the final drawing and finishing operation.

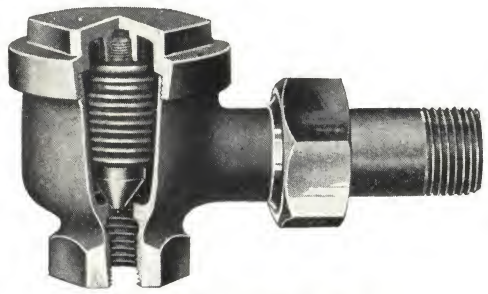
From drawn tubing of such high quality as a foundation, the Hydron is made, and while the original cost of such tubing is considerably more, the forming process used in making the bellows is so much more economical that we are able to offer the Hydron Bellows at no greater cost than the ordinary bellows.

The high internal forming pressure permits the metal to flow freely and without restriction, which materially lengthens the life of the Hydron Bellows.

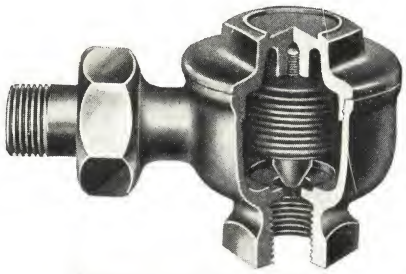
A further advantage of the Hydron is its entire freedom from tool marks or scratches since it is formed without rolling, rubbing, or spinning action of any kind. The result is that the metal in the finished bellows is remarkably uniform in thickness, metallurgical structure, and physical properties throughout every part of each convolution. This is absolutely essential to a good bellows and is a feature exclusive with the Hydron.

Thermoflex

RADIATOR TRAPS



Radiator Trap No. 12—Angle



Radiator Trap No. 2—Angle

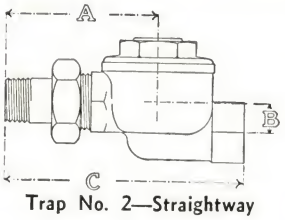
Radiator Traps No. 12 and No. 2

Specify For—Pressure steam heating (up to 25 lb.) vapor, vacuum and all systems where traps are used, on every radiator outlet. Also for drips on drop-feed run-outs.

Models—No. 12 is made in angle, right-hand corner and left-hand corner patterns, one size only, ½-in. inlet—½-in. outlet.

No. 2 is made in angle, straightway and offset patterns (for offset, see Page 5) and in two sizes, ½-in. inlet, ¾-in. outlet and ¾-in. inlet, ¾-in. outlet.

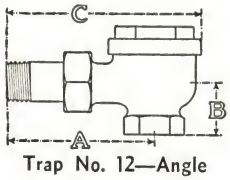
Note that while the ½-in. No. 12 and the ½-in. No. 2 have the same capacity, the body of the ½-in. No. 2 is larger due to the fact that it is tapped ¾-in. on the outlet.



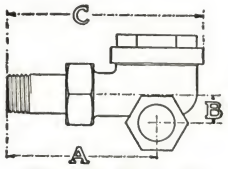
Trap No. 2—Straightway

Action—Thermostatic in operation, the highly sensitive Thermoflex-Hydron Bellows remains off its seat while passing air and water through the body, but closes instantly against the passage of steam, thus assuring at all times a radiator filled with steam. The large area outlet port assures rapid and efficient drainage and also freedom from trouble caused by dirt and scale.

Specifications—Bodies are heavy all-bronze construction with union, fully nickel plated with highly polished trimmings. Cover and tailpiece are hot forged, having twice the strength of a casting and will not split or stretch. Thermostatic bellows is a full eight fold Thermoflex-Hydron, automatically Tested-During-Manufacture.



Trap No. 12—Angle

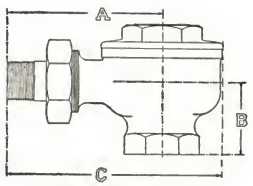


Trap No. 12—L. H. Corner
(R. H. not shown)

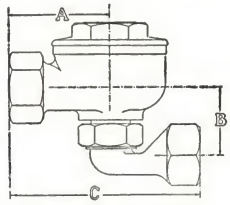
LIST PRICES, CAPACITIES AND DIMENSIONS

Size and No.	List Prices	Inlet	Outlet	Capacity, sq. ft.	A	B	C
½-in.—No. 12 Angle	$ 7.00	½	½	200	3¼	1⅛	4¼
½-in.—No. 12 R.H. cor	7.00	½	½	200	3¼	⅝	4¼
½-in.—No. 12 L.H. cor	7.00	½	½	200	3¼	⅝	4¼
½-in.—No. 2 Angle	8.50	½	¾	200	3¼	1½	4½
½-in.—No. 2 Straightway	8.50	½	¾	200	3¼	⅝	5¼
½-in.—No. 2 Offset	8.50	½	¾	200	2¼	1⅝	4½
¾-in.—No. 2 Angle	12.00	¾	¾	500	3½	1½	4¾
¾-in.—No. 2 Straightway	12.00	¾	¾	500	3½	⅝	5½
¾-in.—No. 2 Offset	12.00	¾	¾	500	2¼	1⅝	4½

Capacities are given in sq. ft. of direct cast iron radiation or its equivalent.



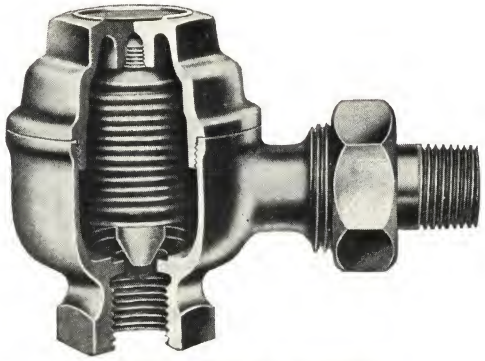
Trap No. 2—Angle



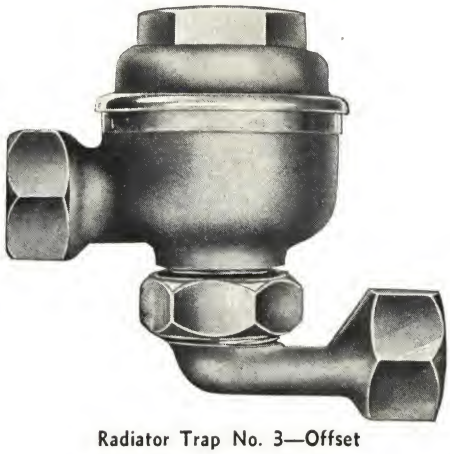
Trap No. 2—Offset

Thermoflex

HIGH DUTY RADIATOR TRAP



Radiator Trap No. 3—Angle



Radiator Trap No. 3—Offset

Radiator Traps No. 3—Angle, Straightway and Offset

Specify For—Vacuum, vapor or pressure steam heating (up to 25 lb.)

(1) For connection to every radiator.

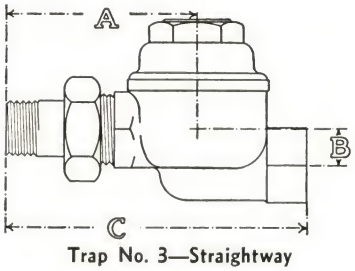
(2) For drips at bottom of risers.

(3) For drips on drop-feed run-outs.

(4) For return connection to Thermolier—the Grinnell Unit Heater (see Page 2 carrying schedule of traps for Thermoliers, typical connections, etc.).

Action—High Duty Thermoflex Traps No. 3 are thermostatic in operation and are similar to, but have greater capacity than the No. 12 and No. 2 Traps (see Page 4), as will be noted by comparison of the tables at bottom of the pages.

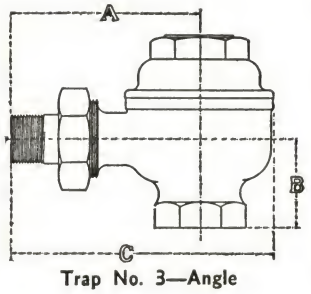
They can be used for special conditions where the service is continuously severe and meet the demands of those engineers who, regardless of price, want over-capacity together with an article which will give super-service.



Trap No. 3—Straightway

Specifications—Heavy all bronze body with union. Fully nickel plated with highly polished trimmings. Hot forged union nut which will not split or stretch. Full twelve-fold Hydron Bellows, automatically Tested-During-Manufacture.

No. 3 Offset Trap—Attention is called to the special patented feature of the No. 3 Offset Trap. The union swivel connection being placed on the discharge side of the trap enables return piping to be connected to trap from any angle desired. Connection is made on inlet end with a nipple. This offset feature is also available for the No. 2 Radiator Trap shown on Page 4.

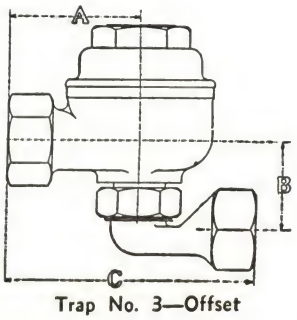


Trap No. 3—Angle

LIST PRICES, CAPACITIES AND DIMENSIONS

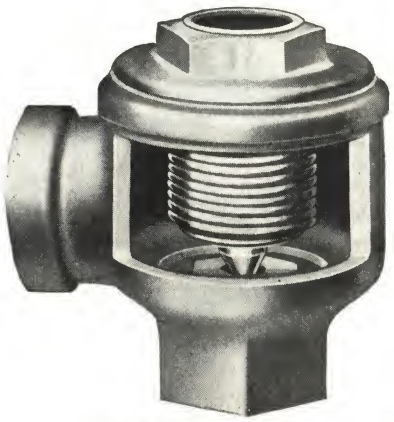
Size and No.	List Prices	Inlet	Outlet	Capacity, sq. ft.	A	B	C
½-in.-No. 3 Angle	$10.00	½	¾	350	3¼	1½	4½
½-in.-No. 3 Straightway	10.00	½	¾	350	3¼	⅝	5¼
½-in.-No. 3 Offset	10.00	½	¾	350	2¼	1⅝	4½
¾-in.-No. 3 Angle	13.50	¾	¾	800	3½	1½	4¾
¾-in.-No. 3 Straightway	13.50	¾	¾	800	3½	⅝	5½
¾-in.-No. 3 Offset	13.50	¾	¾	800	2¼	1⅝	4½

Capacities are given in sq. ft. of direct cast iron radiation or its equivalent.



Trap No. 3—Offset

Thermoflex
IRON BODY TRAP
No. 4



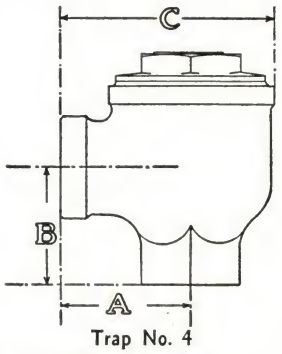
Iron Body Trap No. 4

Specify For—Vacuum, vapor or pressure steam heating (up to 25 lb.). On drips of supply mains and risers, pipe coils, Thermoliers (the Grinnell Unit Heaters), unit ventilators, etc. Also for return connection to dryer coils, process kettles and for other industrial uses where pressures of steam used do not exceed 25 lb. There are many places in heating and industrial steam work where this I. B. (Iron Body) Trap at a lower price, but with all of the other valuable features of the No. 3 High Duty Trap (shown on Page 5), will be found most satisfactory.

Models—One pattern, angle only *without* union and in three sizes, ¾, 1 and 1¼-in. inlet and outlet, respectively.

Action—Thermostatic in action the same as the No. 3 High Duty Radiator Trap and with same capacity for the ¾-in. size; the 1 and 1¼-in. sizes have correspondingly greater capacities. This I. B. Trap and also the No. 3 High Duty Trap with their extra long (12-fold) bellows have high lift which, combined with the large orifice, provide not only unusual capacity but freedom from dirt and scale troubles.

Specifications—Cast iron body, finished in gray lacquer, with bronze cap and inserted renewable bronze seat in body. Full twelve-fold Thermoflex-Hydron Bellows, automatically Tested-During-Manufacture.



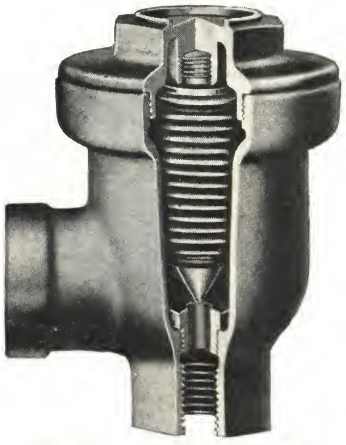
Trap No. 4

LIST PRICES, CAPACITIES AND DIMENSIONS—NO. 4

Size and No.	List Prices	Inlet	Outlet	Capacity sq. ft.	A	B	C
¾-in.-No. 4	$11.00	¾	¾	800	2¼	2	3¾
1 -in.-No. 4	16.75	1	1	1350	2½	2⅛	4¼
1¼-in.-No. 4	20.00	1¼	1¼	1800	2¾	2¼	4½

Capacities are given in sq. ft. of direct cast iron radiation or its equivalent.

HIGH PRESSURE TRAP
No. 100



High Pressure Trap No. 100

Specify For—Working steam pressures from 25 to 125 lb. for use on hospital sterilizers, kitchen equipment, laundry machinery, vulcanizers, drying ovens and kilns, street steam service, Thermoliers, etc. This thermostatic type of trap is rapidly growing in use for these working pressures, because of simplicity of working parts and operation, and therefore, long life. Small in size, light in weight and easily installed.

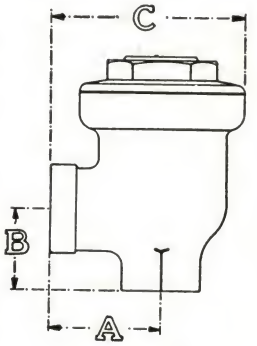
Models—One pattern, angle only without unions. Three sizes, ½, ¾ and 1-in. inlet and outlet respectively. All fully nickel plated.

Action—Thermostatic in operation, closing against escape of steam and allowing free venting and rapid draining.

Caution—These traps being thermostatic in operation must always be installed so that they discharge into a return line or receiver which is vented to atmosphere. They will not operate with a back pressure in the return line or against a head.

Not suitable for use where the total steam temperature exceeds 400° F. When discharging into a vacuum return, provision should be made for properly cooling the condensate.

Specifications—Extra large bodies with stainless steel renewable seats, fully nickel plated. Special Thermoflex-Hydron Bellows automatically Tested-During-Manufacture and fitted with a nitrided steel valve which will not rust and cannot wear. Can also be furnished with unions, chromium plated, polished nickel, etc., at extra cost.



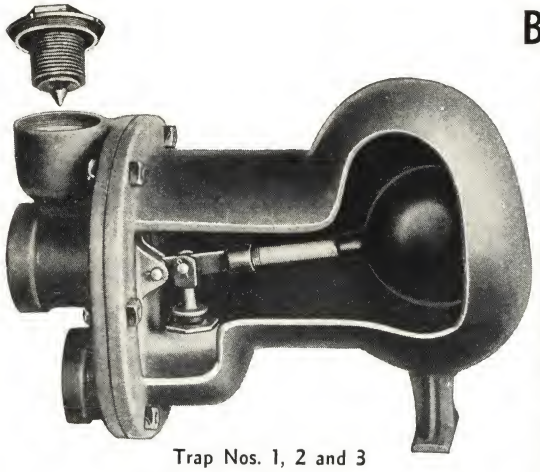
Trap No. 100

LIST PRICES, CAPACITIES AND DIMENSIONS—NO. 100

Size	List Prices		Inlet	Outlet	Capacity lb. per hr.	A	B	C
	Plain nickel	Polished nickel or chromium						
½	$15.00	$16.50	½	½	500	1¾	1¼	3
¾	20.00	21.50	¾	¾	650	2¼	2	3¾
1	25.00	26.50	1	1	800	2½	2⅛	3⅞

Above capacities are given in lb. of water per hr. at 25 lb. pressure.

Thermoflex
BLAST TRAPS

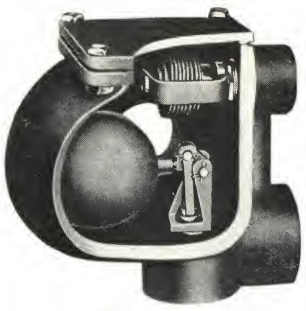


Trap Nos. 1, 2 and 3

Specify For — All types of unit heaters, cast iron and light weight types of hot blast radiation; hot water storage tanks and generators, large supply mains and risers, dryer coils, etc.; especially for handling large quantities of condensate.

Models—No. 0 differs from Nos. 1, 2 and 3 in shape of body only. All sizes made in two pressure ranges, 0—25 lb. and 25—100 lb.

Action—Is combined float and thermostatic, water being normally handled by large capacity ball float and valve and air vented through thermostatic by-pass. In flood conditions water is also handled through by-pass. The Thermoflex-Hydron Bellows on by-pass prevents air binding of trap, allows free and rapid venting and no escape of steam into return line.

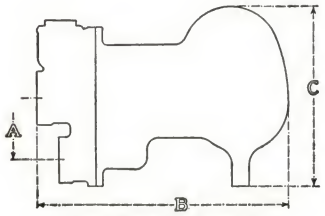


Trap No. 0

Specifications—Cast iron bodies with all working parts of bronze with high test seamless copper ball floats.

Bolted-on heads, easily accessible for inspection and cleaning.

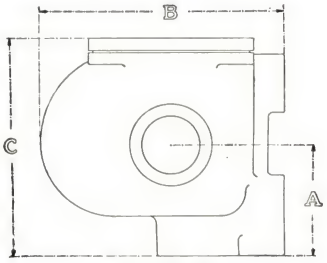
LIST PRICES, CAPACITIES AND DIMENSIONS



Trap Nos. 1, 2 and 3

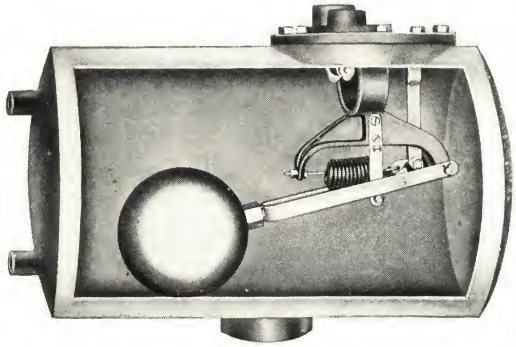
No. 0–25 lbs.	No. 25–100 lbs.	List Prices 0–25 lbs.	List Prices 25–100 lbs.	Inlet	Outlet	Capacity	A	B	C
0	0—1	$30.00	$35.00	2–1¼	2–1¼	650	3	6½	6
1	1—1	60.00	65.00	1	¾	1000	3½	14½	10
2	2—1	70.00	75.00	1¼	1	2000	3½	17½	10
3	3—1	85.00	90.00	1½	1¼	3000	3½	20½	10

Capacities given in lb. of water per hr. at 2 lb. pressure. Higher pressures give resultant higher capacities.



Trap No. 0

ALTERNATORS—VENT TRAPS

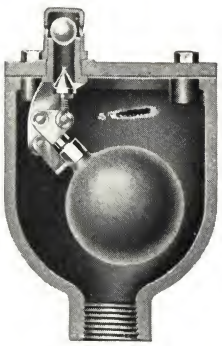


Alternator

Specify—The Alternator and Vent Trap, in combination on every vapor heating system to insure positive return of water to boiler under pressure conditions. Usually one Alternator is installed per job, but several Vent Traps may be used as deemed necessary for rapid venting according to layout.

Models—Alternator is made in one model and five sizes. Vent Trap in one model and two sizes.

Action—The accumulation of condensate in returns and in alternator body, due to a pressure on boiler, causes float to rise and at its high point opens live steam valve with a snap action, instantly equalizing pressure in alternator and allowing water to flow by gravity to boiler. As float drops to low position, it snaps closed the steam valve and opens vent of Alternator allowing Alternator to again fill. This is repeated so long as pressure on boiler continues. Meanwhile the Vent Trap is constantly venting air and closes should water reach it. It prevents return of air, once vented, allowing at times a vacuum to be carried in returns.



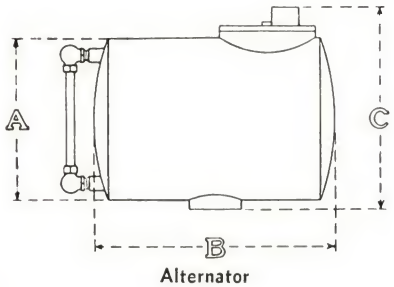
Vent Trap

Specifications—Alternators have steel bodies on all sizes. All working parts are bronze or stainless steel and design permits entire mechanism to be removed with head, allowing easy access.

Bodies tapped for water gauges. Gauges furnished extra on order. Vent Traps have cast iron bodies with bronze working parts.

Seamless high test copper ball floats used in both.

LIST PRICES, CAPACITIES AND DIMENSIONS

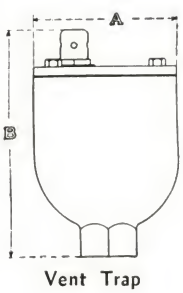


Alternator

Alternators No.	List Price	Steam Inlet, in.	Steam From boiler, in.	Water tapping, in.	Capacity	Dimen., in. A	B	C
0	$ 65.00	¾	1	1¼	1000	9	14	*
1	100.00	1	1¼	1½	2500	10½	16½	13
2	175.00	1	1½	2	6000	12½	18½	15
3	300.00	1½	2	2½	12000	16½	21½	22½
4	500.00	1½	2½	3	20000	20½	24½	26½

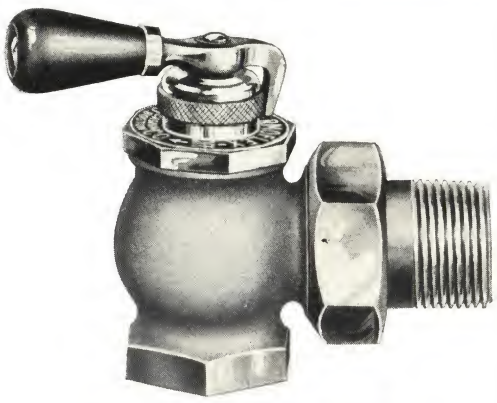
Vent Traps No.	List Price	Tapping, in.	Capacity	Dimen., in. A	B
30	$20.00	¾	800	2½	4
40	28.00	1	5000	4½	7

Capacities are given in sq. ft. of direct cast iron radiation or equivalent.
Capacities of Alternators are based on bottom of same being 9 in. above water line.
*No. 0 Alternator has steam and vent connections on end of tank (not illustrated).



Vent Trap

Thermoflex PACKLESS RADIATOR INLET VALVES



Inlet Valve No. 10—Lever Handle

Specify for—All types of direct radiators on vapor, vacuum and low pressure heating systems on the supply end of each radiator.

Models—Two models as illustrated, Lever Handle and Wheel Handle. The No. 10 and No. 11 Valves are identical, except for handle. Either lever or wheel is furnished as desired at same price.

Three body styles—Angle, Right Hand Corner and Left Hand Corner.

Action—For manual control only. Will fully open or close with less than one full turn of the lever or wheel.

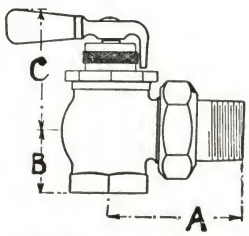
Specifications—All bronze construction, fully nickel plated with highly polished trimmings. Large dial plate, easily read.

Non-heating levers and wheels. Note the low bonnet construction which gives a very pleasing appearance.

Inlet Valve No. 11—Wheel Handle

Special Equipment—The No. 10 and No. 11 Valves can also be furnished with lock shields and various types of extended handles and stems.

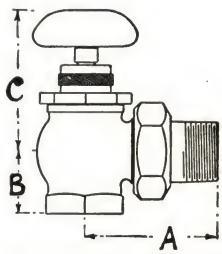
LIST PRICES, CAPACITIES AND DIMENSIONS



No. 10—Angle Pattern

Size	List Prices		Capacity Nos. 10 & 11	No. 10 Angle			No. 11 Angle		
	Nos. 10 & 11 Angle	Nos. 10 & 11 R.H., L.H.		A	B	C	A	B	C
½	$4.55	$ 6.70	0— 30	2¾	1⅛	2¼	2¾	1⅛	2¾
¾	5.30	7.45	31— 60	2¾	1⅛	2¼	2¾	1⅛	2¾
1	6.25	8.00	61—120	3⅛	1⅜	2⅜	3⅛	1⅜	2⅞
1¼	7.85	11.50	121—200	3½	1½	2¾	3½	1½	3¼

Capacities are given in sq. ft. of direct cast iron radiation with a pressure at the valve of 8 oz. A higher pressure on the supply or a vacuum on the return will give correspondingly higher capacities.



No. 11—Angle Pattern

SPECIAL ATTACHMENTS FOR PACKLESS RADIATOR INLET VALVES

Below we show Thermoflex Packless Inlet Valves with four types of Special Attachments:

No. 10-1. Standard Lock Shield Pattern.

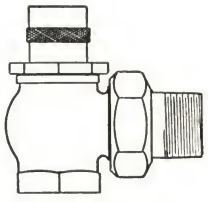
Nos. 10-2 and 11-2. Standard Vertical Extension.

No. 10-3. Special drop wheel which is flush with top of window seat or sill. Wheel is lifted up to operate valve and will automatically drop to flush position when released.

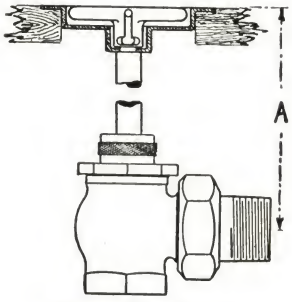
Nos. 10-4 and 11-4. Gear driven, 90 deg. extension where lever or wheel is desired on vertical face of a panel or wall.

All types furnished complete ready for installation.

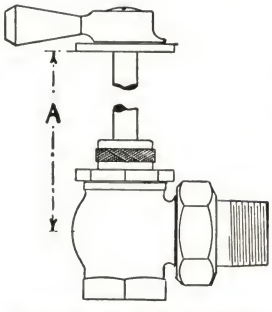
Note: Nos. 11-2 and 11-4 Wheel Handles, not shown.



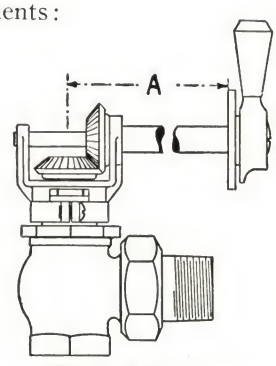
Lock Shield Type
No. 10-1



Flush Type Extension
No. 10-3



Standard Vertical Extension
No. 10-2



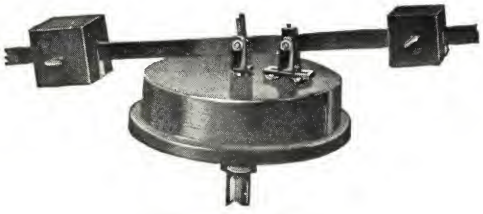
90° Angle Extension
No. 10-4

LIST PRICES

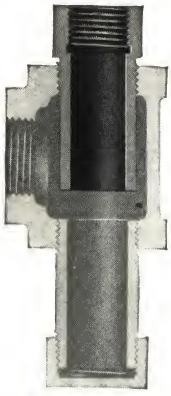
Size	Angle				Right or Left Hand Corner			
	*10-1	10-2 11-2	10-3	10-4 11-4	*10-1	10-2 11-2	10-3	10-4 11-4
½	$5.55	$ 7.55	$ 8.55	$10.55	$ 7.70	$ 9.70	$10.70	$12.70
¾	6.30	8.30	9.30	11.30	8.45	10.45	11.45	13.45
1	7.25	9.25	10.25	12.25	9.00	11.00	12.00	14.00
1¼	8.85	10.85	11.85	13.85	12.50	14.50	15.50	17.50

*Key for No. 10-1, list price, each $0.75.
Note: Other special offset extensions, etc., can be furnished upon special order. Prices upon application.
Important: Dimension "A" must be given with order.

Thermoflex
DAMPER REGULATORS—LIFT ADAPTERS—COMPOUND GAUGES



Damper Regulator



Lift Adapter

Compound Gauge

Specify—Thermoflex Damper Regulators for sensitive and accurate control of pressure on steam boilers using coal, oil or gas for fuel.

Thermoflex Lift Adapters for lifts in return lines on vacuum heating systems only.

Thermoflex Compound Gauges for accurate reading of pressures on steam boilers of all types.

Models—Damper Regulators in one model, and two sizes.

Lift Adapters in one model, seven sizes, in connection with straight size cast iron screwed tees. Compound Gauges in three sizes.

Specifications—Damper Regulators have cast iron case, large area metal diaphragms, fully enclosed and are furnished complete with rods, weights, chains and pulleys.

Lift Adapters, cast iron. Outlet is tapped one size smaller than fitting size, except 4-in. size which is tapped 3 in. on outlet.

Compound Gauges have cast iron case, bronze ring with T-handle cock. Retard type and very accurate.

LIST PRICES AND DIMENSIONS

Damper Regulators			Compound Gauges		
No.	Size diaphragm	List Price	No.	Size dial	List price
90	7	$42.00	80	5	$15.00
91	10	50.00	81	7	40.00
			82	8½	56.00

Lift Adapters

No.	*List Price	Fitting size	Adapter outlet	No.	*List Price	Fitting size	Adapter outlet
70	$3.00	1	¾	73	$ 6.00	2	1½
71	4.00	1¼	1	74	7.00	2½	2
72	5.00	1½	1¼	75	8.00	3	2½
				76	10.00	4	3

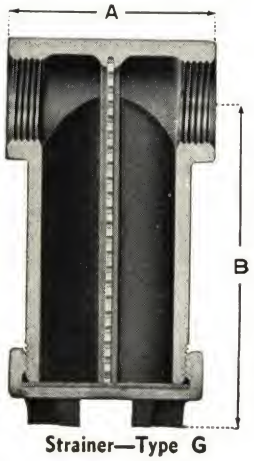
*List price covers Lift Adapter only; does not include fittings shown.
Lift Adapters must be used with straight size cast iron Tees. Reducing Tees *cannot* be used.

STRAINERS

Specify For—All drip points in steam supply mains and risers before all drip traps; before all blast traps, reducing valves and governors, and at all points necessary to protect specialties from dirt and scale.

Models—Two models as illustrated and sizes as listed.

Specifications—Cast iron bodies with bronze screens or baskets, screwed or flanged. Also with special screens or baskets of monel, stainless steel, etc., at extra cost.



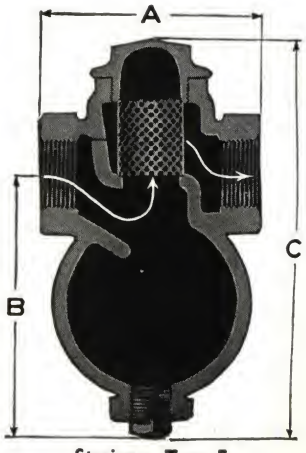
Strainer—Type G

LIST PRICES AND DIMENSIONS
Type G (screwed end only)

Size	List Price	A	B	Size	List Price	A	B
½	$4.25	2¼	3¼	1½	$ 7.00	4¾	7½
¾	4.70	3	4¼	2	11.80	5½	9½
1	5.50	3½	5½	2½	18.00	6½	11½
1¼	5.85	4	6½	3	30.00	7⅝	13⅝

Type F

Screwed end					Flanged end (std.)					
Size	List Price	A	B	C	Size	List Price	A	B	C	Dia. flg.
2½	$ 50.00	8½	10½	16	3	$ 75.00	11	11¼	16½	7½
3	67.00	8½	10½	16	3½	100.00	12	12	18½	8½
3½	92.00	10¾	12½	19½	4	125.00	13	12	18½	9
4	117.00	10¾	12½	19½	5	150.00	15	15	23	10
					6	210.00	16	16½	25¾	11



Strainer—Type F

Thermoflex

APPLICATIONS OF THERMOFLEX HEATING SPECIALTIES

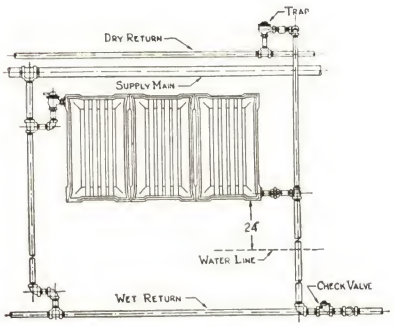


Fig. No. 1—Connections to Radiator Located Below Supply Main

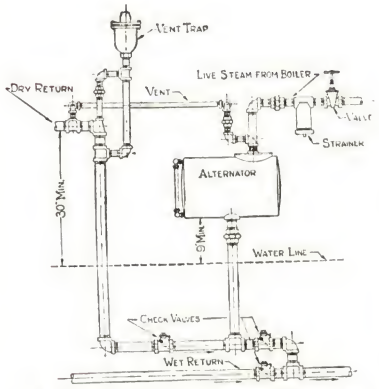


Fig. No. 2—Connections to Alternator and Vent Trap

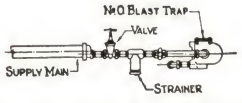


Fig. No. 4—Dripping End of Supply Main Through No. 0 Blast Trap. This Method Is Recommended on Vapor Systems Where a Dry Return Only Is Used

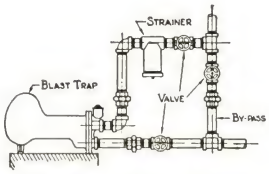


Fig. No. 6—By-pass Connections to Blast Trap

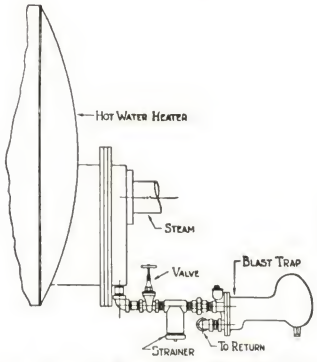


Fig. No. 7—Blast Trap Connections to Hot Water Heater

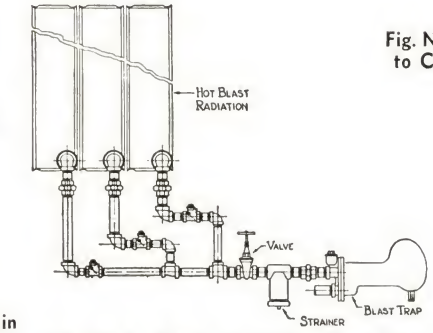


Fig. No. 8—Blast Trap Connections to an Indirect Hot Blast Heater

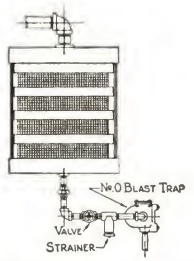


Fig. No. 9—Recommended Return Connections to Header to Header Type of Unit Heater

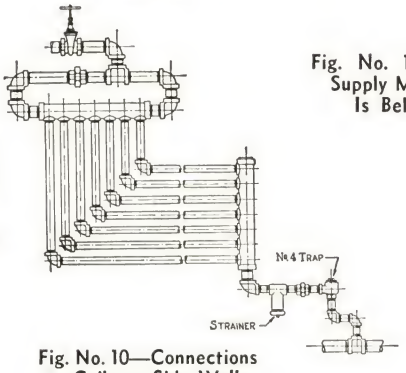


Fig. No. 10—Connections to Coils on Side Walls

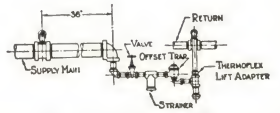


Fig. No. 11—Vacuum System—Dripping End of Supply Main to Return at Level of or Above Supply Main

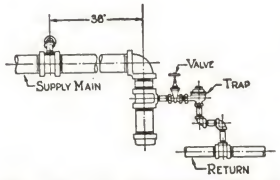


Fig. No. 12—Dripping End of Supply Main Where Return Is Below Supply Main

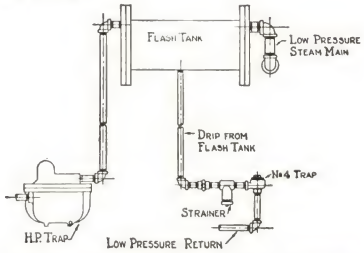


Fig. No. 14—Discharging High Pressure Trap to Low Pressure Return Using a Flash Tank

Further Information

Further information, including data sheets, illustrating the proper application of Thermoflex Specialties and heating systems, will be gladly supplied on application.

Other Grinnell Products

The Grinnell Company products also include Sprinkler Systems, Thermolier Unit Heaters, Equiflo Valves, Pipe Fittings, Fabricated Pipe and Adjustable Pipe Hangers. For these products see Manufacturers' Index.

Grinnell Service

A half century of experience stands in back of all Grinnell Products, the benefits of which we offer freely as consultants in any matter pertaining to the use of our products. At each of our sales offices will be found an engineering staff ready to aid in the solution of problems in the various fields of industry covered by the Grinnell Company.

HOFFMAN HEATING EQUIPMENT

INDEX TO USE AND DESCRIPTION OF HOFFMAN PRODUCTS

The Hoffman Specialty Company offers a complete line of Specialties and Equipment for the efficient handling of Steam, Air and Water in connection with all types of Heating Systems. Listed below are the types of systems most commonly used, together with a list of Hoffman Products adapted to each type.

One-Pipe Gravity Steam System

Product	Page
No. 1 Siphon Air Valves	3
Airport Air Valves	3
No. 4 Quick Vent Air Valves	3
No. 5 Quick Vent Float Air Valves	3
Valve Lock (for No. 1 Valves)	4

One-Pipe Gravity Vacuum System

No. 2 Siphon Air and Vacuum Valves	4
No. 6 Quick Vent Float Air and Vacuum Valves	4
No. 16 Quick Vent Vacuum Valves	4
Kompo Gage	4
Valve Lock (for No. 2 Valves)	4

Two-Pipe Vapor—Vacuum System
(Hoffman Controlled Heat)

No. 7 Modulating Valves	5
No. 8-A and 18-A Radiator Traps	6
Basement Specialties Consisting of:	
Differential Loop and No. 15 Valve	8
Kompo Gage	8
Traps for venting mains	7
Damper Regulator (for coal)	8

Two-Pipe Gravity System with Pump

No. 7 Modulating Valves	5
No. 19 Quick Opening Supply Valves	5
No. 8-A and 18-A Radiator Traps	6
No. 9-A and 10-A Traps	6 & 7
Hoffman-Economy Condensation Pumps	10

Two-Pipe Vacuum Pump System

No. 7 Modulating Valves	5
No. 19 Quick Opening Supply Valves	5
No. 8-A and 18-A Radiator Traps	6
No. 9-A and 10-A Traps	6 & 7
Hoffman-Economy Return Line Vacuum Pumps	9

High Pressure Systems
(0 to 100 lbs.)

No. 20 and 21 Thermostatic Steam Traps	9
Hoffman-Economy Condensation Pumps	10

HOFFMAN SPECIALTY COMPANY, INC.

MAIN OFFICE AND FACTORY

Waterbury, Conn.

General Sales Department: Chrysler Building, New York, N. Y.

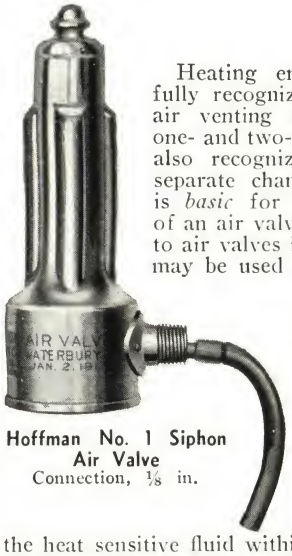
SALES REPRESENTATIVES IN PRINCIPAL CITIES

HOFFMAN VENTING VALVES FOR ONE OR TWO-PIPE GRAVITY STEAM SYSTEMS

Venting the Radiators

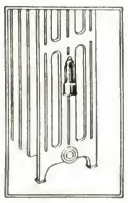
NO. 1 SIPHON AIR VALVE

The Perfect Air Valve



Hoffman No. 1 Siphon Air Valve
Connection, ⅛ in.

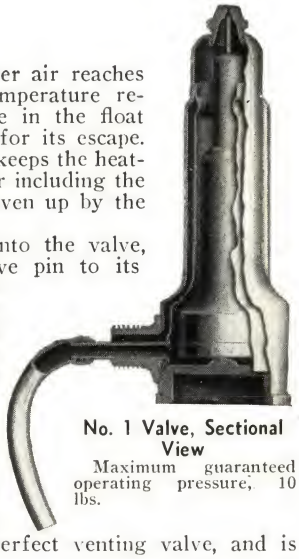
Heating engineers and contractors fully recognize the importance of the air venting equipment in successful one- and two-pipe steam systems. They also recognize that the principle of separate channels for air and water is *basic* for the successful operation of an air valve. This principle applied to air valves is covered by patents and may be used only in Hoffman Valves.



The No. 1 Hoffman Siphon Air Valve is used for venting air from radiators or heating units of one- or two-pipe gravity steam systems, without steam or water loss.

Operation of No. 1 Valve—Vent port is normally wide open for free escape of air. When steam reaches the float, which is likewise the thermostatic member, vaporization of the heat sensitive fluid within the float expands the flexible diaphragm base with "snap" action, thus raising the valve pin to its seat. Whenever air reaches the valve, its lower temperature reduces the fluid pressure in the float and the port is opened for its escape. This sensitive operation keeps the heating unit free from all air including the non-condensible gases given up by the steam in condensing.

Should water surge into the valve, the float raises the valve pin to its seat. As soon as water drops away from the valve, the float chamber is drained through the siphon and the flow of air into the valve through the nipple connection clears the air channels of water. When the port opens, air flows through the dry channels and venting occurs without the slightest "spit."



No. 1 Valve, Sectional View
Maximum guaranteed operating pressure, 10 lbs.

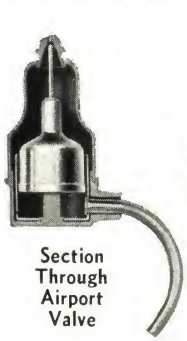
In all of its operations, the No. 1 Hoffman Valve is a perfect venting valve, and is guaranteed for five years.

THE AIRPORT

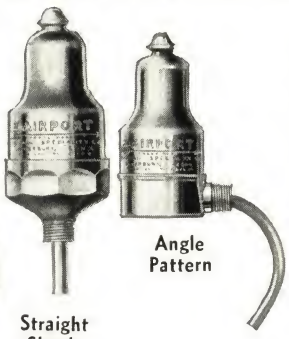
A High Quality, Efficient Air Valve for Jobs Where Initial Low Cost Is a Factor

A tested and guaranteed air valve in medium price field. The Airport is small and unobtrusive, attractive in appearance, and strongly built. All-metal construction and non-adjustable.

An adaptation of the double-shell or separate channel construction assures proper operation should water flood the valve. The base and nipple connection is a one-piece hot brass forging having many times the strength of a casting. The valve pin is of non-corrosive nickel silver. These features give the Airport more quality than its price implies.



Section Through Airport Valve



Straight Shank Pattern

Angle Pattern

In operating principles the Airport is similar to the No. 1 Valve.

The Airport is made in angle pattern for cast iron radiation and in straight-shank pattern for venting certain types of concealed radiators. Both angle and straight-shank valves have ⅛-in. connection. Maximum operating pressure, 10 lbs. Guaranteed for five years.

Venting the Pipe Lines

The importance of using the proper type of valve for venting ends of steam mains cannot be over-emphasized. To obtain steam in the far-off radiators at practically the same time as those near the boiler requires the use of Quick Vent Valves having a large vent port to cause steam to flow to the end of the main before going into the radiators. The No. 4 and No. 5 Valves are designed for this service.

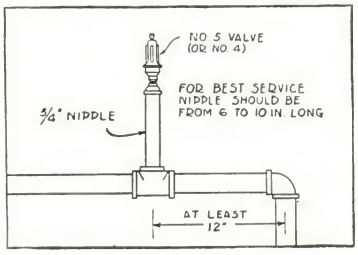
Hoffman No. 4 Quick Vent Valve

No. 4 Valve

The No. 4 Hoffman Quick Vent Valve is used for venting steam mains of one- or two-pipe systems which end 18 ins. or more above the boiler water line. The vent port is ⅛ in., permitting free venting, but it closes tightly against steam loss. As it does not contain a float, the valve should not be used where water is a factor.

The No. 4 may also be used for venting tops of risers, unit heaters, indirect radiators, blast coils, dryers, drums and low pressure feed water heaters.

Standard pipe connections, ¾ in., furnished with ¼ in. when so ordered. Maximum guaranteed operating pressure —10 lbs.



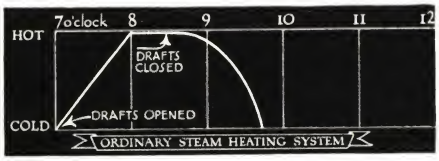
No. 5 Valve

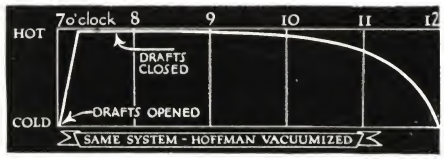
The No. 5 Hoffman Quick Vent Float Air Valve is intended for service similar to that of the No. 4, but, in addition, may be used for mains where boiler water level is less than 18 ins. below main or for other conditions where water is encountered. This valve is constructed with the double shell and operates similar to the No. 1 Valve.

Connection, ⅜ in. Maximum guaranteed operating pressure for valves with $\frac{1}{16}$-in. port, 10 lbs.; for $\frac{3}{16}$-in. port, 3 lbs. When ordering, size of port (depending on maximum operating pressure) should be specified.

Hoffman No. 5 Quick Vent Float Valve

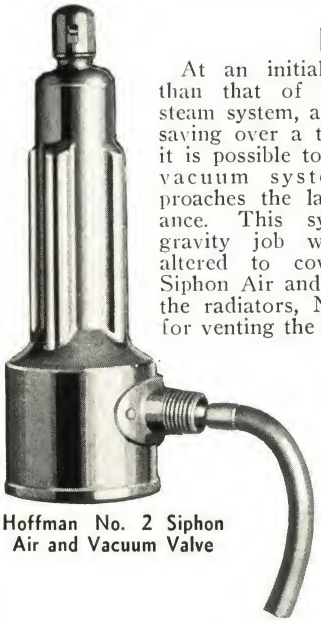
HOFFMAN VENTING VALVES FOR ONE-PIPE GRAVITY VACUUM SYSTEM





Almost every one-pipe steam system can be quickly and inexpensively converted to a modern vacuum system by replacing present venting equipment with Hoffman Vacuum Valves plus a general tightening up of the system against air leaks. The graphs clearly show what the results will be in heating comfort. This alone would justify the nominal expenditure, but, in addition, the return to the user through fuel economy pays for the initial cost in two or three heating seasons.

Venting the Radiators
NO. 2 SIPHON AIR AND VACUUM VALVE



Hoffman No. 2 Siphon Air and Vacuum Valve

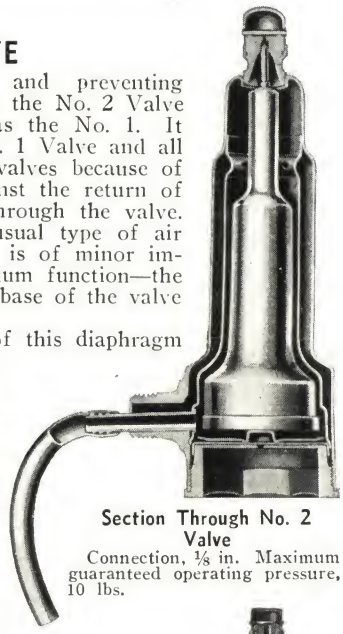
At an initial cost slightly higher than that of an ordinary one-pipe steam system, and with a considerable saving over a two-pipe vapor system, it is possible to furnish a fuel-thrifty vacuum system that closely approaches the latter type in performance. This system is a one-pipe gravity job with the specifications altered to cover No. 2 Hoffman Siphon Air and Vacuum Valves for venting the radiators, No. 6 or 16 Vacuum Valves for venting the end of each steam main, and a Hoffman Kompo Gage on the boiler. It is also recommended that packless supply valves be used on the radiators.

Such a system is isolated from the effect of atmospheric pressure and the user benefits by more rapid heating up of the system and longer "hot periods" in the operating cycle (see graphs above) through utilization of residual heat in the boiler water and elimination of the need for repeatedly venting large quantities of air. This means greater heating comfort and, at the same time, less consumption of coal, gas or oil.

In venting air and preventing steam or water loss, the No. 2 Valve operates the same as the No. 1. It differs from the No. 1 Valve and all other vacuum type valves because of its double lock against the return of air to the system through the valve. In the No. 2 the usual type of air check over the port is of minor importance to the vacuum function—the vacuum diaphragm in the base of the valve is the main factor.

The ratio of the area of this diaphragm to the area of the vent port multiplied by the pressure differential across the diaphragm causes powerful action in holding the valve pin to its seat. As the vacuum in the radiator and valve increases, the pressure differential across the diaphragm likewise increases the force holding the port closed.

The distinguishing features of the Hoffman No. 2 Valve—double shell construction plus double air lock—doubly assure satisfaction to the user.



Section Through No. 2 Valve
Connection, ⅛ in. Maximum guaranteed operating pressure, 10 lbs.

Venting the Pipe Lines
NO. 6 AIR AND VACUUM VALVE

No. 6 Hoffman Quick Vent Float Air and Vacuum Valve. For all quick venting services (without steam or water loss) where return of air through the valve is to be prevented. It is recommended for venting mains of one-pipe vacuum systems which end less than 18 ins. above boiler water line.

The No. 6 contains a large float and separate air channels for efficient operation under a surging condition. In principle, it is an enlarged No. 2 Valve.

Hoffman No. 6 Air and Vacuum Valve

Venting the
NO. 16 VACUUM VENT VALVE

Hoffman No. 16 Vacuum Vent Valve

The No. 16 Hoffman Vacuum Vent Valve is designed to vent steam mains of one-pipe vacuum systems which end 18 ins. or more above the boiler water line. Air is freely vented without steam or water loss and return of air is prevented by the "double air lock"—vacuum diaphragm and air check. Also adapted for any quick vent service where return of air is not desired and where water in small amounts is encountered.

Vent port, 1/16 in.; connection, ¾ in.; maximum guaranteed operating pressure, 10 lbs.

HOFFMAN KOMPO GAGE
With Externally Operated Hand Reset

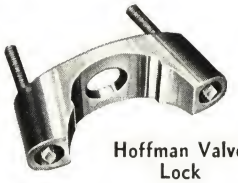
The Hoffman Kompo Gage accurately indicates the pressure of the vapor being generated in the boiler or the degree of vacuum under which the system is operating.

An unusual feature of the Kompo Gage is the externally operated set-screw for resetting the hand, if jarred from its normal position during shipment.

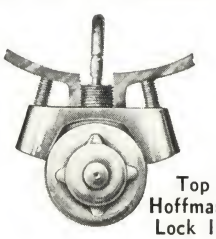
Made in one style only—pressed steel case and ring, finished in dull black; white dial, 5 ins. dia. connection ¼ in.

HOFFMAN VALVE LOCK
Prevents Removal of No. 1 and No. 2 Valves

The Hoffman Valve Lock is a simple device for preventing unauthorized removal of No. 1 or No. 2 Valves. Installed as shown—no tapping in the radiator is required. A good investment, especially for apartment buildings, hotels, etc., as protection against loss of vacuum should valves be removed, as well as loss of valves.



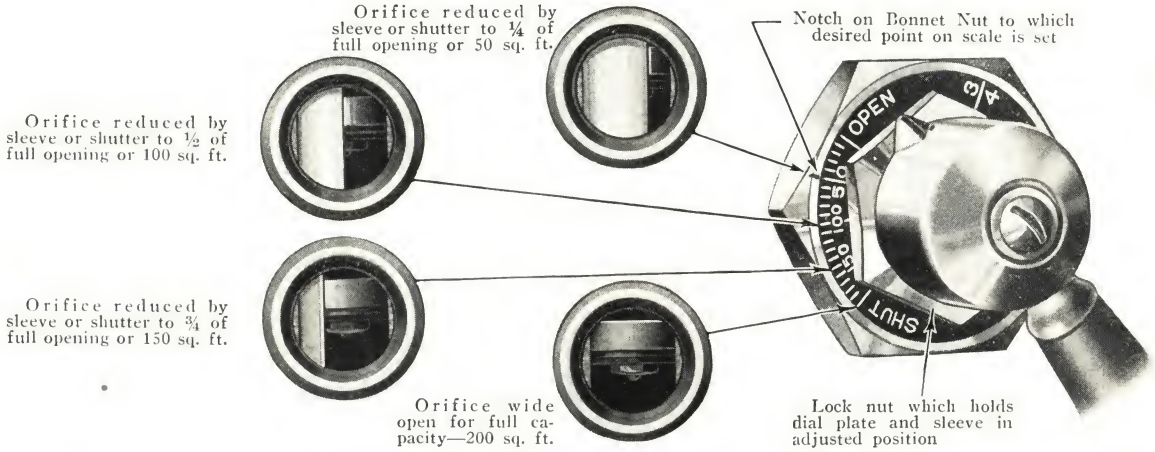
Hoffman Valve Lock



Top View. Hoffman Valve Lock Installed

NO. 7 HOFFMAN ADJUSTABLE MODULATING VALVE

For Accurately Balancing the Distribution to All Radiators of Vapor or Vacuum Heating Systems or Forced Hot Water Jobs



How Size of Orifice Is Regulated

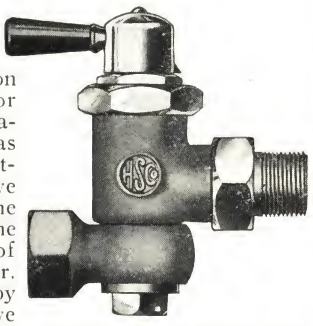
Hoffman No. 7 Angle Pattern Valve

The No. 7 Hoffman Modulating Valve with its dual adjustment meets every requirement for balancing steam distribution to all radiators in a vapor or vacuum system and for steam utilization at the radiators.

The primary adjustment, illustrated above, is made at the time of installation and assures each radiator its full quota of steam, irrespective of distance from the boiler and variation in frictional losses in the piping. To adjust the orifice, loosen the lock nut, rotate dial plate until the desired point on scale is opposite notch on bonnet nut, and then tighten lock nut. The simplicity and wide range of accurate orifice adjustment are noteworthy features.

The secondary adjustment allows the user to control the heat output of the radiator to suit individual needs. Operation of the valve handle raises or lowers the valve disc which varies the size of the orifice, as made by the primary adjustment. The position of the valve disc is visibly indicated and the fractional graduations on the dial are direct indications of the heat output of the radiator.

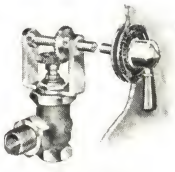
The service performed by the Hoffman No. 7 Valve is indispensable for maximum heating comfort, economy and control.



Hoffman No. 7 Swivel Connection Valve

Furnished in one size only, ¾ in. for radiators up to 200 sq. ft. The angle pattern with lever handle is standard. Also furnished with swivel connection for right, left, straightway or any intermediate angle and with the special attachments shown below.

SPECIAL ATTACHMENTS FOR NO. 7 HOFFMAN VALVE



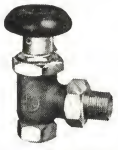
Bevel Gear

Chain Pull

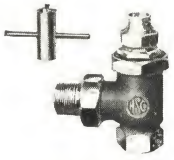
Straight

Offset

Extended Stems



Wood Wheel

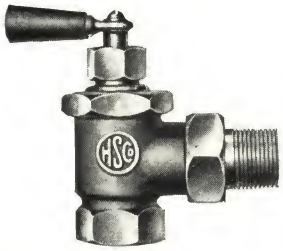


Lock Shield

NO. 19 HOFFMAN QUICK OPENING SUPPLY VALVE

The No. 19 is of the semi-packless type for vacuum pump or vapor installations where modulation is not required. The valve stem is of one piece, the end engaging in disc holder having quadruple thread which allows full opening with three-quarters of a turn of the handle.

The stem packing is lubricated, compressed asbestos fibre that will last indefinitely and requires no attention other than an occasional takeup of packing nut.



The No. 19 is made in ¾-in. size only, capacity, 200 sq. ft. of radiation. Maximum operating pressure 15 lbs.

Regularly furnished in angle pattern with lever handle standard. Also furnished with wood wheel handle, lock shield, and straight or offset extended stems.

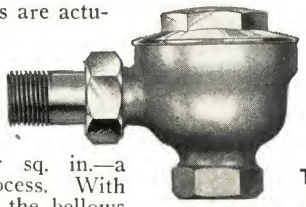
THE NEW HOFFMAN BELLOWS TYPE TRAPS

With the Hydraulically Formed and Tested Bellows

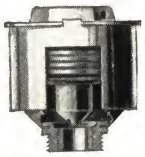
NO. 8-A AND NO. 9-A TRAPS

The new Hoffman Traps are actuated by a bellows thermal member made from drawn seamless tubing and formed by a new hydraulic method under an internal pressure of more than 500 lbs. per sq. in.—a "tested-in-the-making" process. With this process, the folds of the bellows maintain a uniform metal thickness and crystalline structure and are unimpaired by tool marks—factors essential to uniform performance and long life.

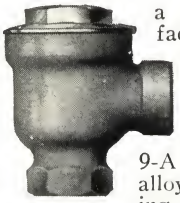
A new and improved construction is featured in the Nos. 8-A and 9-A Traps. The cage supporting the bellows is combined into a single unit with the valve seat. This unit is screwed into the body and the joint tightly sealed with a soft copper gasket which also facilitates removal of the unit if ever necessary.



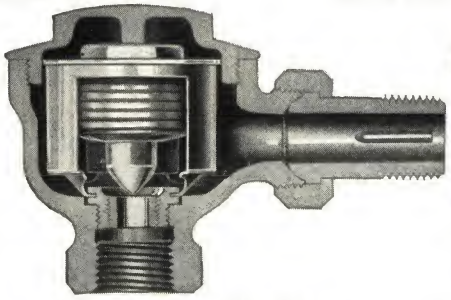
No. 8-A Trap



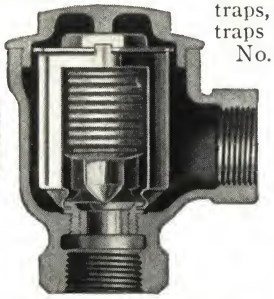
Type of Thermal Member in No. 8-A and No. 9-A Traps
Combines bellows, valve pin and seat, into a single unit



No. 9-A Trap



Sectional View, No. 8-A Trap



Sectional View, No. 9-A Trap

An important factor in trap operation is the durability of the seating surfaces. The valve pins and seats of the Nos. 8-A and 9-A Traps are of a special nickel-silver alloy having exceptional wear resisting qualities.

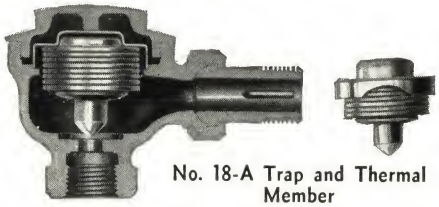
These traps are intended for vapor or vacuum heating as well as for pressures up to 25 lbs., for regular traps, and up to 50 lbs. for special traps (furnished at same price).

No. 8-A, made with ½-in. connections, angle or swivel patterns. Nominal capacity for pressures under 1 lb., 300 sq. ft. of radiation. Bellows, 1½-in. diameter, 8 convolutions. Port, ⅜ in.

No. 9-A, ¾-in. connections, without union, angle pattern only. Nominal capacity for pressures under 1 lb., 700 sq. ft. of radiation. Bellows, 1½ in. diameter. 12 convolutions. Port, 7/16 in.

NO. 18-A TRAP

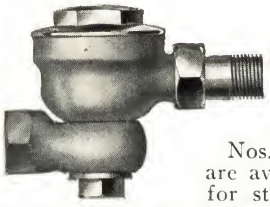
The No. 18-A Hoffman Trap contains the same hydraulically formed and tested bellows as the No. 8-A. It is mounted in a cage so constructed that it is interchangeable without adjustment in all No. 18-A bodies.



No. 18-A Trap and Thermal Member

The valve pin is of wear resisting nickel-silver alloy.

No. 18-A, ½-in. connections, angle or swivel patterns. Nominal capacity for pressures under 1 lb., 300 sq. ft. of radiation. Port, ⅜ in. Maximum guaranteed operating pressure, 25 lbs.

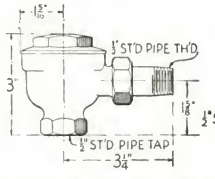


No. 8-A and No. 18-A Swivel Connection

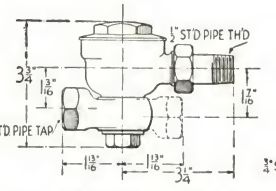
SWIVEL CONNECTION FOR NO. 8-A AND NO. 18-A TRAPS

Nos. 8-A and 18-A Hoffman Traps are available with swivel connection for straightway, right or left hand pattern or any intermediate angle. Adjustment is simply made by means of a nut which threads into an extension piece integral with the valve body. By reversing the swivel, two roughing-in dimensions are available.

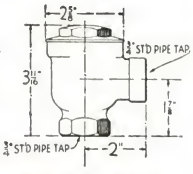
ROUGHING-IN DIMENSIONS



No. 8-A and No. 18-A Angle Pattern



No. 8-A and No. 18-A Swivel Connection



No. 9-A, Angle Only

***CAPACITIES IN POUNDS, OF CONDENSATE PER HOUR—NOS. 8-A AND 18-A**

Pressure difference, lbs., per sq. in.	Temperature drop—Degrees Fahrenheit.						
	4°	5°	6°	7°	8°	9°	10°
1	126	130	135	141	147	152	160
2	129	134	139	145	151	157	167
3	133	138	143	149	156	163	174
4	138	142	147	154	162	170	182
5	142	146	151	159	168	178	190
6	147	151	157	166	176	186	198
7	153	158	164	174	184	194	206
8	159	166	173	181	192	202	214
9	166	174	182	190	200	211	222
10	175	184	192	200	209	220	230

*To obtain capacities in square feet of direct radiation, multiply above capacities by 4.

***CAPACITIES IN POUNDS OF CONDENSATE PER HOUR—NO. 9-A**

Pressure difference, lbs. per sq. in.	Temperature drop—Degrees Fahrenheit.				
	4°	5°	6°	7°	8°
1	200	245	340	480	670
2	220	270	365	500	700
3	240	300	400	530	730
4	270	330	435	560	760
5	300	360	475	590	795
6	340	395	520	630	840
7	380	435	565	690	890
8	430	485	620	750	950
9	480	540	680	820	1010
10	540	600	750	900	1100

*To obtain capacities in square feet of direct radiation, multiply above capacities by 4.

HOFFMAN HEAVY DUTY AND HIGH PRESSURE TRAPS

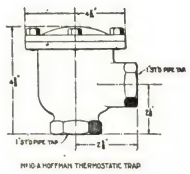
NO. 10-A HEAVY DUTY TRAP WITH WATERHAMMER PROOF BELLOWS

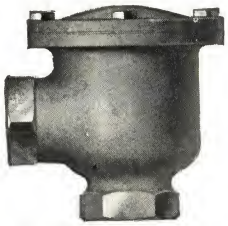
Thermostatic Steam Trap for Heavy Duty Service Where Cooling Leg Can Be Employed

This trap contains a "solid fill" bellows which enables it to withstand, without appreciable harm, the shock of waterhammer, frequently encountered where large quantities of condensate are handled. This feature, together with its compactness and light weight, makes the No. 10-A adaptable for draining unit heaters, steam mains or other equipment of large condensing power.

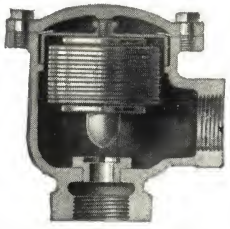
The bellows, $2\frac{7}{16}$ in. in diameter, 13 convolutions, is supported in a cage which is interchangeable without adjustment in all 10-A bodies. Valve pin and renewable seat are of a wear resisting nickel-silver alloy.

The No. 10-A has iron body, 1-in. connection without union. Nominal capacity for pressures under 1 lb., 2800 sq. ft. of radiation. Angle pattern only. Port, $\frac{7}{16}$-in. diameter.





No. 10-A Heavy Duty Trap



Section Through No. 10-A Trap

***CAPACITIES IN POUNDS OF CONDENSATE PER HOUR—NO. 10-A**

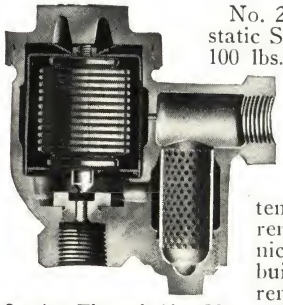
Pressure difference, lbs. per sq. in.	Temperature drop—degrees F.		
	3°	4°	5°
1	950	1410	1950
2	1140	1600	2140
3	1360	1790	2350
4	1580	1990	2590
5	1800	2210	2850
6	2030	2480	3130
7	2300	2790	3460
8	2600	3100	3810
9	2910	3480	4200
10	3380	3860	4610

*To obtain capacities in square feet of direct radiation, multiply above capacities by 4.

COMBINATION FLOAT AND THERMOSTATIC TRAPS

On December 1st, 1931, we shall place on the market a complete line of Float and Thermostatic Blast Traps in a range of sizes up to 2 in. Outstanding features of these traps will be large capacity, simple construction and compact design. Literature will be gladly furnished on request.

NO. 20 and NO. 21 HIGH PRESSURE TRAPS



Section Through No. 20 and No. 21 Traps

No. 20 and No. 21 Hoffman Thermostatic Steam Traps—pressure range, 0 to 100 lbs. without adjustment.

The trap bodies are of rugged, all-bronze construction. The hydraulically formed bellows is so constructed as to be waterhammer proof, an important factor in reducing maintenance expense. The valve pin and renewable seat are of wear resisting nickel-silver alloy. A strainer is built into the trap body and is easily removed for cleaning.

The cage, supporting the bellows, has a stop which permits removal of the thermal member while steam-hot without damage to the bellows. Thermal members are interchangeable in bodies of the same size without adjustment.

The valve port is normally wide open for the free discharge of air and initial condensation. No hand operated bypass for venting the unit is required.

The discharge capacity is dependent on differences between the temperature of the condensate delivered to the trap and the steam temperature—the greater the difference, the larger the capacity as shown in the capacity table. To insure maximum capacity and long life of valve pin and seat, the cooling leg should be made as long as possible.

No. 20 Trap connections, ½ in.; port diameter, $\frac{3}{16}$ in. No. 21 Trap connections, ¾ in.; port diameter, ¼ in.

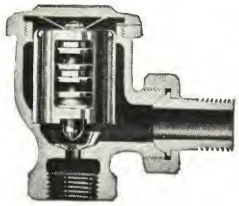
CONTINUOUS DISCHARGE CAPACITY

Pressure, lbs. per sq. in.	No. 20 Temperature drop—Degrees Fahrenheit				No. 21 Temperature drop—Degrees Fahrenheit			
	20°	25°	30°	35°	20°	25°	30°	35°
10	275	450	600	725	375	610	800	950
20	425	615	775	900	575	825	1050	1200
30	550	750	940	1075	725	985	1250	1410
40	640	860	1075	1225	835	1150	1450	1640
50	715	960	1210	1380	925	1285	1620	1860
60	775	1050	1340	1540	1010	1410	1775	2075
70	820	1130	1440	1675	1085	1525	1900	2250
80	860	1200	1510	1760	1150	1600	2010	2400
90	900	1250	1560	1830	1190	1660	2090	2490
100	925	1260	1590	1860	1225	1725	2140	2550

NO. 8, NO. 9 AND NO. 18 HOFFMAN DIAPHRAGM TRAPS

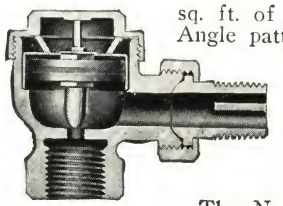
The No. 8 and No. 9 Hoffman Traps contain the diaphragm type of thermal member consisting of six diaphragms joined into three chambers and interconnected through the center. The collective movement of the six diaphragms is imparted to the valve pin giving long valve travel. The thermal member is supported in a cage and the complete unit is interchangeable in bodies of the same size without adjustment. The characteristics of the volatile fluid are such that these traps operate with consistently high efficiency under pressures up to 50 lbs.

The No. 8, ½-in. Trap, has a nominal capacity of 200 sq. ft. of radiation; port diameter, ¼ in. Angle pattern standard. Maximum operating pressure, 50 lbs.



No. 8 Trap, ½ in.
No. 9 Trap, ¾ in.

No. 9, ¾-in. connections, angle pattern, nominal capacity 600 sq. ft. of radiation; standard port diameter, ⅜ in. For pressures above 15 lbs., $\frac{3}{16}$-in. port is furnished.



No. 18 Trap

The No. 18 Trap is used for draining radiators of 100 sq. ft. or less and for pressures below 15 lbs. The thermal member is a complete unit and interchangeable without adjustment.

Made in ½-in. size only. Port diameter, ¼ in. Angle pattern standard.

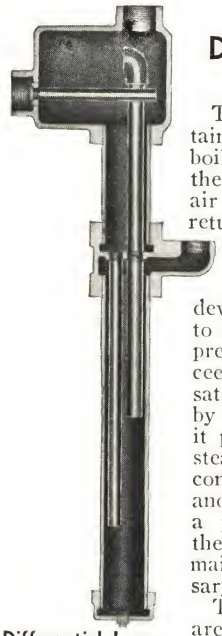
HOFFMAN CONTROLLED HEAT

A Vapor-Vacuum System That Combines Simplicity, Economy and Individual Heating Comfort—Applicable to All Sizes and Types of Buildings

The equipment shown below, in conjunction with that shown on pages 5 and 6 includes all the specialties necessary for a complete vapor-vacuum system of heating—Hoffman "Controlled Heat." It is extremely flexible, economical and practically automatic, and suitable for any type of building where condensate will return to the boiler by gravity and the necessary water line difference is obtainable. For buildings requiring up to 3500 sq. ft. of radiation, 24 ins. between lowest point in dry return and boiler water line are required—and 30 ins. where 3500 to 15,000 sq. ft. of radiation are installed.

The radiator specialties are No. 7 Modulating Valve at the feed end and No. 8-A or 18-A Traps at the return end in combination with the Basement Specialties shown below.

The Basement Specialties



Differential Loop

DIFFERENTIAL LOOP AND NO. 15 AIR VALVE

The Hoffman Differential Loop maintains the flow of condensate back to the boiler in event of excessive pressure, and the No. 15 Valve controls the flow of air from the system and prevents its return. The simplicity of the Loop and the fact that it contains no moving parts emphasizes its suitability for the service it performs—boiler protective device. It is only called upon to operate when the boiler pressure, for any reason, exceeds that at which condensate will return to the boiler by gravity. In functioning, it passes a small quantity of steam into the return main, compresses the air therein and increases the pressure in a predetermined relation to the boiler pressure, thus maintaining the balance necessary for gravity return of condensate.

No. 15 Air Valve

The Differential Loop and No. 15 Valve are sold only as part of the complete Basement Specialties which are grouped for installations of various sizes and listed below.

DAMPER REGULATOR

The Hoffman Damper Regulator is designed to operate on the low boiler pressures (measured in ounces) encountered with "Controlled Heat." It is used only with coal-fired boilers and maintains a low but constant pressure in the mains to supply heat promptly when needed. The slight change in pressure, due to the opening or closing of the No. 7 Modulating Valves on the radiators, is sufficient to operate the regulator, increasing or retarding the fire to meet the change in demand. Fuel is consumed only as needed, eliminating the waste resulting through improper damper control.

Damper Regulator

NO. 14-A KOMPO GAGE

The Hoffman Kompo Gage accurately indicates the pressure of the vapor being generated in the boiler or the degree of vacuum under which the plant is operating.

An unusual feature of the Kompo Gage is the externally operated setscrew which resets the hand. During shipment it often occurs that the hand is jarred from its normal position at zero. By turning the setscrew, without dismantling the gauge or removing the glass, the hand may be reset to zero with perfect assurance that it will register as accurately as when it left the factory.

No. 14-A Kompo Gage

Pressure is measured up to 30 lbs., the first 5 lbs. being shown in ounce graduations, with a retard from 5 to 30 lbs. Vacuum is shown up to 30 ins., the first 10 ins. being indicated in ½ in. graduations, with a retard from 10 to 30 ins.

The Hoffman Kompo Gage is made in one style only—pressed steel case and ring, finished in dull black, white dial—5 ins. in diameter, pressure and vacuum readings in black. Pipe connection is ¼ in.

STANDARD BASEMENT SPECIALTIES

Class "O" Basement Specialties for installations up to 2500 sq. ft. of radiation, consist of:

2 No. 18 Traps for venting steam mains into dry returns
1 No. 0 Differential Loop, with 1 No. 15 Vacuum Valve
1 No. 14-A Kompo Gage.

Class "B" Basement Specialties for installations of 2500 to 3500 sq. ft. of radiation, consist of:

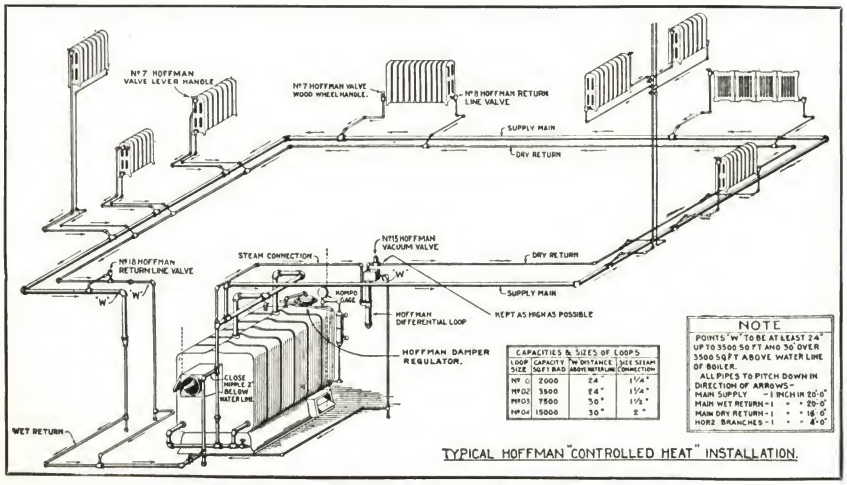
3 No. 18 Traps for venting steam mains into dry returns
1 No. 02 Differential Loop with 1 No. 15 Vacuum Valve
1 No. 14-A Kompo Gage.

Class "C" Basement Specialties for installations of 3500 to 7500 sq. ft. of radiation, consist of:

4 No. 18 Traps for venting steam mains into dry returns
1 No. 03 Differential Loop with 1 No. 15 Vacuum Valve
1 No. 14-A Kompo Gage.

Class "D" Basement Specialties for installations of 7500 to 15,000 sq. ft. of radiation, consist of:

6 No. 18 Traps for venting steam mains into dry returns
1 No. 04 Differential Loop with 2 No. 15 Vacuum Valves
1 No. 14-A Kompo Gage.



Typical Installation, Hoffman Controlled Heat

HOFFMAN ECONOMY PUMPS

Return Line Vacuum Pumps, Air Line Vacuum Pumps, Horizontal and Underground Condensation Pumps, Reciprocating Pumps

Return Line Vacuum Pumps—For systems where it is desired to accelerate steam circulation at low pressures by maintaining a vacuum on the return mains.

Air Line Vacuum Pumps—To remove air from air line or "Paul" systems or industrial processes where it is desired to handle moderate amounts of air at vacuums of 4 to 28 ins.

Horizontal Centrifugal Condensation Pumps—For low, medium or high pressure service—draining radiators below water line in gravity systems or returning condensate to medium or high pressure boilers and heaters.

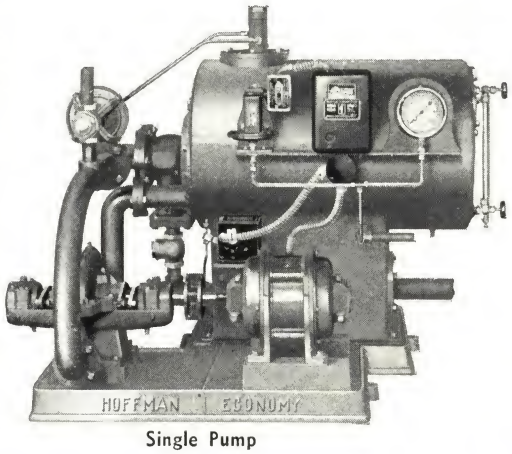
Vertical Underground Condensation Pumps—For gravity heating systems where returns are located below floor level or otherwise too low for horizontal pumps.

Reciprocating Condensation Pumps—For pressures from 50 to 100 lbs. where initial cost is a factor and slight noise of operation is not objectionable. Suitable for laundries, greenhouses, etc.

RETURN LINE VACUUM PUMP

The Hoffman-Economy Return Line Vacuum Pump performs three functions, (1) removes air from the system, (2) maintains a vacuum on the return lines, accelerating circulation at low boiler pressures and (3) returns condensate to the boiler.

The jet type vacuum producer used is one of the simplest and most efficient methods of exhausting air and vapors. It contains no moving parts and does not require close clearances in the pump so that loss of efficiency, due to wear, is negligible. These pumps are capable of producing high vacuums and because of the jet action and constant static head on the pump case, will handle water almost at the boiling point.



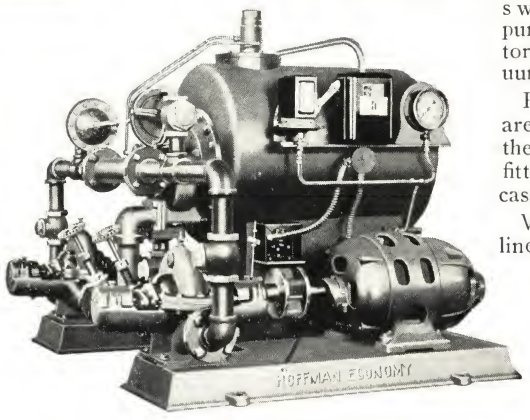
Single Pump

Units of 16,000 sq. ft. capacity and over have horizontal split case pumps with enclosed, double suction, bronze impellers.

Smaller units have vertically split volute pumps with enclosed impeller, removable bronze stand bearing and outboard ball bearing.

All sizes furnished in Single or Duplex Units and are shipped complete, ready to run, including full automatic control for both vacuum and float operations, built-in accumulator tank, vacuum gauge, strainer, etc.

Duplex Units are of same general design and consist of one tank, one float switch, two pumps, two motors and two vacuum regulators.



Duplex Pump

Return inlets are low, avoiding the use of lift fittings in many cases.

Where return lines are below floor level an auxiliary accumulator tank will permit operation on float control only.

CAPACITY TABLE—RETURN LINE VACUUM PUMPS

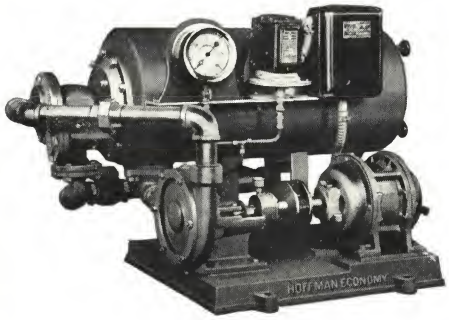
Pump No.	Capacity, sq. ft. direct c. i. radiation or equivalent	Water capacity, gallons per minute	Air capacity, cu. ft. minute	Orifice size, in.*	Motor hp. 20 lbs. discharge pressure
SV-0†	1500	3	1	1/16	1/2†
SV-1A	3500	7	3	3/32	3/4
SV-2	5000	9	3	7/64	1
SV-2A	7000	13	4	1/8	1
SV-3A	12000	18	7	11/64	1 1/2
SV-4	16000	22	9	3/16	2
SV-5	20000	28	12	7/32	3
SV-6	26000	35	15	1/4	5
SV-7	40000	60	21	9/32	5
SV-8	65000	90	34	11/32	7 1/2
SV-9	100000	140	50	7/16	10
SV-10	150000	210	102	9/16 & 5/16	15
SV-11	250000	350	130	23/32	25

†Discharge pressure SV-0—10 lbs. All others, 20 lbs.
*Size of sharp edge orifice in 1/8-in. plate through which pump maintains 10-in. vacuum.

AIR LINE VACUUM PUMP

The Hoffman-Economy Air Line Vacuum Pump is for use on air line gravity heating systems using No. 3 Hoffman Air Line Valves on the radiators. They remove air only and do not handle condensate or act as a boiler feed pump. Also suitable for industrial use on evaporators, condensers, etc., where it is desired to handle moderate amounts of air at vacuums from 4 to 28 ins.

These pumps contain the jet vacuum producer and are extremely simple, consisting only of a horizontal centrifugal pump and circulating water tank. The pump is bronze fitted and arranged so that access may be had to the interior without breaking any pipe connections. Control is entirely automatic.



All sizes are made in Duplex Units having one tank, two pumps, two motors and two vacuum regulators.

CAPACITY TABLE—AIR LINE VACUUM PUMPS

Pump No.	Capacity, sq. ft. direct radiation	Air capacity, cu. ft., minutes	Motor hp.
AL-1	4000	1 3/4	3/4
AL-2	8000	4	1
AL-3	12000	6	1 1/2
AL-4	20000	10	2
AL-5	30000	15	3
AL-6	40000	20	5
AL-7	60000	30	5
AL-8	80000	40	7 1/2
AL-9	150000	70	10

HORIZONTAL CENTRIFUGAL CONDENSATION PUMPS

These pumps are used to drain radiation below the boiler water line of gravity heating systems or to keep long steam mains which end close to or below the water line free of condensate.

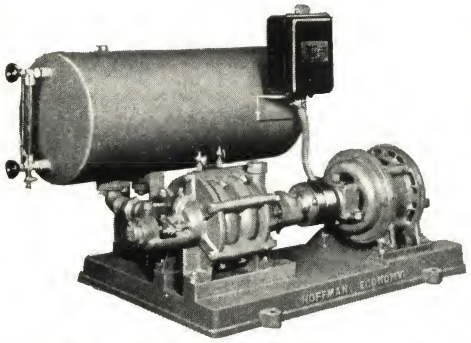
They are also adapted for all types of industrial and commercial installations for returning condensate to the boiler.

All units are compact and sturdily built to give continued high efficiency during many years of service. Pumps are bronze fitted throughout. All sizes available in Single and Duplex Units and are shipped complete, ready for service.

Style "A" Horizontal Condensation Pump

These pumps are furnished in styles "A" (for 0 to 20 lbs. pressure) and "B," "C" and "D" (for 35 to 100 lbs. pressure). Style "A" has vertically split case, outboard ball bearing and self-lubricating, renewable bronze stand bearing. Styles "B" and "C" have vertically split case and double outboard bearings, ring oiling at driving end and ball bearing at opposite end, both readily renewable. Style "D" has horizontal split case and double outboard ring oiling bearings, both renewable.

All units are operated by a positive float switch with bronze float arm supported by two liberal bearings.



Styles "B" and "C" Horizontal Condensation Pump

CAPACITY TABLE—CONDENSATION PUMPS—60-CYCLE AND DIRECT CURRENT

Pump No.	Capacity, sq. ft. dir. e. i. radiation	Disc press., lbs. sq. in.	Pump cap., g.p.m.	Motor hp.	Speed r.p.m.	Pump No.	Capacity, sq. ft. dir. e. i. radiation	Disc. press. lbs. sq. in.	Pump cap., g.p.m.	Motor hp.	Speed r.p.m.	Pump No.	Capacity, sq. ft. dir. e. i. radiation	Disc press., lbs. sq. in.	Pump cap., g.p.m.	Motor hp.	Speed r.p.m.
10A	1,000	10	2	¼	1,750	100A	10,000	10	20	¼	1,750	200A	20,000	10	40	½	1,750
30A	3,000	10	5	¼	1,750	101A	10,000	15	20	½	1,750	201A	20,000	15	40	¾	1,750
31A	3,000	15	5	½	1,750	102A	10,000	20	20	¾	1,750	202A	20,000	20	40	1	1,750
32A	3,000	20	5	¾	1,750	103B	10,000	25	20	1	1,750	203B	20,000	25	40	1½	1,750
60A	6,000	10	12	¼	1,750	104B	10,000	30	20	1½	1,750	205B	20,000	40	40	2	1,750
61A	6,000	15	12	½	1,750	105B	10,000	40	20	1½	1,750	205C	20,000	40	40	2	3,500
62A	6,000	20	12	¾	1,750	105C	10 000	40	20	1½	3,500	207B	20,000	60	40	3	1,750
64B	6,000	30	12	1	1,750	106B	10,000	50	20	2	1,750	207C	20,000	60	40	3	3,500
65B	6,000	40	12	1½	1,750	106C	10,000	50	20	2	3,500	209C	20,000	100	40	5	3,500
65C	6,000	40	12	1½	3,500	107B	10,000	60	20	3	1,750	300A	30,000	10	53	½	1,750
66B	6,000	50	12	2	1,750	107C	10,000	60	20	3	3,500	301A	30,000	15	53	¾	1,750
66C	6,000	50	12	2	3,500	109C	10,000	100	20	5	3,500	302A	30,000	20	53	1	1,750
67B	6,000	60	12	3	1,750	151A	15,000	15	30	½	1,750	303A	30,000	25	53	1½	1,750
67C	6,000	60	12	3	3,500	152A	15,000	20	30	¾	1,750	304A	30,000	30	53	2	1,750
68C	6,000	75	12	3	3,500	153B	15,000	25	30	1	1,750	307C	30,000	60	53	5	3,500
69C	6,000	100	12	5	3,500	155B	15,000	40	30	2	1,750	308C	30,000	75	53	7½	1,750
						155C	15,000	40	30	2	3,500	309B	30,000	100	53	10	1,750
						157B	15,000	60	30	3	1,750						
						157C	15,000	60	30	3	3,500	(Made in standard sizes up to 70,000 sq. ft. capacity)					
						159C	15,000	100	30	5	3,500						

VERTICAL UNDERGROUND CONDENSATION PUMPS

The Vertical Underground Pumps are used on Gravity Heating Systems where return lines are below floor or otherwise too low for Horizontal Pumps. The heavy cast iron receiver is installed below the floor and cemented in with cover plate flush with floor. No concrete pit lining is required nor is there any need for access to the tank as all apparatus is removable through the cover.

These units have special vertical centrifugal pumps with enclosed bronze impellers of the non-overloading type.

All sizes furnished in Duplex Units consisting of two pumps, two motors and two sets of automatic float switch controls, all installed in connection with a single receiving tank.

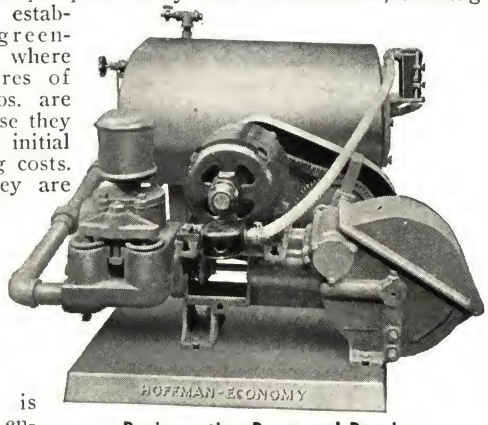
CAPACITY TABLE—VERTICAL UNDERGROUND CONDENSATION PUMPS

Pump No.	Capacity, sq. ft. direct c. i. radiation or equivalent	Pressure, lbs. per sq. in.	Pump capacity, gals. per min.	Motor hp.	Receiver dimensions, ins.
U-30	3000	10	6	¼	16x30
U-31	.....	15	.....	½	20x30
U-32	.....	20	.....	¾	20x30
U-50	5000	10	10	¼	16x30
U-51	.....	15	.....	½	20x30
U-52	.....	20	.....	¾	20x30
U-80	8000	10	16	¼	18x30
U-81	.....	15	.....	½	20x30
U-82	.....	20	.....	¾	20x30
U-120	12000	10	24	½	24x36
U-122	.....	20	.....	¾	24x36
U-200	20000	10	40	½	24x36
U-201	.....	15	.....	¾	24x36
U-202	.....	20	.....	1	24x36
U-300	30000	10	60	1	30x36
U-301	.....	15	.....	1½	30x36
U-302	.....	20	.....	2	30x36

Vertical Underground Pump and Receiver

RECIPROCATING CONDENSATION PUMPS

This type of pump is widely used for laundries, cleaning and dyeing establishments, greenhouses, etc., where steam pressures of 50 to 100 lbs. are carried because they are low in initial and operating costs. However, they are not as quiet as a centrifugal type due to the slight pulsation at the end of each stroke and the chain drive.



Reciprocating Pump and Receiver

The pump is self-oiling, enclosed type, with bronze lined cylinders, bronze valve seats and piston rod. Timken bearings, accurately cut gears and silent chain drive. Controlled by automatic float switch.

CAPACITY TABLE—RECIPROCATING PUMPS

Pump No.	Capacity, sq. ft. direct c. i. radiation or equivalent	Discharge pressure, lbs. per sq. in.	Pump capacity, gals. per min.	Motor hp.	Receiver capacity, gals.
R-11	1000	50	2	½	9
R-12	1000	100	2	¾	9
R-31	3000	50	5	½	13
R-32	3000	100	5	¾	13
R-61	6000	50	10	½	20
R-62	6000	100	10	1	20
R-101	10000	50	16	1	26
R-102	10000	100	16	2	26

HOFFMAN
SALES AND SERVICE

Hoffman Products are sold and carried in stock by leading Wholesalers of Heating and Plumbing Supplies, assuring a quick and convenient source of supply to the Heating Contractor.

For the convenience of the Architect and Engineer, the Hoffman Specialty Co. maintains trained representatives in the field who will be glad to assist in the selection of equipment most suitable for various services.

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Waterbury, Conn.
U. S. A.

WILLIAM S. HAINES & COMPANY

Manufacturers of Steam Heating Specialties

Twelfth and Buttonwood Streets
PHILADELPHIA, PA.

Products

HAINES VACUUM HEATING SYSTEMS and AUTOMATIC VAPOR SYSTEMS, consisting of Haines Thermostatic Traps, Automatic Air Traps, Graduated Supply Valves, Damper Regulators and all Specialties used in the systems.

Vacuum System of Steam Heating

The architect and the engineer are sufficiently familiar with the principle, operation and general piping arrangement of the vacuum heating system to make it unnecessary to detail them here.

It is generally conceded that the vacuum system of steam heating, properly installed and equipped, is the most efficient and economical heating system that can be used in connection with large buildings of any description.

When vacuum heating systems fail to function properly it is seldom the fault of the piping design, or layout. Almost invariably the trouble is with the equipment. The most important equipment, the very heart of a vacuum heating system, is the return line trap, whose function is to pass all of the water of condensation and the air from the radiating surfaces and drip points without permitting the escape of steam to the return line. Haines traps do just this and so insure the successful and economical operation of the system.

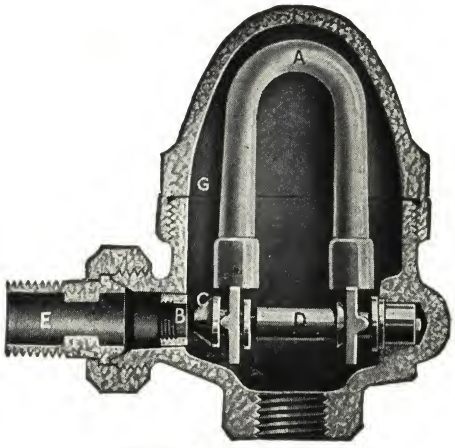
Haines Thermostatic Traps

All Haines thermostatic traps, whether they are made for service at below atmospheric pressure or at pressure in excess of 100 lb. per sq. in. employ as their operating member a specially constructed bourbon tube, a principle as positive and accurate as that which actuates your steam gauge. In more than 30 years this company has not changed the principle of the operating member. Time has proven its positiveness and durability.

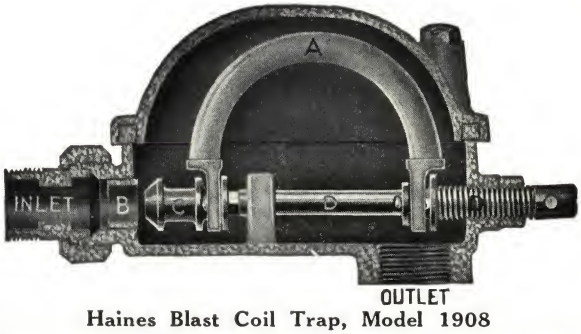
Construction—The tube itself is of tempered steel, charged with a volatile liquid. It is the expansion or contraction of this liquid that furnishes the operating power. The thermostatic tube is mounted vertically on a horizontal valve motion. The end opposite the valve is anchored, hence, the travel of the tube either opens or closes the valve piece.

This thermostat is sensitive to a temperature change of 1° F. It is mounted outboard the valve seat closing the valve against the flow of steam. This arrangement prevents fouling of the trap due to scale or other foreign matter in the system and permits thorough draining of the unit to which it is attached.

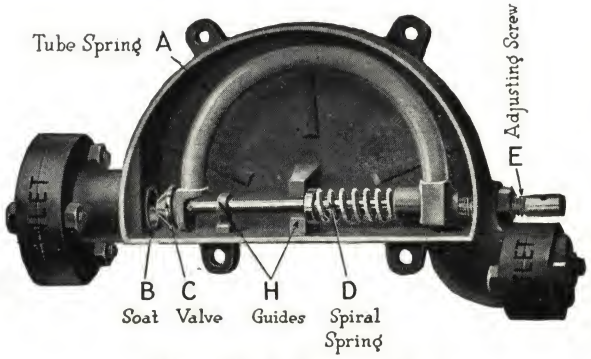
Advantages—With Haines Traps—
Not a particle of steam gets away.
Nothing that ought to stay in gets out.
Nothing that ought to get out stays in.



Haines Vento Trap
Recommended for vacuum, vapor and low pressure heating systems



Haines Blast Coil Trap, Model 1908
Recommended for any conditions where working pressure does not exceed 50 lbs.



Haines High Pressure Trap

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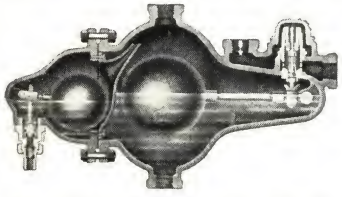
POWER PLANT SPECIALTIES: Pressure Reducing Valves for steam, water and air, Back Pressure Valves, Steam Traps, Liquid Level Controllers, Dirt Strainers, Vacuum and Pressure Relief Valves, Float Valves, Balanced Lever Valves, Condensation Receiver and Pump Governors, Non-Return Valves, Oil Separators, Grease Traps and Exhaust Head.

Also a full and complete line of Gas and Oil Specialties.

Sectional Catalogue No. 30

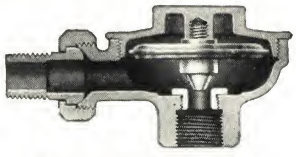
In the McAlear Sectional Catalogue No. 30 each part of the McAlear line is completely covered in one section. Write for the section you are interested in or the complete catalogue.

Direct-to-Boiler Water Feeders



No. 826 Duplex Water Feeder

Manufactured both Simplex and Duplex and made as one unit with pressure and low water cut-out switches for automatically controlling stoker, gas or oil burner installations. Make-up water flows direct to boiler. Working parts of non-corrosive material, heavy seamless copper floats. Shown in Section K3.



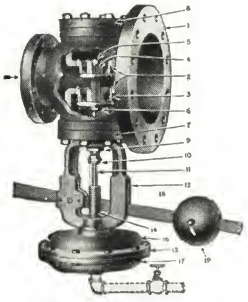
No. 10 Radiator Trap

Radiator Traps

Constructed in several sizes and patterns up to 1 in. Furnished with renewable stainless steel seats and tips and pretinned phosphor bronze thermostatic elements. Traps are large capacity—self-cleaning and absolutely noiseless in operation. Radiator Traps for vacuum up to 20 in. or pressures up to 15 lbs. Other thermostatic traps for pressures up to 100 lbs. Shown in Section L.

Reducing Valves

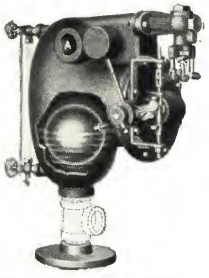
Constructed in either the diaphragm, weight and lever type, spring weighted diaphragm type, or the pilot operated type. Made with either single or double seats, and with expanded outlets when desired. For all practical working conditions. Sizes up to 20 in. Shown in Section A.



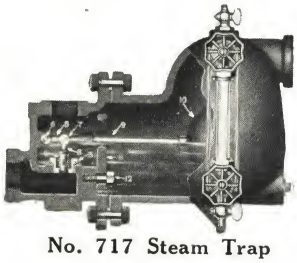
No. 155 Reducing Valve

Air Eliminators and Return Traps

Working pressures up to 25 lbs. Suitable for use in connection with any vapor or low pressure steam heating system. It is designed especially for returning the water of condensation direct to the boiler at high temperatures, irrespective of pressure or vacuum carried on boiler or system, and at the same time discharging the air to atmosphere as fast as it accumulates. Constructed in sizes for any amount of radiation up to 24,000 sq. ft. Shown in Section L.



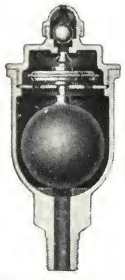
No. 786 Air Eliminator and Return Trap



No. 717 Steam Trap

Ball Float Steam Traps

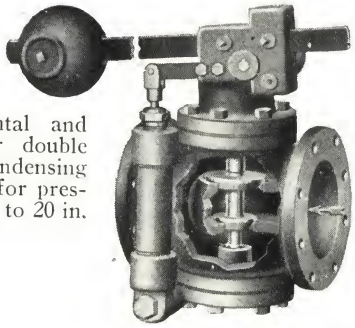
No. 717 (illustrated) is invaluable for low pressure drip connections. Can be used on pressures up to 125 lbs. It has large capacity, equipped with accessible valve construction, deep water seal, and thermostatic element when used for blast trap service. Sizes ½ to 3 in. Also other types for steam pressures up to 250 lbs. Shown in Section I.



No. 15 Automatic Air Valve

Automatic Air Valves

Used for venting low pressure and vapor heating systems and for discharging the air from mains, risers, pipe coils, direct and indirect radiators, vento coils, sterilizing apparatus, or any equipment from which air must be relieved. Working pressures No. 14, 15, 16 up to 15 lbs. No. 17 up to 25 lbs. Shown in Section L.



No. 616 Back Pressure Valve

Back Pressure Valves

Constructed in horizontal and vertical patterns, single or double seat construction for non-condensing or condensing service—and for pressures up to 60 lbs. Sizes 2½ to 20 in. Shown in Section B.

Self-cleaning Strainer

A complete line of basket and self-cleaning strainers, sizes ¼ to 16 in. No. 530 (illustrated) constructed with iron, brass or steel bodies, brass or monel strainers, screwed or flanged ends. A proper strainer will protect and prolong the life of pumps, reducing valves, traps, pump governors, etc. Shown in Section E.

Self-cleaning Strainer

JAS. P.

MARSH

& COMPANY

Marsh Heating Systems

JAS. P. MARSH & COMPANY

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SCOPE OF THIS CATALOGUE

The material in this catalogue completely describes and illustrates Marsh Heating Systems, Marsh System Units, Marsh Gauges and Instrument Panels. It falls into several main divisions. The Marsh Weather Compensating System of heating is given detailed treatment. Due to the specific nature of the type W specialties entering into this system, they are described as part of the system. In the case of the Marsh Standard Vacuum System, the Marsh Vapor System and the Marsh One Pipe System, the system units are essentially alike and have been grouped for description in one place. Where units are particularly a part of the system they are described with it. Medium pressure traps and vents for industrial application are shown. A section is devoted to Marsh Gauges and Instrument Panels. Grouped at the end are roughing-in dimensions on all the Marsh Heating Units.

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WEATHER COMPENSATING SYSTEM OF HEATING

TO heat a building properly, a given amount of radiation is installed to overcome heat loss, the amount of heat that passes through inside walls, windows, doors and cracks. The amount of radiation is calculated to maintain a comfortable temperature within the building during the severest weather conditions, usually based upon an operating steam pressure ranging from 1 to 3 pounds gauge. But, while sufficient radiation may be installed to heat the building to a comfortable temperature during severely cold weather, no provision is made in an ordinary system to properly meet the heat demands of mild spring and fall weather when but little heat is required.

Accordingly, when the weather is mild the system delivers too much heat. Unless some means is provided to restrict the amount of heat delivered to a radiator, which the radiator in turn transmits to the room, the rooms are overheated and fuel waste occurs. This means of control in its simplest form lies in placing individual shut-off valves on each radiator. That simple means would be effective provided room occupants operated the valves. That, the individual occupant cannot be depended upon to do.

There are available a number of means of automatically controlling individual room temperatures. However, they are very costly to install.

Under ideal operating conditions such controls function to maintain temperatures. But it is possible for the occupant of a room so controlled to nullify the effect of the thermostatic control of a radiator by opening a window, thereby forcing the radiator to deliver its full capacity of heat.

Fuel Waste

In rare cases, such a condition is overcome by the operating engineer, who must give his entire time to the heating system in order to regulate the fire in the boiler to generate only sufficient steam to supply the demand for heat. However, even though the operating engineer regulates the firing of a boiler, there are conditions that cannot be governed at the source of generation.

It is a common occurrence for outside temperature to rise or drop to a noticeable degree in an hour, due to a change in direction or increase in velocity of wind movement. In an ordinary system, the engineer cannot regulate the volume or temperature of steam intended to meet the heat demand in a building where one side of the building is subjected to the sun, nor can he regulate the amount of steam to be supplied to the opposite side which is shaded from the sun and possibly subjected to a brisk wind.

The engineer will, as far as possible, govern the generation of steam to supply the heat demand of that portion of the building where the most heat is required, which in this instance would be the shaded side. The result is the overheating of the sunny side of the building.

The U. S. Weather Bureau publishes data on outside temperatures for various localities throughout the United States which indicate that heat is required 210 to 240 days out of the entire year, depending upon the locality. Of this period, weather reports show that but 5% may be classified as severe weather demanding a maximum heat load, while heat may be supplied well under maximum heat load for the remaining 95% of this period.

Under the latter condition the engineer operating an ordinary system is obliged to supply steam to the radiators in the building at practically the same temperature and volume as he does when the outside weather demands a maximum heat load, causing needless waste of fuel.

The Marsh Weather Compensating System

The solution of this problem is found in the Marsh Weather Compensating System of Heating. This system accomplishes its results by compensating the volume and temperature of the steam in the entire heating system and by limiting the amount of steam which each radiator consumes—all in accordance with weather requirements.

In its construction aspects, the Marsh Weather Compensating System is a two pipe vacuum system. Steam is supplied either by means of a boiler or from an outside source. A vacuum pump is employed to create circulation and to withdraw air and condensate.

The Marsh Compensating Supply Control is placed in the supply mains. It operates thermostatically and is fully automatic. This control governs the pressure (or vacuum) and regulates the amount and temperature of the steam distributed throughout the system.

Guarantee of Economy

JAS. P. MARSH & COMPANY *guarantees (with a satisfactory warranty) that the total fuel consumption will be at least 25% less than the amount of fuel or steam consumed by a standard vacuum system of heating.*

Installed in a new building, it will yield to the owner a return of 30 to 50% per year on the additional investment. Installation in an existing structure necessitates the removal of certain of the old style valves and somewhat increases the cost.

The installation of a Marsh Weather Compensating System of Heating includes our engineering service, expert supervision of installation and operation, and guaranteed care for a period of five years.

ELEMENTARY PRINCIPLES OF THE MARSH WEATHER COMPENSATING SYSTEM

Effect of Atmospheric Pressure Upon Boiling Points of Water

The air surrounding us has weight and exercises a pressure (14.7 pounds per square inch at sea level and 32° F.) upon every surface with which it is in contact. It is due to this force that water at sea level boils at a temperature of 212° F., while at higher altitudes where the force of the atmosphere is less, water boils at lower temperatures. In Denver, for example, approximately 5280 feet (24.45 inches mercury barometer) above sea level, water boils at approximately 201° F.

Effect of Pressure Upon Volume and Temperature of Steam

The temperature at which water boils depends entirely on the pressure exerted upon the surface of the water. Likewise, volume of steam also depends upon pressure, whether from an outside source or created by the steam.

By removing the air from a closed heating system, the force of atmosphere upon the surface of the water in a steam generating unit is reduced, allowing water to boil at lower temperatures. Since a given amount of air is removed, steam is allowed to expand to replace the space taken up by the air, hence greater volume of steam can be generated than at atmospheric pressure, or above.

The effect of pressure upon volume and temperature of steam may be seen by referring to Fig. 1. Assume that a quantity of water is placed in a closed vessel, and that a pressure of 1 pound per square inch has been induced into the vessel from an outside source. With sufficient heat applied under the vessel, the liquid would boil and start forming into steam at a temperature of 215° F., and when the entire 1 pound of water had been evaporated, the steam would occupy a space equal to 25.2 cubic feet as indicated by "A." With the pressure in the same vessel reduced to 0 pound (atmospheric pressure) water would evaporate into steam at 212° F., and the pound of water entirely evaporated into steam would occupy a space of 26.79 cubic feet as in "B." With the pressure in the vessel reduced to 5 inches of vacuum, evaporation takes place at 202.92° F. and the steam generated from 1 pound of water occupies a space equal to 31.77 cubic feet as indicated in "C." By further reducing the pressure to 15 inches of vacuum, water boils at 178.91° F., the volume of steam 51.3 cubic feet, as in "D." In other words 1 pound of water evaporated into steam at 15 inches of vacuum will fill approximately twice the space as at 1 pound pressure.

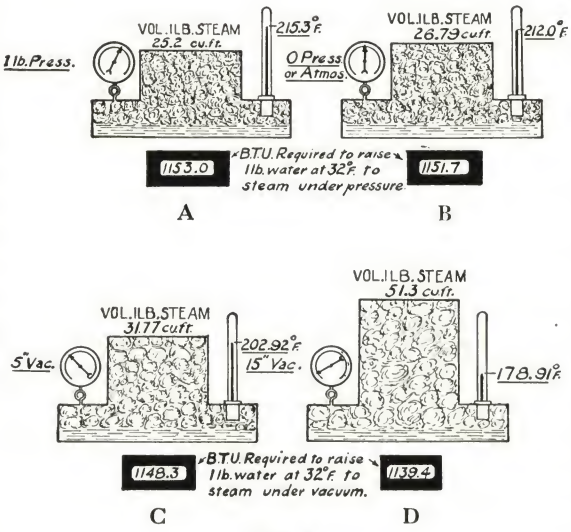


Fig. 1

The amount of heat required to generate steam varies with the amount of pressure. The amount of heat required to evaporate one pound of water under an induced pressure of one pound square inch in vessel "A" is much greater for example than the heat required to evaporate the same pound of water in vessel "C," in which the pressure is 5 inches of vacuum. This is due to the fact that in vessel "A" sufficient energy or heat must be absorbed by the water to overcome the pressure exerted upon the surface of the water which will tend to prevent the molecular expansion of water until the amount of energy is added to the water to equal that of the pressure upon the water. In vessel "C" there is less pressure to overcome, therefore less energy must be added to the water to overcome existing pressure. Expressed in B.t.u. the energy expended to evaporate the water (the initial temperature assumed at 32° F.) in vessel "A" would be 1153 B.t.u., while the B.t.u. required to evaporate the water in vessel "C" would be 1148.3 B.t.u.

Summed up, the amount of fuel required to generate steam varies as pressure and vacuum vary.

Flexibility

The Marsh Weather Compensating System of Heating employing this principle, in conjunction with the limiting effect of the Marsh Compensating Trap upon the individual radiator, has such flexible features that the volume and temperature of steam delivered to the radiators are directly proportioned to correspond with the heat demand required for prevailing weather conditions. Controlling the temperature of steam distributed to the system and automatically maintaining a required volume of low temperature steam in the radiators effects a definite fuel saving.

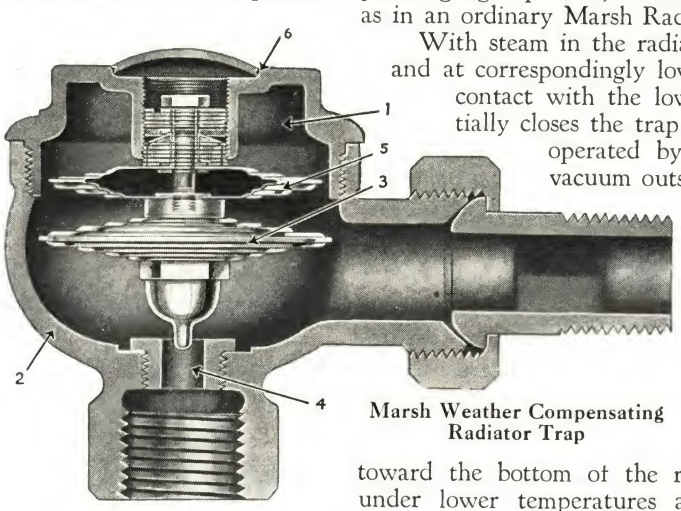
Effects of Variation

In the Marsh Weather Compensating System of Heating steam under varying pressure has three direct effects of variation due to changing pressures. First, varying the pressure of steam varies the volume of this steam and the cubical space which a given amount of steam will fill. Second, varying the temperature means a variation of the B.t.u. content of a given space filled with steam. Third, direct action of the Marsh Compensating Radiator Trap controls the amount of a given radiator which is available for heating purposes.

"COMPENSATING"

The prime object in ordinary heating systems is to purge the system of air as quickly as possible. In the Marsh Weather Compensating System, the Marsh Compensating Radiator Trap makes use of a portion of the air present in the radiator, to control the heat output of the radiator.

In construction, the Compensating Radiator Trap consists of a diaphragm assembly (1) inserted into a body (2). The diaphragm assembly incorporates two distinct types of diaphragms. The lower diaphragm (3) is identical to that of the Marsh System Unit Thermostatic Trap. This diaphragm is charged with a volatile fluid as the motor element and responds to the temperature of steam to open or close the outlet orifice. The upper diaphragm (5) communicates with atmosphere through an opening in the cap (6) and functions only when the radiator is under vacuum.



Marsh Weather Compensating Radiator Trap

The two diaphragms actuated by their respective forces are so related in their operation that under all conditions of vacuum at which the heating system operates they combine to close the trap against passage of steam at corresponding temperatures.

Under conditions of steam pressure ranging from 0 pound gauge upwards, the lower diaphragm (3) functions as in an ordinary Marsh Radiator Trap.

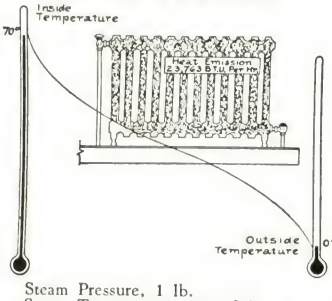
With steam in the radiator under vacuum conditions and at correspondingly lower temperatures, the heat in contact with the lower diaphragm (3) only partially closes the trap. The upper diaphragm (5), operated by the difference between the vacuum outside of the diaphragm and atmospheric pressure within, expands, carrying the lower diaphragm and valve piece downward.

With the system operating under vacuum, air and non-condensed gases are entrained within the radiator. Being heavier than steam, they tend to settle toward the bottom of the radiator. As the trap closes under lower temperatures after passing off condensate, these gases are entrained within the radiator occupying space from which steam is excluded. As the temperature at which the trap opens and closes varies with the vacuum in the radiator, the portion of the radiator available for steam decreases or increases.

TYPICAL APPLICATION TO VARIOUS WEATHER CONDITIONS

The four diagrams illustrate the manner in which the Marsh Weather Compensating System controls the heat output of a typical radiator, assuming desired room temperature of 70° and a radiator of 100 sq. ft.

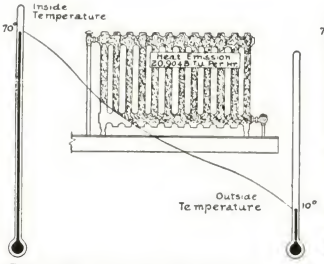
ZERO WEATHER



Steam Pressure, 1 lb.
Steam Temperature, 215.3° F.
Efficiency, 99%
Volume per lb. of Steam, 25.20 cu. ft.

At one pound gauge pressure 1 pound of steam assumes a volume of 25.2 cubic feet and has a corresponding temperature of 215.3° F. Assuming the normal efficiency at this temperature of 99 per cent, this 100 square foot radiator will have a heat emission capacity of 23,763 B.t.u. per hour, which is sufficient to maintain a constant temperature within the room of 70°.

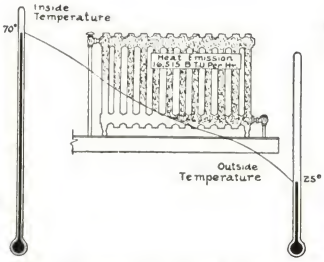
10° ABOVE ZERO



Steam Pressure, 4 inches Vacuum
Steam Temperature, 204.85° F.
Efficiency, 96.9%
Volume per lb. of Steam, 30.62 cu. ft.

At 4 inch vacuum 1 pound of steam assumes a volume of 30.62 cubic feet with a corresponding temperature of 204.85° F. and due to the action of the steam under the sub-atmospheric pressure of 4 inches, the Marsh Compensating Trap has now functioned to reduce the efficiency of the radiator so that only 96.9 per cent of the space is available for steam. The heat emission of the radiator has been reduced to 20,904 B.t.u. per hour.

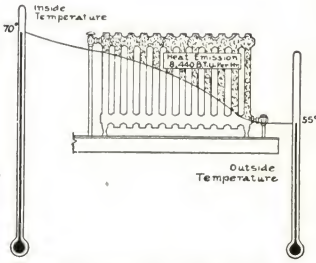
25° ABOVE ZERO



Steam Pressure, 10 inches Vacuum
Steam Temperature, 192.19° F.
Efficiency, 85%
Volume per lb. of Steam, 39.16 cu. ft

At 10 inches vacuum one pound of steam assumes a volume of 39.16 cubic feet and has a corresponding temperature of 192.19° F. The Marsh Compensating Radiator Trap under these conditions automatically compensates the radiator so that only 85 per cent of the entire radiator is available for heating purposes, the remaining 15 per cent being rendered inefficient. The heat emission for the entire radiator will be reduced to 16,515 B.t.u. per hour.

55° ABOVE ZERO



Steam Pressure, 15 inches Vacuum
Steam Temperature, 178.91° F.
Efficiency, 50%
Volume per lb. of Steam, 51.3 cu. ft.

At 15 inches of vacuum one pound of steam has a volume of 51.3 cubic feet and a temperature of 178.91° F. The Marsh Compensating Radiator Trap under these conditions automatically compensates the radiator so that only 50 per cent of the entire radiator is available for heating purposes. The heat emission for the radiator will be reduced to 8,440 B.t.u. per hour.

DESCRIPTION OF THE MARSH WEATHER COMPENSATING SYSTEM

The Marsh Weather Compensating System of Heating is a two pipe vacuum system operating at pressures ranging from above atmosphere to 15 inches of vacuum, which are varied according to prevailing weather conditions. It utilizes equipment which makes it possible to generate and circulate steam under vacuum, which, coupled with the operation of the Marsh Compensating Radiator Trap, gives perfect modulation of the radiator under all conditions.

The piping for a Marsh Weather Compensating System is practically the same as for an ordinary vacuum system. A series of steam and return piping is utilized to transmit steam to and return condensation and air from the radiating units. Standard trade practices as to pipe sizes, boilers, radiation and other appurtenances are followed. Steam may be supplied from a boiler plant integral with the building or from outside sources.

The system is applicable to all types of modern radiating units and may be used in conjunction with unit heaters, ventilating systems, and air conditioning apparatus.

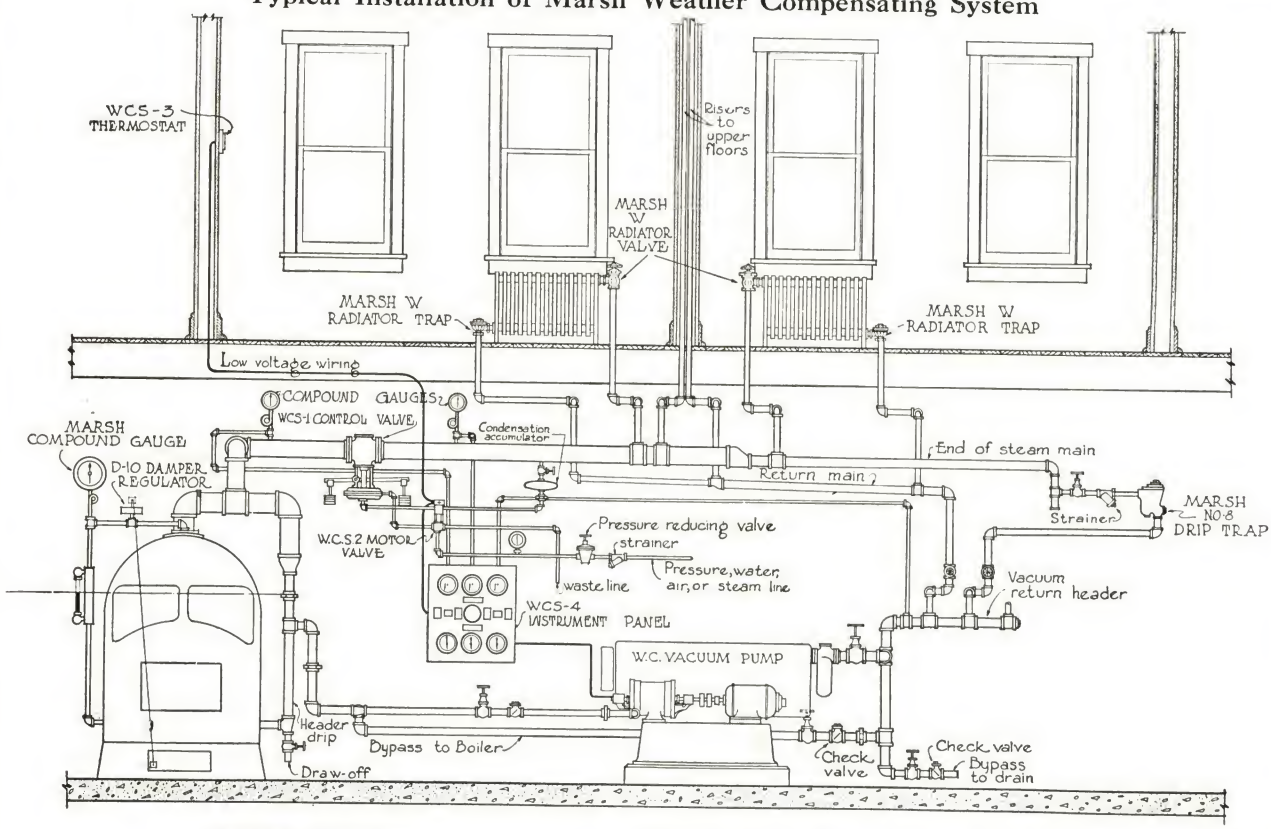
The installation of the Compensating Radiator Valve and Trap completes the radiating unit.

The steam supply system is fitted with one or a series of Compensating Control Valves, the number of which depend upon the type of building to which the system is applied. These valves control the flow and pressure of the steam into the supply system and the radiation.

The return line system follows back to a vacuum pump which is employed to create circulation and to withdraw the water of condensation from the system and return it to the boiler plant. This pump also functions to withdraw from the system such air and gases which are not utilized in the Compensating process.

Control panels are equipped with indicating, recording and controlling instruments. Incorporated in the make-up of the control panel is the Marsh Compensating Governor which regulates the operation of the vacuum pump. In addition to this the panel contains switches for the operation of the various electrical units.

Typical Installation of Marsh Weather Compensating System



Auxiliary Apparatus

Where the Marsh Weather Compensating System is installed in conjunction with Vento heater, unit heaters, domestic hot water heaters and similar apparatus operating at pressures to 10 pounds or higher, the returns from such equipment are handled independently.

Condensate and air from these units are discharged through standard Marsh System Unit Drip Traps and Heavy Duty Traps into a separate return line, and usually a condensation pump is installed. However, where desired to discharge the return from such equipment into the Compensating System Vacuum Pump this can be arranged, by installing Marsh Return Line Regulating Equipment. This equipment is designed especially for each installation.

MARSH WEATHER COMPENSATING SYSTEM UNITS

THE Marsh Weather Compensating System Units described in the following pages are most modern in design and in principle of operation. Beauty is featured in the radiator units. Efficiency in operation and sturdiness in design has been the prime object in the production of the system units comprising the Marsh Weather Compensating Systems of Heating.

Type W Radiator Valve

The octagonal body lines of the Type W Radiator Valve blend perfectly with the body lines found in the modern tubular radiator, and as installed in combination with the Type W Radiator Trap, gives a pleasing effect. The Type W Radiator Valve stands out in pleasing relief in two-tone chrome finish; the body in satin chrome and the bonnet and tailpiece in polished chrome. A bakelite handle crowns the Type W Radiator Valve, lending itself to easy opening or closing.

See full description on page 18. Data on valve extensions and other accessories are given on page 20. Roughing-in dimensions are on page 31.

Type W Radiator Valve

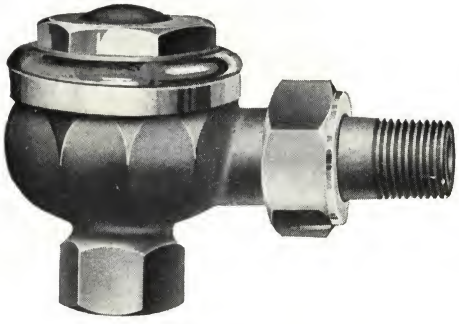
Type W Radiator Trap

The Type W Compensating Radiator Trap controls the heat output of the radiator. The compensating feature has been previously described.

The octagonal body lines of the Type W Compensating Radiator Trap show a pronounced similarity to the body lines of the modern tubular radiator. Its contour resembles that of the Type W Radiator Valve. Installed on the radiator in combination with the Type W Radiator Valve, it tends to beautify the radiator.

The Type W Compensating Radiator Trap is finished in two-tone chrome; the body in a satin finished chrome and the bonnet and tailpiece in polished chrome.

Roughing-in dimensions are on page 32.



Type W Radiator Trap

Marsh Compensating Control Valve

The Marsh Compensating Control Valve functions to automatically control the flow and the pressure of steam in the heating system. One complete set, as illustrated on the next page, is installed on each zone of the heating system and controls that particular section of the building.

A thermostat of proper design is installed in the section of the building to be controlled. The type of thermostat and the exact location varies with the construction and the design of the building. In some cases the thermostat is of the room type and is actuated by temperature in a key location. In other cases the thermostat is of the dual type and is actuated by thermostatic bulbs of the remote type. One bulb is installed subjected to outside temperature and another to room temperature, or in some cases actual steam temperature.

The steam control valve proper (1) (see illustration on next page) is of the lever and weight type and is provided with double seat valves. This valve functions to control the flow of steam into the heating system and is operated by a diaphragm of extra large area contained within the housing (2-3).

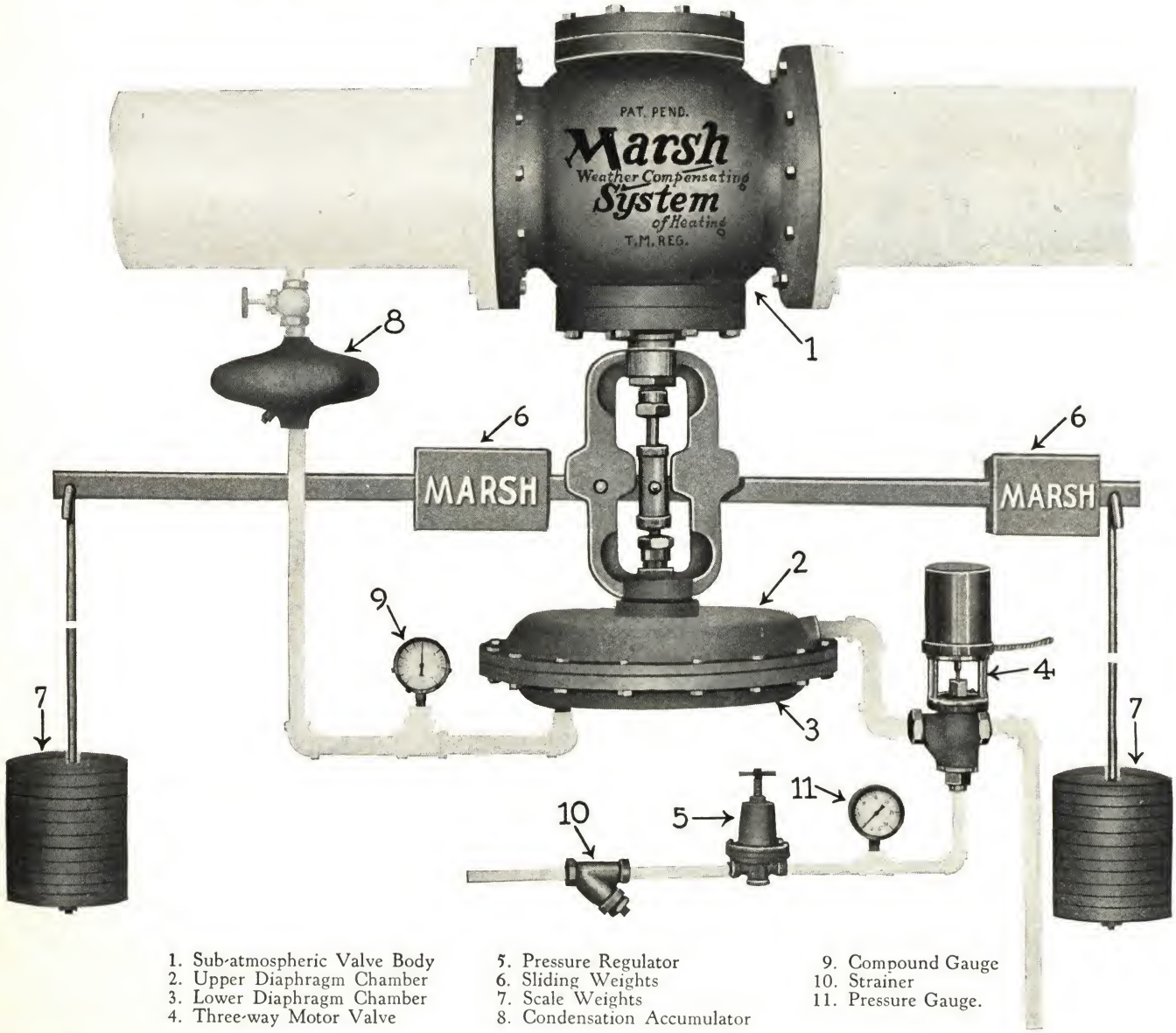
This diaphragm forms a seal between chambers (2-3). Chamber (3) is connected in the conventional manner to the delivered side of the reducing valve and in that manner the underside of the diaphragm is subjected to the steam pressure prevailing within the heating system. Chamber 2 is connected through a three-way motor valve (4) to a pressure line in which pressure regulator (5) maintains

a constant water or air pressure (usually ten pounds). In this manner the upper side of the diaphragm is subjected to the pressure in this water or air line when the motor valve (4) is open, or to atmospheric pressure when the motor valve (4) is closed. The three-way motor valve (4) is energized by the thermostat.

Weights (6-7) are set so that, in conjunction with the diaphragm contained in the housing (2-3), the stem operates the valve (1) to deliver sufficient steam to the heating system to maintain 15 inches of vacuum during periods when small volume of heat is required in the building. When additional heat is needed to maintain the desired temperature, the thermostat energizes the three-way motor valve (4) opening the pressure line to diaphragm housing (2) and subjecting the upper side of the diaphragm to this pressure, opening the valve and permitting more steam to flow into the heating system. When the heat demand has been satisfied the thermostat acts to close the valve against the pressure line and open it to the drain connection. As the thermostat is subjected to additional heat demands from time to time this operation is repeated, increasing the steam pressure and temperature in the heating system.

The flow of steam so controlled is constant and at no time is the steam control valve proper (1) fully closed. At all times when the heating system is in operation the minimum flow of steam is equivalent to a vacuum of 15" and the introduction of additional steam is gradual. As heat demands operate the control valve mechanism increasing the steam flow and the corresponding steam pressure, the increased pressure in the heating system acting on the underside of the diaphragm in diaphragm chamber (3) partially counteracts the pressure introduced into the upper diaphragm chamber (2). The opening in the steam control valve (1) is reduced in proportion. Thus the control functions to introduce additional steam into the heating system only as the heating system is in a position to absorb and circulate such additional steam efficiently and noiselessly.

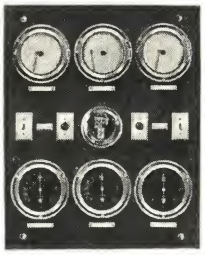
THE MARSH COMPENSATING CONTROL VALVE



1. Sub-atmospheric Valve Body
2. Upper Diaphragm Chamber
3. Lower Diaphragm Chamber
4. Three-way Motor Valve
5. Pressure Regulator
6. Sliding Weights
7. Scale Weights
8. Condensation Accumulator
9. Compound Gauge
10. Strainer
11. Pressure Gauge.

Compensating Control Panel

Control panels for use on Marsh Weather Compensating Systems of Heating are designed to meet the requirements of individual installations. Marsh Recording Gauges are employed to provide the operating engineer with a permanent record of the pressures carried on the initial steam supply line, the house supply line and vacuum carried on the return system. For observation purposes, Marsh Indicating Gauges are included, permitting the operator to determine at a glance the conditions existing in the supply and return systems.

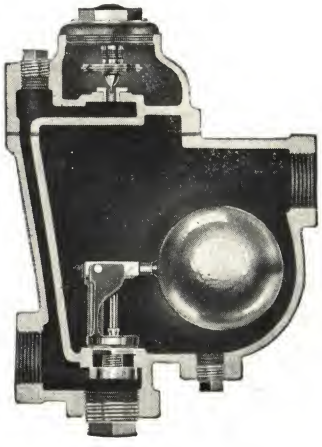


Each panel is equipped with a Marsh Compensating Pump Governor which operates the vacuum pump, maintaining circulation.

In some instances panels are equipped with manual switches for operation of three-way valves, pump, etc.

Type W Indicating Gauge

This instrument is provided as a regular part of all Marsh Weather Compensating Systems for installation on the house side of supply and return systems, also for installation on boilers. Pressure is graduated to 10 pounds in magnified reading and retarded to 30 pounds. Vacuum is graduated to 20 inches in magnified readings and retarded to 30 inches.



Marsh No. W-8 Drip Trap

This trap is designed to quickly remove condensation and air from drip points on steam mains, steam risers, steam coils, or blast heaters.

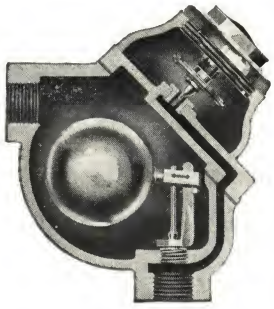
The water discharge valve is float controlled and located at a low point in the bottom of the trap. Air is removed through a thermostatically controlled port in the cap of the trap. The by-pass member used is the standard assembly as in the No. W-1 compensating radiator trap. Normally air is discharged through a port directly to the outlet connections of the trap. In cases where the trap may be required to discharge to a wet return the air discharge may be connected to a dry return from a special opening tapped in the cap of the trap.

Body of trap is provided with one 1¼-inch tapped inlet and two 1¼-inch tapped outlet openings. These openings are located to permit direct connection both to inlet and from outlets. The trap may be suspended directly in the piping and no other supports are necessary.

All interior parts are of bronze or monel, except the float, which is a seamless copper float tested for a working pressure of 25 pounds per square inch.

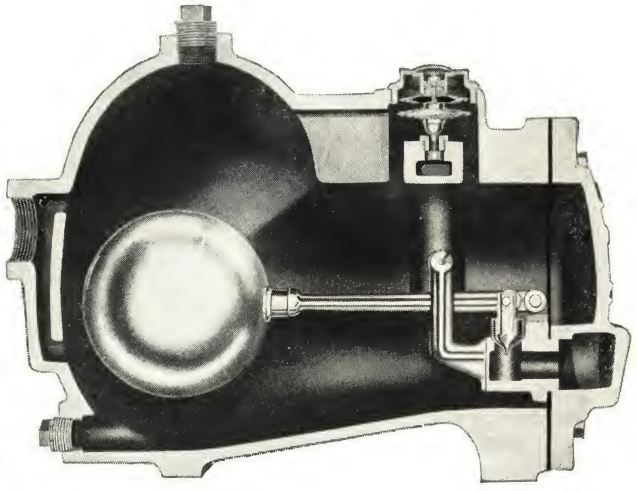
Marsh No. W-12 Drip Trap

Designed for removal of air and condensation from short steam mains, branches or riser. Unit heaters, steam coils, etc., are within the limits of the capacity of the trap. The size and weight of the trap permits its installation in the piping without other means of support. Condensation is removed through a float operated valve located at the lowest point inside body. Body of trap is of cast iron and all interior parts are of steam bronze, copper and monel metal. The air by-pass is the same assembly as in the No. W-1 compensating radiator trap. Inlet and outlet connections are ¾ inch.



Marsh No. W-14 Heavy Duty Trap

Where the System is so designed that Vento heaters, hot water heaters, etc., are to be operated with steam from



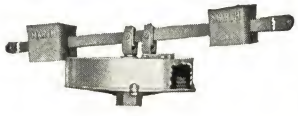
2 pounds to sub-atsmospheric pressure, this trap is applied. The air and condensate is discharged directly to the Vacuum return line of the heating system.

Condensation is discharged through a float operated valve located at the lowest point in the body. The air by-pass is the same assembly as in the No. W-1 Compensating radiator trap. Body is of cast iron and all interior parts of forged steam bronze, copper and monel metal.

This trap is made in four sizes—1 inch, 1¼ inch, 1½ inch and 2 inch connection sizes.

Boiler Damper Regulator

This device functions to control the dampers on hand fired coal boilers. A lever arm is automatically actuated to control the dampers.



In stoker, oil or gas fired boilers Marsh Merkustat Regulators are provided.

TYPICAL SPECIFICATIONS MARSH WEATHER COMPENSATING SYSTEM OF HEATING

1. General Conditions—The general conditions governing this portion of the work shall be in accordance with those of the American Institute of Architects and installation shall be in accordance with standard practices of the local association of contractors.

2. Scope of Work—The work to be done includes the furnishing of all labor and materials for the complete installation of a Marsh Weather Compensating System of Heating as hereinafter specified and as shown on drawings. Work to be done shall be executed in a neat and workmanlike manner, and all apparatus pertaining to this portion of the work to be of the best grade materials and shall strictly conform to these specifications.

3. Boiler—Boiler shall be a .... with guaranteed rating for .... sq. ft. of radiation and shall contain .... sq. ft. of heating surface. Boiler shall be installed upon suitable foundation and equipped with all connections and trimmings. For automatic stoker, oil or gas-fired boilers provisions shall be made for connection of this apparatus to boiler in accordance with manufacturer's instructions.

4. Smoke Pipe—Connect boiler to chimney with suitable smoke pipe of ..... gauge black steel, of size as recommended by boiler manufacturer.

5. Pipe and Fittings—Contractor shall furnish and install where indicated on plans all pipe and fittings properly supported and graded to insure complete and successful operation of the System. All piping shall be free from dirt and scale and ends reamed. All joints shall be made up with graphite and oil paste which shall be applied to male threads only. Provisions to be made for expansion in all mains, risers and branches.

Boiler header shall be made up of standard flanged fittings connected to boiler full size of steam opening, same to be dripped to return header through a bleeder. All spring pieces to mains shall be taken out of top of mains at 45 deg. on upfeed systems and out of bottom of steam mains at 90 deg. on downfeed systems.

Supply mains shall be graded to ½ in. in 10 ft. away from boiler and dripped through Type W Drip Traps. Runouts or branches to radiators or risers to be graded not less than 1 in. in 10 ft. towards supply mains.

Return mains shall be graded 1 in. in 10 ft. in direction of flow and shall be free from sags or pockets. No loop connections shall be used in return mains.

6. Floor Plates—Where pipes project through finished floors, ceilings or walls provide approved nickel plated floor or ceiling plates.

7. Vacuum Pump—Furnish and install vacuum pump as supplied by JAS. P. MARSH & CO. as shown on plan. Pump to have capacity of ..... sq. ft. of radiation, to be full automatic for .... volts, ... phase, ... cycle, to be duplex unit consisting of two pumps with their respective motors, one receiving tank, necessary float and automatic control, check valves, gate valves, switches, etc., for complete installation ready to run. Vacuum pumps shall be of air capacity and equipped with Marsh Compensating Controls to automatically maintain the necessary difference in pressure between supply and return with maximum of 15 in. of vacuum in supply side when full load of radiation is on.

8. Thermostatic Supply Control—This contractor shall furnish and install Marsh Compensating Supply Control Valves as furnished by JAS. P. MARSH & CO. and as shown on the drawings. Each control valve shall be fitted complete with thermostat, motor valve, regulating valve, strainer condensation accumulator and necessary gauges. Thermostats and motor valves shall be connected up complete ready for operation including all necessary electrical connections.

9. Control Panels—Install where shown on plans Marsh control panel having all necessary recording and indicating instruments and compensating governor, with all necessary switches and wiring and auxiliary piping completely installed by this contractor.

10. Radiator Traps—Each radiator shall be provided with a Marsh Type W Compensating Radiator Trap of proper size as manufactured by JAS. P. MARSH & CO.

11. Radiator Valves—Each radiator shall be equipped with a JAS. P. MARSH & CO. Type W Flexcone Radiator Valve of proper capacity.

TAPPING SCHEDULE

Sq. ft.	Valve	Trap
0– 30	½″ Type W	½″ No. W-1
31–100	¾″ Type W	½″ No. W-1
101–125	1 ″ Type W	½″ No. W-1
126–175	1 ″ Type W	½″ No. W-2
176–280	1¼″ Type W	½″ No. W-2
281–up	1½″ Type W	½″ No. W-2

12. Radiation—Furnish and install radiation shown on plan. All radiation to be of approved make. Radiation shall be washed and cleaned at the factory and shipped equipped with wooden plugs in supply and return ends.

13. Hot Water Heaters—Returns from this equipment shall be either handled separately by a condensation pump direct to the boilers or shall be dripped into the vacuum return through Marsh Return Line Regulating Equipment in accordance with manufacturer's instructions.

14. Ventilating Apparatus—Steam coils in connection with this type of apparatus shall be handled generally as is the hot water heating equipment.

15. Covering—Cover all steam mains and spring pieces with 1 in. thick asbestos sectional covering. Cover all fittings with asbestos cement. All piping run on outside walls or within 18 in. of same shall be covered with ½ in. thick asbestos covering. Cover boiler as specified by boiler manufacturer. Smoke pipe is to be covered with asbestos blocks wired on and finished smooth with coat of asbestos cement.

16. Painting—Where painting is included on this contract all exposed piping and radiators in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed. Exposed parts on boiler to be given two coats of graphite paint.

17. Check Valves—Check valves shall be horizontal type with brass disc, best grade obtainable. They shall be installed where called for by plans and shall be tested for tightness before final connections are made.

18. Dirt Strainers—A gate valve and Marsh Dirt Strainers of same size as inlet tapping to trap shall be placed ahead of every drip trap and heavy duty trap. Each strainer shall be provided with gate valve at blowoff.

19. Test for Tightness—The system when finished shall be tested for tightness in presence of a representative of JAS. P. MARSH & CO. A drop of 10 in. of vacuum in one hour will be allowed, measured from a maximum of 15 in. of vacuum secured when system is filled with steam. At this point the steam supply valve shall be closed, the pump stopped and at the end of an hour 5 in. of vacuum shall remain in the steam side of the system.

20. Guarantee—The heating contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise, with a vacuum of 15 in. in steam main. If the apparatus shall fail to accomplish this guarantee by reason of any defect developing within the period of one full heating season and that defect is due to faulty material or poor workmanship, the heating contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

21. Inspection—JAS. P. MARSH & CO. will have a representative come on the job from time to time for inspection work and any instructions given by him in writing regarding changes shall be considered a part of this specification. The heating contractor must lend any assistance necessary in connection with these inspections.

22. Finally—The true intent and meaning of these specifications is to bring about the satisfactory installation of a Marsh Weather Compensating System of Heating and nothing contained herein can be construed to relieve the contractor from making good and perfect the work in all usual details of construction, and he will be held responsible and bear all expenses incidental to the satisfactory completion of the work. Upon satisfactory completion and inspection, JAS. P. MARSH & CO. will issue to the heating contractor a certificate certifying correct installation and operation of the Marsh Compensating equipment, which certificate shall be executed in duplicate, one copy to be delivered by heating contractor to the architect.

MARSH STANDARD VACUUM SYSTEM OF HEATING

THE Marsh Standard Vacuum System of Heating is a two pipe system especially adaptable to larger apartment buildings, store buildings, office buildings, hospitals and public structures. This system is ideal for application to groups of buildings served by one power plant. This type of system circulates steam at low pressures. Steam may be obtained from a boiler, from a central station or by utilizing exhaust steam. Rapid circulation is secured by means of a mechanically created vacuum in the return line system.

Marsh Heating Systems

Design

The Marsh Standard Vacuum system of Heating consists of steam supply mains with risers and branches to deliver steam to the inlet of all radiators or convection heaters, and a system of return mains, risers and branches to remove air and condensation from the complete system including the supply piping and the radiators.

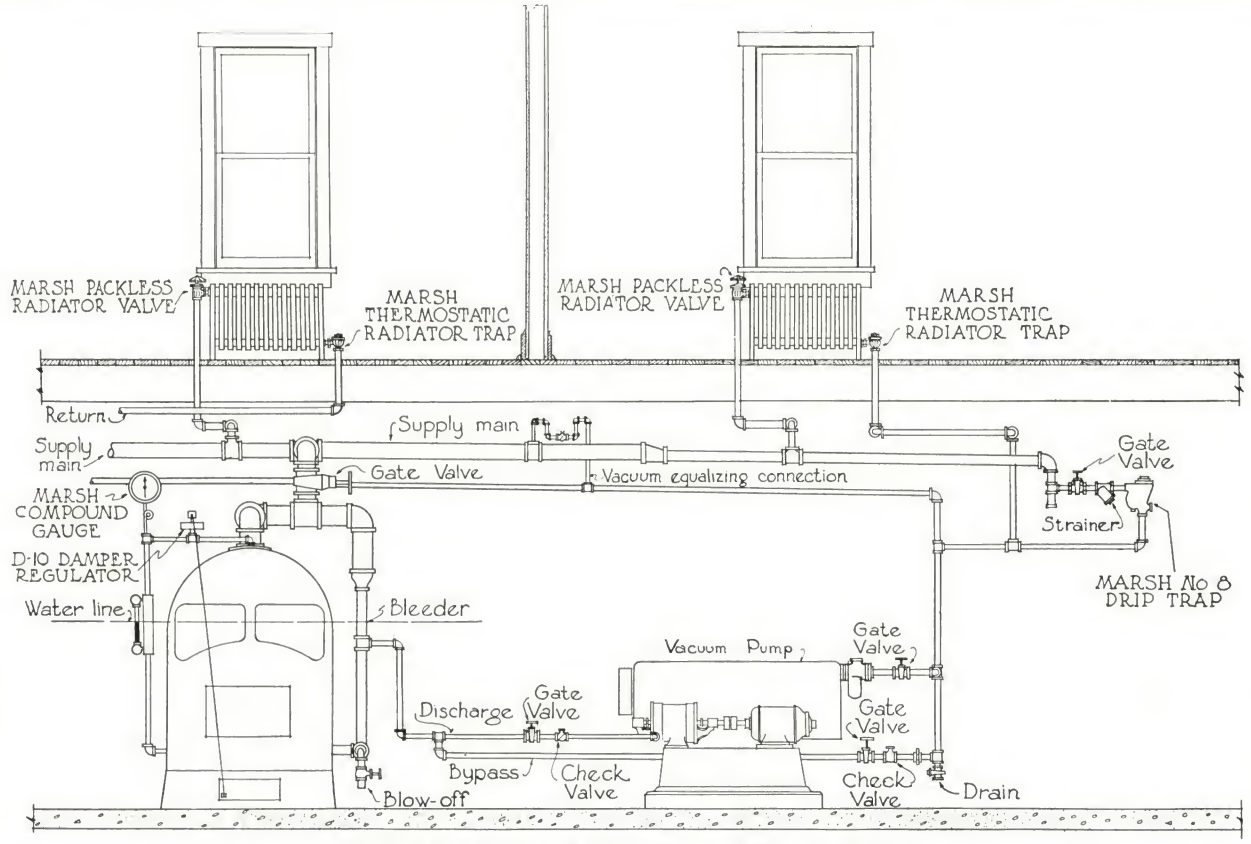
If air tempering coils or domestic water heaters are included these units are served by the same steam and return mains that provide steam for the direct heating units.

A Marsh System Unit radiator valve is installed at the inlet of each radiator to control the supply of steam and a Marsh System Unit thermostatic radiator trap is installed at the outlet end of each radiator to permit the passage of air and condensate, but prevent steam entering the return lines. At properly located points the steam mains are provided with Marsh Float and Thermostatic traps which serve to keep these mains free of condensation and air.

Larger condensing units are equipped with a Marsh System Unit Valve on the inlet and a Marsh System Unit Drip Trap on the outlet.

Air tempering coils are drained through Marsh System Unit Heavy Duty Traps and are vented through Marsh System Unit Thermostatic Traps. Domestic Water Heaters are also drained through Marsh Heavy Duty Traps. All condensation and air from these units are discharged into the return main.

The return main is connected directly to a vacuum pump and its function is to free return lines of air and water. As a general rule the vacuum pump discharges the air to atmosphere and condensation is delivered



Typical Installation of Marsh Standard Vacuum System

For Complete Description of System Units, See Page 18 for Radiator Valves, Page 22 for Radiator Traps and Page 24 for Drip Traps. For Roughing-in Dimensions, Pages 31, 32 and 33. Gauges on Page 28.

direct to the boiler. If steam is secured from an outside source the condensate is usually discharged through a meter to the sewer. If exhaust steam is used the condensation is ordinarily discharged to a hot well or an open feed water heater.

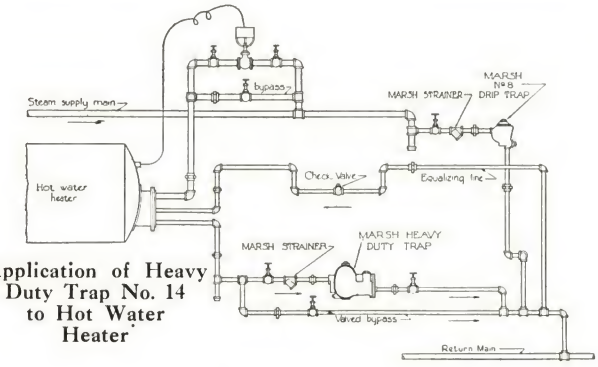
A Marsh Standard Vacuum System of Heating may be either of the up-feed or down-feed type. In the up-feed system the steam supply mains are located in the basement and condensation and air from the risers may be passed back through the mains to the drip traps on the mains or each riser may be dripped independently into the return lines through a Marsh Thermostatic Trap. Either will give satisfactory results if properly installed.

In some cases it is good practice to provide an up-feed system for the lower floors and a down-feed system for the upper stories of a building.

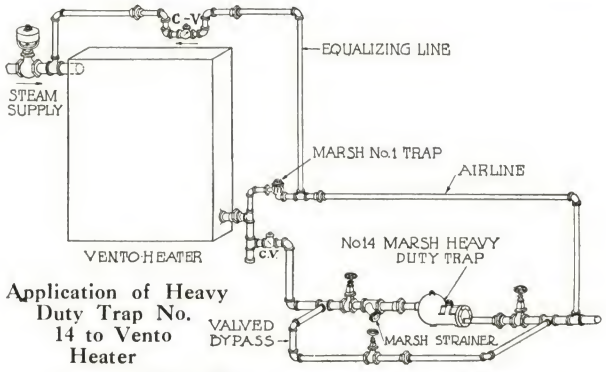
When the down-feed system is used it is common practice to supply steam to air tempering coils or domestic water heaters through special basement mains installed for this specific purpose.

In the case of a down-feed system a main steam riser supplies steam to mains located in the attic space to which risers are connected supplying steam to the radiation throughout the building. The base of the main steam riser is dripped through a Marsh Heavy Duty Float and Thermostatic Trap and the base of each riser is dripped through Marsh Thermostatic Traps or through Marsh Float and Thermostatic Drip Traps.

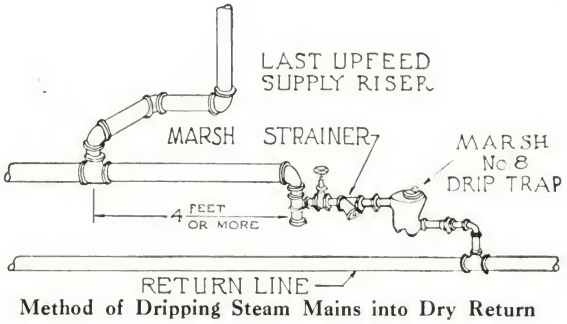
A regular feature of construction in the Marsh Standard Vacuum System of Heating is an equalizing connection between the supply and return systems. This feature assures circulation in the heating system during off-peak load periods when the fires are banked and insufficient steam is being provided to warrant regular operation of the vacuum pump and the pump is operated only to return condensate to the boiler. During such periods a natural vacuum is often created in the boiler and supply line deeper than that in the return. Condensate and air in the return are retarded so they will not flow to the vacuum pump and circulation is impaired. The equalizing feature is a connection between the supply and return main in which a swing check valve is installed. This valve opens when the vacuum in the supply is in excess of that in the return, thus equalizing the system and permitting free flow of condensate by gravity back to the vacuum pump.



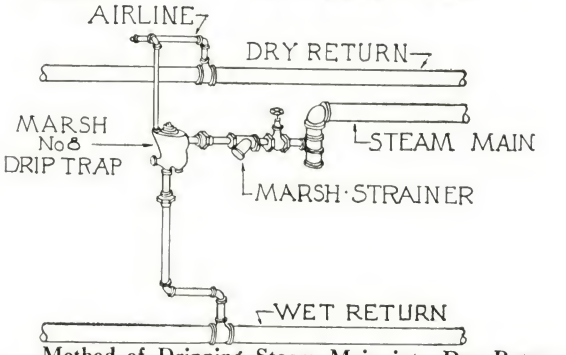
Application of Heavy Duty Trap No. 14 to Hot Water Heater



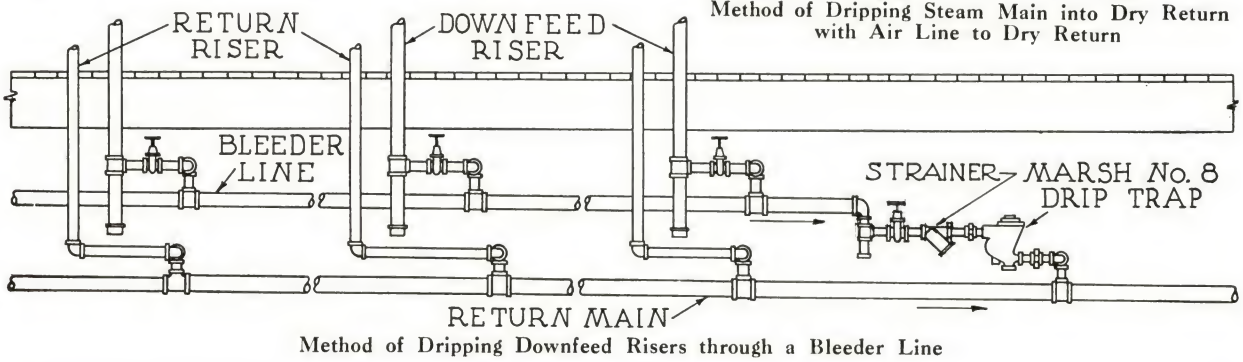
Application of Heavy Duty Trap No. 14 to Vento Heater



Method of Dripping Steam Mains into Dry Return



Method of Dripping Steam Main into Dry Return with Air Line to Dry Return



Method of Dripping Downfeed Risers through a Bleeder Line

TYPICAL SPECIFICATIONS MARSH STANDARD VACUUM SYSTEM OF HEATING

1. General Conditions—The general conditions governing this portion of the work shall be in accordance with those of the American Institute of Architects and installation shall be in accordance with standard practices of the local association of contractors.

2. Scope of Work—The work to be done includes the furnishing of all labor and materials for the complete installation of a Marsh Vacuum System of Heating as hereinafter specified and as shown on drawings. Work to be done shall be executed in a neat and workmanlike manner, and all heating apparatus pertaining to this portion of the work to be of the best grade materials and shall strictly conform to these specifications.

3. Boiler—Boiler shall be a..... with guaranteed rating for ..... sq. ft. of radiation and shall contain ..... sq. ft. of heating surface. Boiler shall be installed upon suitable foundation and equipped with all necessary connections and trimmings, including Marsh Compound Gauge, Kunkle Pop Safety Valve and Type D Damper Regulator. For automatic stoker, oil or gas-fired boilers provision shall be made for connection of this apparatus to boiler in accordance with manufacturer's instructions.

4. Smoke Pipe—Connect boiler to chimney with suitable smoke pipe of ..... gauge black steel, of size as recommended by boiler manufacturer.

5. Pipe and Fittings—Contractor shall furnish and install where indicated on plans all pipe and fittings properly supported and graded to insure complete and successful operation of the System. All piping shall be free from dirt and scale and ends reamed. All joints shall be made up with graphite and oil paste which shall be applied to male threads only. Provisions to be made for expansion in all mains, risers and branches. Boiler header shall be made up of standard flanged fittings connected to boiler full size of steam opening, same to be dripped to return header through a bleeder. All spring pieces to steam and return mains shall be taken out of top of mains at 45 deg. on upfeed systems and out of bottom of steam mains at 90 deg. on downfeed systems.

Supply mains shall be graded to ½ in. in 10 ft. away from boiler and dripped through Marsh No. 8 Drip Traps. Runouts or branches to radiators or risers to be graded not less than 1 in. in 10 ft. towards supply mains.

Return mains shall be graded 1 in. in 10 ft. in direction of flow and shall be free from sags or pockets. No loop connections shall be used in return mains.

6. Floor Plates—Where pipes project through finished floors, ceilings or walls provide approved nickel plated floor or ceiling plates.

7. Vacuum Pump—Furnish and install vacuum pump as shown on plan. Pump to have capacity of ..... sq. ft. of radiation to be full automatic for ..... volts, ... phase, ... cycle. Pump to be unit consisting of pumps with their respective motors, one receiving tank, necessary float and automatic control, with check valves, gate valves, switches, etc., for complete installation ready to run.

8. Radiator Valves—Each radiator shall be equipped with a JAS. P. MARSH & CO. System Unit Flexcone Radiator Valve of proper size.

9. Radiator Traps—Each radiator shall be provided with a Marsh System Unit Radiator Trap of proper size as manufactured by JAS. P. MARSH & CO.

10. Radiation—Furnish and install radiation shown on plan. All radiation to be of approved make with air valve tapping plugged. Radiation shall be washed and cleaned at the factory and shipped equipped with wooden plugs in supply and return ends.

TAPPING SCHEDULE

Sq. ft.	Valve	Trap
0- 30	½″	½″ No. 1
31-100	¾″	½″ No. 1
101-125	1 ″	½″ No. 1
126-175	1 ″	½″ No. 2
176-250	1¼″	½″ No. 2
250-280	1¼″	¾″ No. 2
280 up	1½″	¾″ No. 2

11. Hot Water Heaters—Returns from this equipment shall be either handled separately by a condensation pump direct to the boilers or shall be dripped into the vacuum return through Marsh No. 14 Heavy Duty Traps in accordance with manufacturer's instructions. In this latter case condensation shall be passed through an economizer located as shown.

12. Ventilating Apparatus—Steam coils in connection with this type of apparatus shall be handled generally as is the hot water heating equipment.

13. Covering—Cover all steam mains and spring pieces with 1 in. thick asbestos sectional covering. Cover all fittings with asbestos cement. All piping run on outside walls or within 18 in. of same shall be covered with ½ in. thick asbestos covering. Cover boiler as specified by boiler manufacturer. Smoke pipe is to be covered with asbestos blocks wired on and finished smooth with coat of asbestos cement.

14. Painting—Where painting is included on this contract all exposed piping in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed. Radiators shall be painted as directed. Exposed parts on boiler to be given two coats of graphite paint.

15. Check Valves—Check valves shall be horizontal type with brass disc, best grade obtainable. They shall be installed where called for by plans and shall be tested for tightness before final connections are made.

16. Dirt Strainers—A gate valve and Marsh Dirt Strainer of same size as inlet tapping to trap shall be placed ahead of every drip trap and heavy duty trap. Each strainer shall be provided with gate valve at blowoff.

17. Test for Tightness—The system when finished shall be tested for tightness. A drop of 10 in. of vacuum in one hour will be allowed, measured from a maximum of 15 in. of vacuum secured when system is filled with steam. At this point the steam supply valve shall be closed, the pump stopped and at the end of an hour 5 in. of vacuum shall remain in the steam side of the system.

18. Guarantee—The heating contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise. If the apparatus shall fail to accomplish this guarantee by reason of any defect developing within the period of one full heating season and that defect is due to faulty material or poor workmanship, the heating contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

19. Finally—The true intent and meaning of these specifications is to bring about the satisfactory installation of a Marsh Vacuum System of Heating and nothing contained herein can be construed to relieve the contractor from making good and perfect the work in all usual details of construction, and he will be held responsible and bear all expenses incidental to the satisfactory completion of the work.

MARSH VAPOR SYSTEM OF HEATING

THE Marsh Vapor System is a two-pipe system which, because of its simplicity of design and ease of operation is adaptable to residences, and to stores, and apartment buildings covering a moderate area. It may be applied to all types of radiators and convectors.

Marsh Heating Systems

Advantages

It is a two-pipe system which rapidly circulates vapors at low pressures. In mild weather a few ounces of pressure is sufficient to take care of heat requirements. At times the system may even be operated under vacuum.

The amount of vapor delivered to the radiators is controlled by operating the Marsh System Unit Graduated Radiator Valves.

When these valves are installed they are set by the steamfitter to fit the needs of their respective radiators. The valves are then manually operated by the occupant, the graduations plainly showing the fractional openings. The low pressures under which the system operates and the ability to accurately control heat output of the radiators results in economy of operation and room comfort.

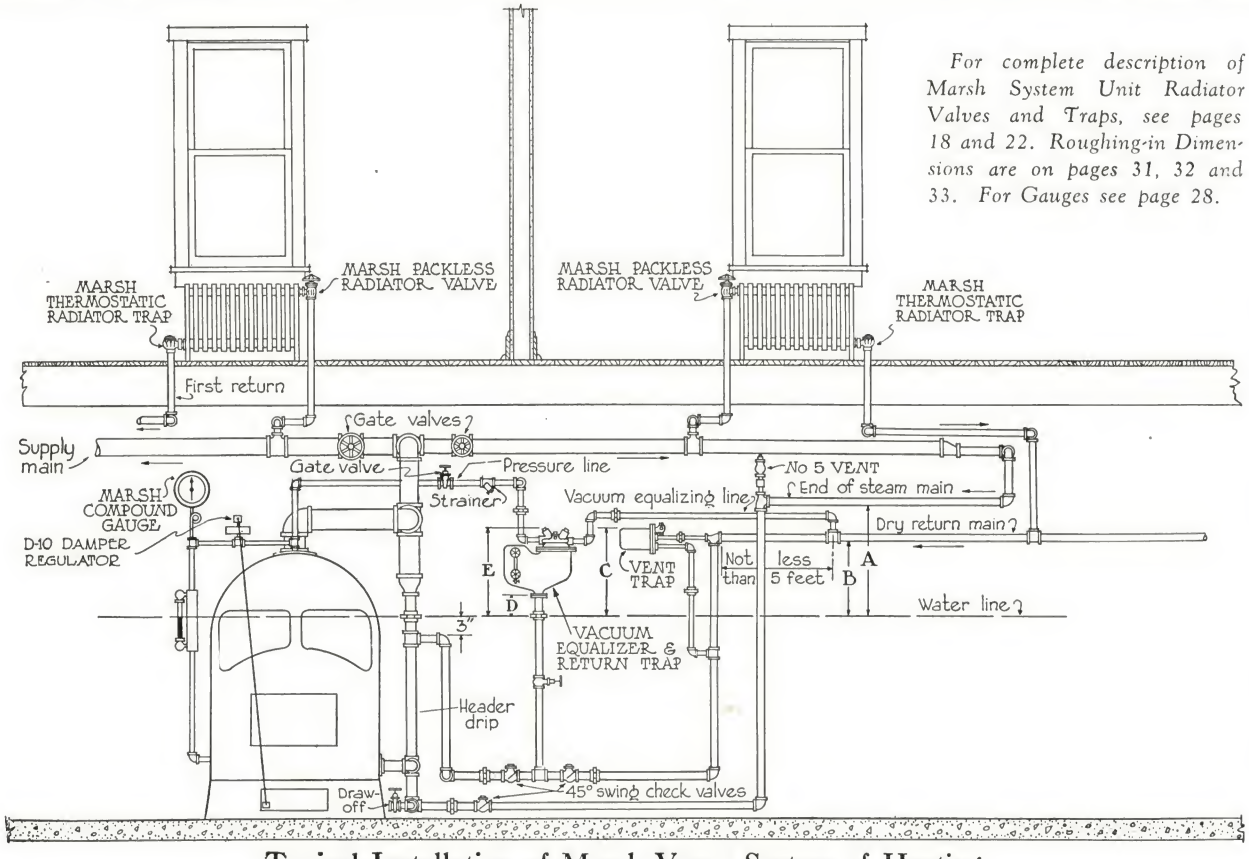
Operation

Vapor is generated in the boiler and circulates through the supply piping, forcing the air present before it. Air is expelled from the supply piping by a Marsh System Unit No. 5 Vent. Marsh System Unit Radiator Valves are installed at the inlet of each radiator to control the flow of vapor into the radiator. As the vapor gives off its heat it condenses. A Marsh System Unit Radiator Valve is installed at the outlet and functions to permit water and air to pass into the return piping, shutting off to vapor.

The condensate and air flow through the return piping to a point near the boiler where the air is vented to atmosphere by a Marsh System Unit Vent Trap. The condensate is returned to the boiler.

As the radiator valves are operated to conform with changing weather conditions, the varied flow of steam serves to actuate a sensitive damper regulator on the boiler. This unit automatically opens or closes the boiler drafts controlling the fire.

In the case of gas boilers, or oil burners, the regulator controls the operation of the burner.



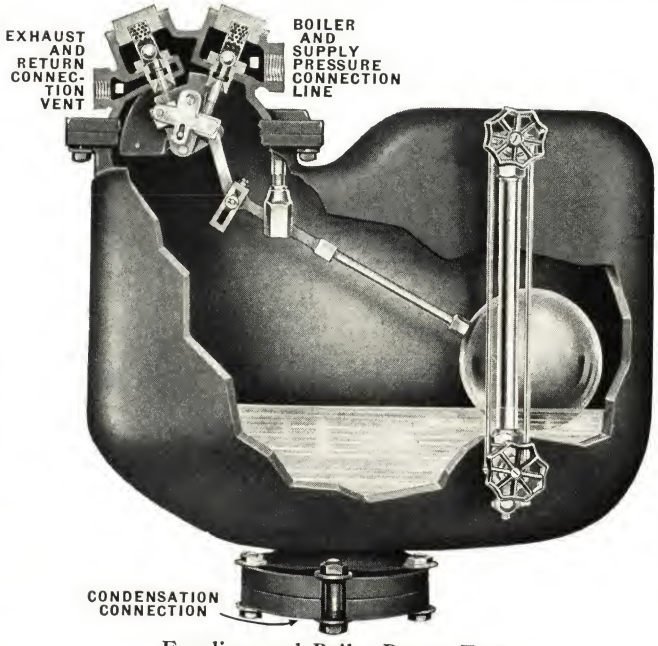
For complete description of Marsh System Unit Radiator Valves and Traps, see pages 18 and 22. Roughing-in Dimensions are on pages 31, 32 and 33. For Gauges see page 28.

Typical Installation of Marsh Vapor System of Heating

Marsh System Unit Equalizer and Boiler Return Trap

This unit serves to maintain circulation in the system. It performs the two functions of equalizing the vacuum between the supply and return piping and returning water to the boiler. It eliminates the installation of additional piping occasioned by the use of a separate equalizer and guarantees protec tion to the boiler by posi tively returning condensate.

The purpose of the equalizer feature is to prevent the holding up of water in the return system due to the creation of deeper vacuum in the supply system when the fire is banked and the volume and pressure of vapor is decreased. It consists of an integral ball check between supply and return connections in the head of the trap. When the vacuum in the supply side becomes deeper than in the return, the ball check opens, equalizing the vacuum, freeing the water in the piping and allowing it to flow into the trap.



Equalizer and Boiler Return Trap
(For Roughing-in Dimensions, See Page 33)

A glance at the installation drawing will show how the return main is connected to the boiler. The pressure in the boiler sets up a resistance that, combined with the loop connection, makes it impossible for the water to return to the boiler by gravity, except when the boiler is operating at very low pressure. The equalizer and return trap is installed above the water line and is connected with the lowest level of the return main below the water line. On either side of this latter connection, swing check valves are placed.

Seeking its own level, condensate accumulates in the boiler return trap. A float in the trap rises. By means of a main weight and idler weight two cam rods are actuated simultaneously. One cam unseats a valve, opening an inlet connected directly with the boiler header. This allows steam to enter the trap. The other cam shuts off an exhaust connection to the return system. The pressure of the boiler has thus been introduced into the trap and makes it possible for the accumulated condensate to flow freely into the boiler.

When the water level recedes, the float and lever actuate the weights and cams in the opposite direction, closing off the inlet port from the boiler and opening the exhaust valve. The steam is vented and the cycle begins again. It is repeated as long as the system is in operation and functions noiselessly.

This unit is produced in sizes varying from 2,000 sq. ft. to 10,000 sq. ft. of radiation. For installation having more than 10,000 sq. ft. of radiation, two or more units are used.

Construction of Equalizer and Boiler Return Trap

The body is of cast iron fitted with a companion flange which bolts on the inlet opening. The head is so designed that when it is removed from the body, the entire mechanism can be taken out in one operation. The float is of heavy copper. The cast brass float lever and connecting rods are pivoted with stainless steel pins to resist rusting or wearing action. The main balance and idler weights are made of cast iron, mounted on the body of the trap by stainless steel pins with bronze bushings, and the valve stems, eccentric and idler blocks are made of brass. The entire assembly is designed to resist wear and rust.

Marsh System Unit Air Trap

This unit vents the air from the return piping. It also vents the air and exhaust vapor from the return trap. A ball float mechanism permits the escape of air and prevents the leakage of water. A ball check valve prevents re-entry of air.

This trap is made in one size to handle installations up to 10,000 sq. ft. of radiation. Where more than one Marsh System Unit Equalizer and Boiler Return Trap is used, the same number of air traps is used.

The body is of cast iron and interior mechanism of non-corrosive metals throughout.

Marsh No. 11 Air Trap
(For Roughing-in Dimensions, See Page 33)

TYPICAL SPECIFICATIONS MARSH VAPOR SYSTEM

1. General Conditions—The general conditions governing this portion of the work shall be in accordance with those of the American Institute of Architects and installation shall be in accordance with the standard practices of the local association of contractors.

2. Scope of Work—The work to be done includes the furnishing of all labor and materials for the complete installation of a Marsh Vapor Heating System, as hereinafter specified and as shown on drawings. Work to be done shall be executed in a neat and workmanlike manner, and all heating apparatus pertaining to this portion of the work to be of the best grade materials and shall strictly conform to these specifications.

3. Boiler—Furnish and install a ..... type boiler as manufactured by ....., having a guaranteed rating of .... sq. ft. of radiation. Boiler shall be equipped with all necessary trimmings and accessories, including Marsh Compound Vacuum and Pressure Gauge, Kunkle Pop Safety Valve and Type D-10 Damper Regulator. The above boiler shall be connected to chimney with a .... in. breeching of .... gauge black steel, all as shown on plans.

4. Pipe and Fittings—Contractor shall furnish and install where indicated on plans all pipe and fittings properly supported and graded to insure complete and successful operation of the system. Fittings to be of standard best grade cast iron, and pipe to be of mild black steel properly threaded and reamed. Piping shall be free of dirt and scale. Joints to be made up with graphite and oil paste applied to male threads only. Proper provision to be made for expansion in all mains, risers and branches.

Boiler header shall be made up of standard flanged fittings connected to boiler full size of steam opening, same to be dripped to return header through a bleeder. All spring pieces to steam and return mains shall be taken out of top of mains at 45 deg. on upfeed, and out of bottom of steam mains at 45 deg. on downfeed systems. All runouts or branches to radiators or risers to be graded 1 in. in 10 ft. and supply and return mains 1 in. in 20 ft.

Short run steam mains shall be returned back to boiler at a height not less than 24 in. above water line, dropping to return header with check valve and vented through a Marsh No. 5 Vent. Mains that terminate a great distance from boiler shall be dripped through a Marsh No. ..... trap and vented by a Marsh No. 5 Vent. Return mains shall run in same direction as steam mains and shall terminate at the boiler at a height not less than .... in. above water line.

5. Covering—All steam mains, risers and runouts that are exposed shall be covered with an approved air cell covering 1 in. thick, same to be canvased and banded in a neat and workmanlike manner. Fittings to be covered with plastic asbestos cement troweled smooth and canvased. System shall be tested with water for leaks before covering of piping is commenced.

6. Floor Plates—Where pipes project through finished floor, ceiling or wall, provide an approved type nickel plated floor or ceiling plate.

7. Radiator—Furnish and install where shown on plans a total of .... sq. ft. of direct radiation, as manufactured by ..... or equal, to have top supply and bottom return tappings at opposite ends. Contractor must instruct manufacturer to thoroughly wash sections free of all core sand and plug all openings. Eccentric bushings shall be used at return tapping.

8. Painting—All radiation and exposed piping shall be given one priming coat of flat paint and one coat of paint to match surrounding decorations, except where piping is to be covered, all as directed by the architect. Boiler and smoke breeching to be given two coats of graphite paint.

9. Radiator Valves—Each radiator shall be equipped with a JAS. P. MARSH & COMPANY System Unit Flexcone Radiator Valve of proper size:

TAPPING SCHEDULE

Sq. ft.	Valve	Trap
0- 30	½″	½″ No. 1
31- 80	¾″	½″ No. 1
81-125	1 ″	½″ No. 1
126-175	1¼″	½″ No. 2
176-250	1½″	½″ No. 2
250 up	1½″	¾″ No. 2

10. Radiator Traps—Each radiator shall be provided with a Marsh System Unit Radiator Trap of proper size as manufactured by JAS. P. MARSH & COMPANY.

11. Vapor Specialties—At each point where steam mains drop to a lower level or where a steam main is dripped, it shall be vented by a Marsh No. 5 Vent. Where the return main drops below water line at boiler, it shall be vented by a Marsh No. 11 Air Trap as indicated on drawings. Return main shall be connected to a Marsh Equalizer and Boiler Return Trap, having a capacity of .... sq. ft. of direct radiation. Steam line to boiler return trap shall be a separate connection direct from boiler to the return trap and shall be at least two sizes larger than steam inlet tapping in trap. This steam line shall be run in the most direct manner from boiler to return trap. Install in this steam line a gate valve and Marsh strainer to be full size of the piping. Install swing check valves on each side of return trap connection in return main and connect same to boiler header bleeder through Hartford loop connection 3 in. below water line of boiler. All check valves to be tested for tightness before installing.

12. Dirt Strainers—A gate valve and Marsh Dirt Strainer of same size as inlet tapping to trap shall be placed ahead of every drip trap. Each strainer shall be provided with gate valve at blowoff.

13. Cleaning System—System shall be operated for a period of several days with condensation wasted to sewer. Boiler shall then be blowed down through the bottom blowoff cennection under 5-lb. pressure. Remove safety valve and connect piping from this opening to sewer properly valved. Fill boiler to proper water level, build hot fire to create at least 5 lb. pressure and open valve in top blowoff connection, feeding enough water to boiler to maintain a constant water level. After four hours firing in this manner, fill boiler with water and allow hot water to flow out of top blowoff connection for one hour. Draw the fire, shut off feed water and blow down through bottom blowoff connection. Allow boiler to cool, replace safety valve and fill boiler with fresh water to proper level.

14. Guarantee—The contractor shall guarantee in the entire system a complete continuous and noiseless circulation of steam to each radiator or coil, free of all air and condensation, at a pressure not to exceed .... lb. gauge. He shall also hold himself responsible for any defects which may develop in any part of the system, including piping, valves or other apparatus included in this specification, due to faulty workmanship, design or material at any time within one full heating season from date of final payment and shall remedy such defects at his own cost.

15. Finally—The true intent of these specifications is to bring about the satisfactory completion of the system as outlined above, and nothing contained herein can be construed to relieve the contractor from making good and perfect the work in all usual details of construction, and he will be held responsible and bear all expenses incidental to the satisfactory completion of the work.

THE MARSH ONE PIPE VACUUM SYSTEM

THE one pipe heating system is usually applied to that type of structure, in the building of which first cost is an important consideration, but in which it is desired to obtain the benefits accruing from radiator steam heating. The installation of the Marsh System Unit Air and Vacuum Valve and correlated devices on one pipe steam heating system overcomes certain weaknesses inherent in this type of system.

Marsh Heating Systems

Air and Vacuum Valve

This valve functions to rapidly eliminate air from the system and seal it against further intrusion of air when the steam pressure drops. It likewise keeps the system under vacuum between heating-up periods. This permits steam to be generated and circulated under lower pressures or vacuum and the radiators retain heat for a much longer period, resulting in a considerable saving in fuel. It also serves to eliminate noises and pounding.

The Radiator Valve

Of prime importance in this system is the use of a perfect packless supply valve which is installed on each radiator. In the one pipe system steam and condensate travel in opposite directions in the same piping and through the same valve. This conflict of opposing elements is responsible for the noisome hammering and pounding to which one pipe heating systems are often subject. This condition is alleviated by the use of valves with large openings. Likewise, valves on such systems must be either fully opened or fully closed. One of the chief causes of loss of vacuum in this type of system is the infiltration of air due to leakage around the valve stem.

The Marsh System Unit Radiator Valve is the ideal valve for the one pipe vacuum system. It is perfectly packless and immune to air infiltration or steam escape. The large port opening provides practically the same opening as the pipe itself, offering no resistance to the flow of steam or condensate. It is quick opening in operation. It opens fully, closes tightly and is operated completely by less than a full turn.

Marsh System Unit Air and Vacuum Valve

Boiler Room Equipment

As in any type of heating system, the proper functioning of the one pipe vacuum system is dependent upon the wise selection of the boiler and boiler equipment. A sensitive damper regulator and a gauge that responds to the slightest changes in pressure or vacuum are essential to its successful operation. The Marsh System Unit No. 5 Rapid Vent is installed at the end of the steam main. This unit rapidly expells air from the piping and then seals it against further intrusion of air when the steam pressure drops. The principle of construction and operation is similar to that of the Marsh System Unit Air and Vacuum Valve.

Application

The Marsh System Units comprising this one pipe vacuum system of heating may not only be utilized in the installing of systems in new buildings but are readily adaptable to old one pipe systems, transforming them to vacuum operation.

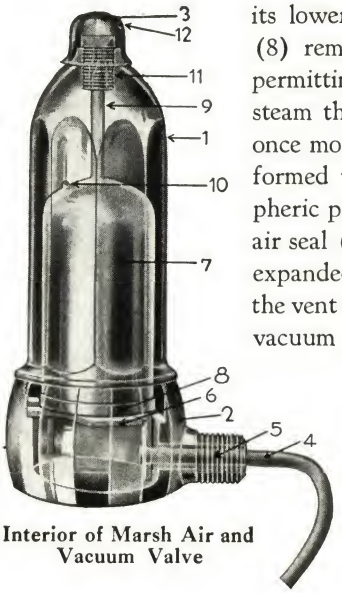
Tightness of System

It is important that all pipe joints be perfectly tight, so that no air can penetrate the system through the joints. A system, to be sufficiently tight, should be subjected upon installation to a two-fold test to determine the tightness of the joints, sealing those that show signs of leakage. The boiler is fired up. When 5 pounds is shown on the gauge and all radiators filled with steam, the fire is drawn. All joints should be carefully examined for leaks. If the system is tight, after the pressure has dropped, continued condensation of the steam will create a vacuum of at least 10 inches. After reaching a maximum, the vacuum indication on the gauge will recede and if the system is tight this recession will be at a rate of less than 1 inch of vacuum per hour.

OPERATION OF THE MARSH AIR AND VACUUM VALVE

The operation of the Marsh Air and Vacuum Valve is based upon a principle of construction, which combines thermostatic, flotation and vacuum operation in one operative part. It has very rapid air eliminating capacity and an absolutely positive vacuum feature. The vacuum operation of the Marsh Air and Vacuum Valve is controlled by the sealing of atmospheric pressure within the float member.

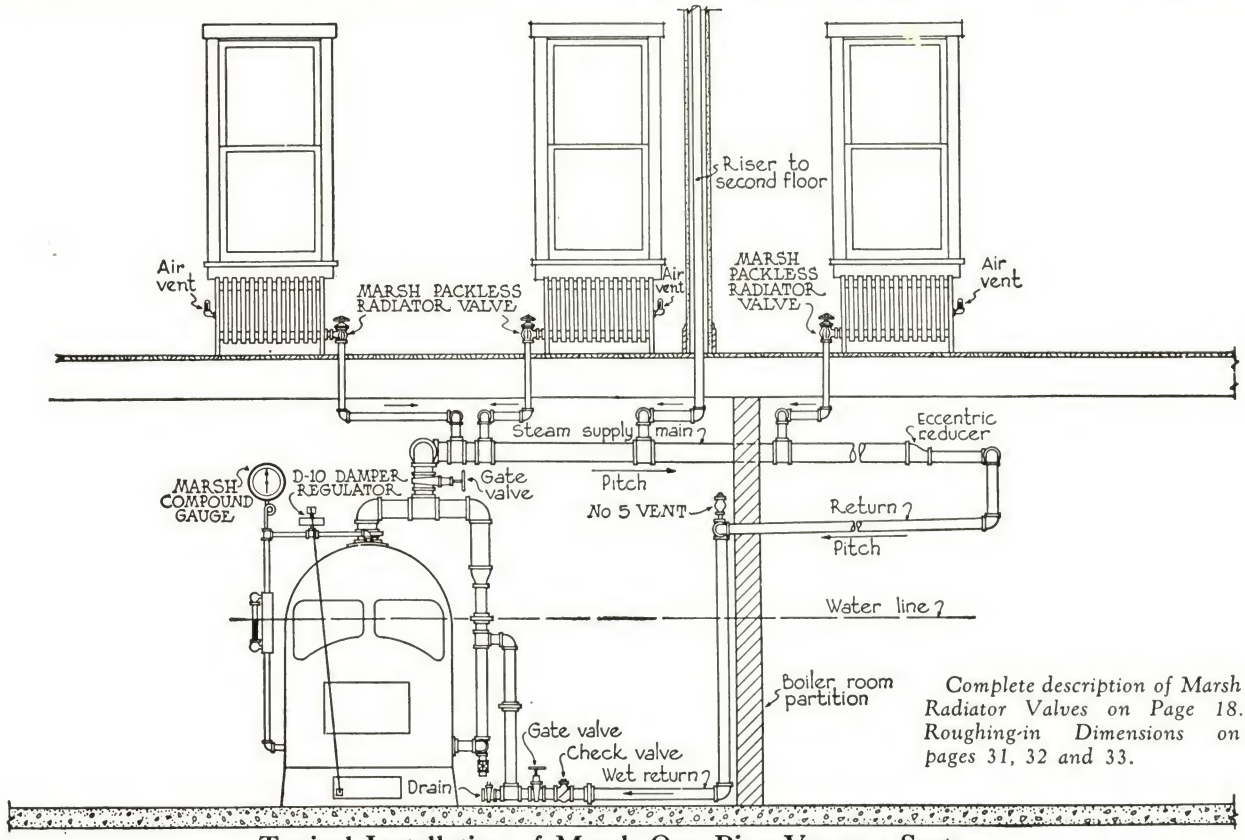
The entire mechanism of the Marsh Air and Vacuum Valve is contained within the assembly of the shell (1) and the base (2).



Interior of Marsh Air and Vacuum Valve

Operation is as follows: When steam enters the radiator it drives air ahead into the valve, through the vent screw (11), and out through the air port (12). When all air has been eliminated steam enters the valve and a combination of volatile fluids contained within the float member (7) creates internal pressure expanding diaphragm (8) which rests upon baffle plate (6), raising the float member (7) and valve pin (9), sealing vent screw (11).

The valve remains closed until additional air forms, when its lower temperature contracts the diaphragm (8) removing valve stem from vent screw and permitting air to escape. As the air is replaced by steam the diaphragm expands, sealing the valve once more. As the steam condenses, a vacuum is formed within the radiator and valve. Atmospheric pressure sealed into the float (7) through air seal (10) causes the diaphragm (8) to remain expanded, raising the float and valve pin against the vent screw, sealing the valve. As the depth of vacuum increases the pressure on the inside of the float against the diaphragm increases, assuring a perfect seal against the entrance of air and maintaining the system under a vacuum until additional steam is supplied. Should a rush of water enter the valve the baffle plate (6) serves to break up the force of the water impact, protecting the float against damage. As this water enters the valve the float (7) rises, carrying the valve pin (9) against the seat, sealing the valve. Due to the inner construction of the base (2) water passes out of the valve by gravity and is aided by the syphon (4) through which water can flow while steam or air enter the valve through channel (5).



Complete description of Marsh Radiator Valves on Page 18. Roughing-in Dimensions on pages 31, 32 and 33.

Typical Installation of Marsh One Pipe Vacuum System

TYPICAL SPECIFICATIONS ONE PIPE VACUUM SYSTEM

1. General Conditions—The general conditions governing this portion of the work shall be in accordance with those of the American Institute of Architects and installation shall be in accordance with standard practices of the local association of contractors.

2. Scope of Work—The work to be done includes the furnishing of all labor and materials for the complete installation of a Marsh One Pipe Vacuum System as hereinafter specified and shown on drawings. Work to be done shall be executed in a neat and workmanlike manner, and all heating apparatus pertaining to this portion of the work to be of the best grade materials and shall strictly conform to these specifications.

3. Boiler—Furnish and install a ..... type boiler as manufactured by ..... having a guaranteed rating of ..... sq. ft. of radiation. Boiler shall be equipped with all necessary trimmings and accessories, including Marsh Compound Vacuum and Pressure Gauge, Kunkle Pop Safety Valve and Type D-10 Damper Regulator.

The above boiler shall be connected to chimney with ..... in. breeching of ..... gauge black steel, all as shown on plans.

4. Pipe and Fittings—Contractor shall furnish and install where indicated on plans all pipe and fittings properly supported and graded to insure complete and successful operation of the system. Fittings to be of standard best grade cast iron, and pipe to be of mild black steel properly threaded and reamed. Pipe shall be free of dirt and scale. Joints to be made up with graphite and oil paste applied to male threads only. Proper provision to be made for expansion in all mains, risers and branches.

Boiler header shall be made up of standard flanged fittings connected to boiler full size of steam openings, same to be dripped to return header through a bleeder. All spring pieces to steam mains shall be taken out of top of mains on upfeed systems, and out of bottom of steam mains on downfeed systems. All runouts or branches to radiators or risers to be graded 1 in. in 5 ft. and supply mains 1 in. in 10 ft. Steam mains shall be carried to their terminus and there dropped below the water line of boiler and vented with a Marsh No. 5 Vent with a swing check valve at the base of the line. Wet return main shall be carried back to boiler and connected to the header bleeder through a loop connection.

5. Covering—All steam mains, risers and runouts that are exposed shall be covered with an approved air cell covering 1 in. thick, same to be canvased and banded in a neat and workmanlike manner. Fittings to be covered with plastic asbestos cement troweled smooth and canvased. System shall be tested with water for leaks before covering of piping is commenced.

6. Floor Plates—Where pipes project through finished floor, ceiling or wall, provide an approved type nickelplated floor or ceiling plate.

7. Radiator—Furnish and install where shown on plans a total of .... sq. ft. of direct steam radiation, as manufactured by ..... or equal, to have bottom supply and a provision for air valve below center of radiator. Contractors must instruct manufacturers to wash sections free of all core sand and plug all openings.

8. Painting—All radiation and exposed piping shall be given one priming coat of flat paint and one coat of paint to match surrounding decorations, except where piping is to be covered, all as directed by the architect. Boiler and smoke breeching to be given two coats of graphite paint.

9. Air Valves—On each radiator a Marsh System Unit Air and Vacuum Valve is to be placed on radiator in the opening provided for by radiator manufacturers.

10. Radiator Valves—At the bottom inlet of each radiator install a Marsh System Unit Quick Opening Packless Radiator Valve of a size to be determined by schedule below.

TAPPING SCHEDULE

Sq. ft.	Valve
0-25	1 "
25-60	1¼"
61 up	1½"

11. Main Vents—Install a Marsh System Unit No. 5 Rapid Vent at the ends of the mains before they are dropped below the water line, and on branch mains to hot water heaters, etc.

12. Test for Tightness—Before pipe covering is installed, the heating contractor shall conduct the following test for tightness of joints: Build a brisk fire in the boiler, filling all radiators with steam. When gauge indicates 5 lbs., draw fire. After pressure has dropped, the gauge shall show a vacuum of at least ten inches. After reaching maximum, indication on the gauge shall recede at a rate of not more than 1 in. of vacuum per hour. The contractor must see that all piping withstands this test.

13. Cleaning System—System shall be operated for a period of several days with condensation wasted to sewer. Boiler shall then be blowed down through the bottom blow-off connection under 5-lb. pressure. Remove safety valve and connect piping from this opening to sewer properly valved. Fill boiler to proper water level, build hot fire to create at least 5-lb. pressure and open valve in top blow-off connection, feeding enough water to boiler to maintain a constant water level. After four hours firing in this manner, fill boiler with water and allow hot water to flow out of top blow-off connection for one hour. Draw the fire, shut off feed water and blow down through bottom blow-off connection. Allow boiler to cool, replace safety valve and fill boiler with fresh water to proper level.

14. Guarantee—The contractor shall guarantee in the entire system a complete continuous and noiseless circulation of steam to each radiator or coil, free of all air and condensation, at a pressure not to exceed .... lb. gauge. He shall also hold himself responsible for any defects which may develop in any part of the system, including piping, valves or other apparatus included in this specification, due to faulty workmanship, design or material at any time within .... years from date of final payment and shall remedy such defects at his own cost.

15. Finally—The true intent of these specifications is to bring about the satisfactory completion of the system as outlined above, and nothing contained herein can be construed to relieve the contractor from making good and perfect the work in all usual details of construction, and he will be held responsible and bear all expenses incidental to the satisfactory completion of the work.

MARSH SYSTEM UNIT RADIATOR VALVES

DESPITE numerous changes in the design of heating systems since the early days when radiator valves were themselves the sole means of regulating, the radiator valve is still a fundamental part of heating systems.

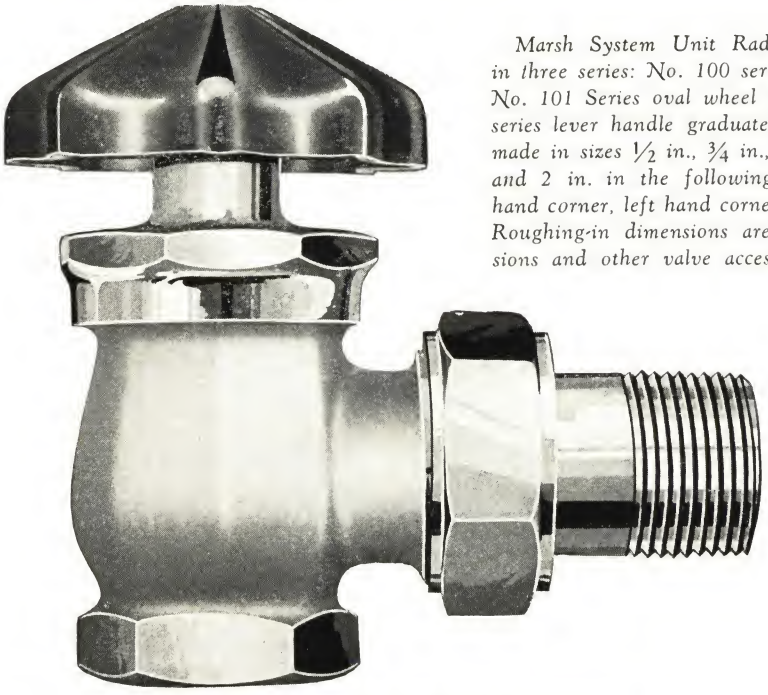
The Marsh System Unit Radiator Valve combines beauty with mechanical perfection. Now, radiator fittings as well as radiators themselves may be worked into interior design and be in keeping with the finest of furnishings

This New Marsh Radiator Valve is modern in design. The simplicity of its lines, the two-tone polished and satin chrome or nickel body finish, crowned by a control wheel or lever of bakelite of distinctive proportions, places this heating necessity abreast of modern trend.

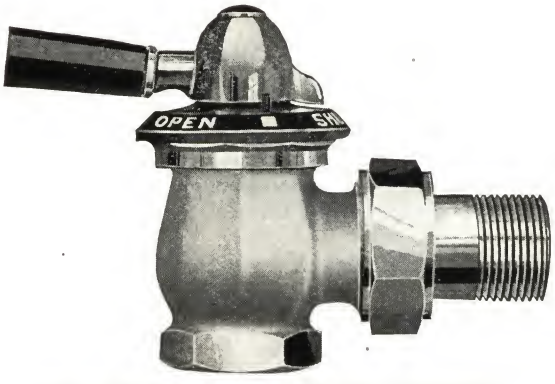
Yet, with all the advanced beauty of design this valve has that dependability typical of all Marsh products.

The Marsh System Unit Radiator Valve is truly packless. Its packless feature is not subject to deterioration, wear or cracking. We have confidence in the principles upon which it has been designed. These principles have proven as sound as they are new.

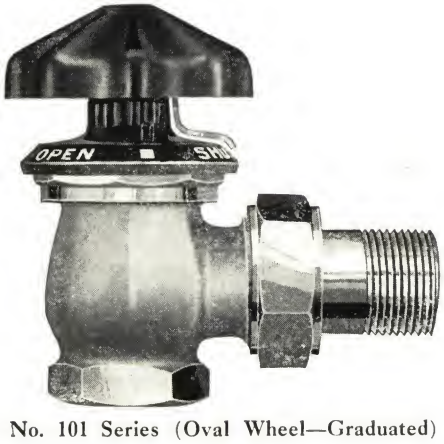
Marsh System Unit Radiator Valves are made in three series: No. 100 series oval wheel packless; No. 101 Series oval wheel graduated and No. 102 series lever handle graduated. All three series are made in sizes ½ in., ¾ in., 1 in., 1¼ in., 1½ in. and 2 in. in the following patterns: angle, right hand corner, left hand corner, globe and back offset. Roughing-in dimensions are on page 31. Extensions and other valve accessories are on page 20.



No. 100 Series (Oval Wheel Packless)



No. 102 Series (Lever Handle—Graduated)



No. 101 Series (Oval Wheel—Graduated)

CONSTRUCTION OF MARSH SYSTEM UNIT RADIATOR VALVES

The construction of Marsh System Unit Radiator Valves consists of two major assemblies, the valve mechanism and the bonnet assembly.

The body (1) of the valve is a steam bronze casting accurately machined and tested to 125 pounds pressure. Modern methods of machining on all parts of the body including the thrust screw thread and the bonnet (9) are employed, gaged by micrometer scale, making all parts uniform and interchangeable.

The valve seat (2), built integrally into the valve body, in combination with the Flexcone valve disc (5) permits of large, full capacity flow through the valve. In the case of the graduated type valve this construction makes for very fine modulation of the flow.

The lift thread, in which the thrust screw (7) operates, is cut integrally into the main body casting, allowing a large, deep thread, and adding to the wall thickness and strength of the body casting.

The thrust screw consists of a forging with a large, heavy, quadruple lift thread which operates directly into the thread machined into the valve body. This construction makes the valve quick opening. It also lends power to the operation of the valve and contributes to the easy operation of the entire valve, eliminating all possibility of sticking or clogging of the threads. In actual test it has been impossible to clog or stick the thread under the most severe operating conditions. The large diameter thread also assures perfect, continuous seating of the valve. Either entirely closed or partially open, the valve seat, at a given position, remains in that position until reset. Chattering or pressure vibration does not disturb the setting.

The Flexcone valve seat (5) is a drawn monel metal spring cup permanently riveted to the thrust screw. This assembly is swivelled, permitting the disc (5) to make a perfect seating at all times.

The cone shape of the valve disc in combination with the large area of the opening in the valve seat gives this valve large, full, pipe size flow capacity when fully opened. The cone shape acts as a deflector in cutting the flow of water diverting it to the proper angle of flow into the radiator and does not restrict flow as in the case of flat composition disc.

In the graduated type valve, the Flexcone valve disc raising and lowering in the orifice of the valve seat modulates the area of the opening and controls the flow in proportion to the setting of the indicator and dial (parts 3 and 4 in illustration on following page).

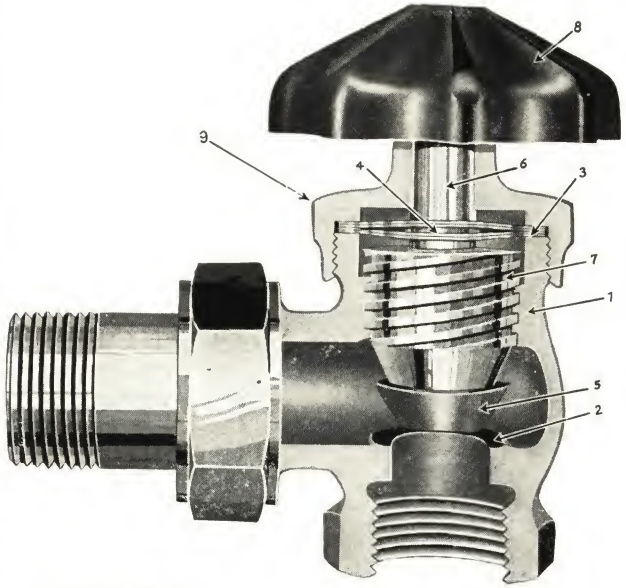
The valve assembly (parts 7 and 5) are operated by a valve stem (6) which fits into the thrust screw. As the valve stem is rotated it in turn rotates the thrust screw, raising or lowering it in the body thread.

Integrally incorporated in the valve stem is a perfectly machined stem collar (4) which in conjunction with the Metalflex sealing discs (3) make the positive sealing packless arrangement. Two pairs of stainless spring steel diaphragms constitute the Metalflex sealing discs.

The entire assembly of valve stem and Metalflex sealing discs is installed into the valve body assembly. The valve bonnet (9) as screwed onto the valve body fits around valve stem, lining up the latter and at the same time compressing the upper set of Metalflex discs tightly against the lower set of discs forming a perfect seal at the outer periphery. This compresses the two sets of Metalflex discs against the stem collar, creating a self-spring seal as the stem collar rests or rotates between the two inner diaphragms.

The valve wheel is made of Bakelite. It is of unique design and its form lends itself to perfect fit of the hand. This form also allows air currents to circulate under and around the wheel, assuring coolness to the touch. The lever handle construction consists of a forging formed to match the balance of the Marsh System Unit Valve design and is fitted with a bakelite lever.

Union nut and tail piece are made of hard brass forgings. The tail piece construction includes two lugs for easy installation into the radiator fitting.



1—Valve Body
2—Valve Seat
3—Metalflex Sealing Discs
4—Stem Collar
5—Flexcone Valve Disc
6—Valve Stem
7—Thrust Screw
8—Bakelite Handle
9—Valve Bonnet

Tests

Laboratory tests of Marsh System Unit Valves calculated to definitely prove the efficiency and perfection of the unique construction, have subjected these units to service many times that of normal operation. To test the wearing qualities of the Flexcone valve disc and bronze valve seat, completely assembled valves have been tested upwards of 30,000 operations, on pressures from vacuum to several hundred pounds, without showing appreciable wear.

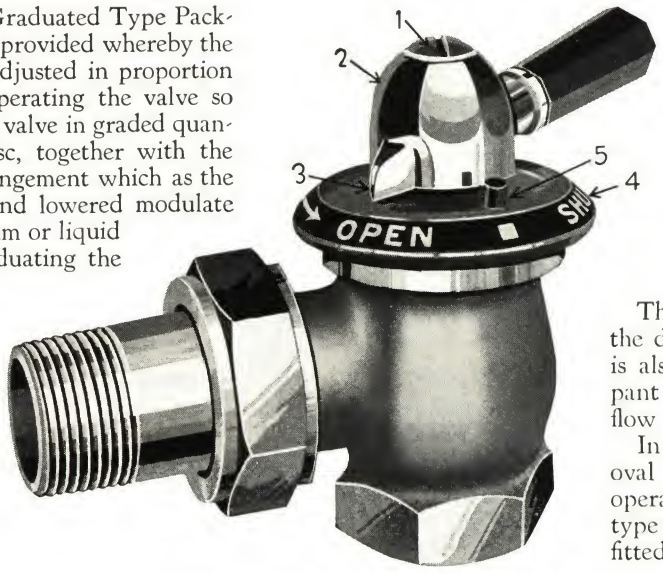
These same tests applied prove the packless and sealing qualities of the Metalflex sealing discs and the stem collar, which following upwards of 30,000 operations show no appreciable wear and resulted in no strain of component parts.

THE GRADUATED TYPE RADIATOR VALVE

In the Marsh System Unit Graduated Type Packless Radiator Valve a means is provided whereby the total capacity of the valve is adjusted in proportion to the size of the radiator, operating the valve so as to limit the flow through the valve in graded quantities. The flexcone valve disc, together with the valve seat, form an orifice arrangement which as the flexcone valve disc is raised and lowered modulate the area through which the steam or liquid can flow and in that way graduating the capacity of the valve.

An indicator and dial act to guide the operator of the valve as to the proper setting for the desired flow.

This construction provides a simple means to calibrate the total capacity found expedient according to the size of the radiator upon which it is installed.

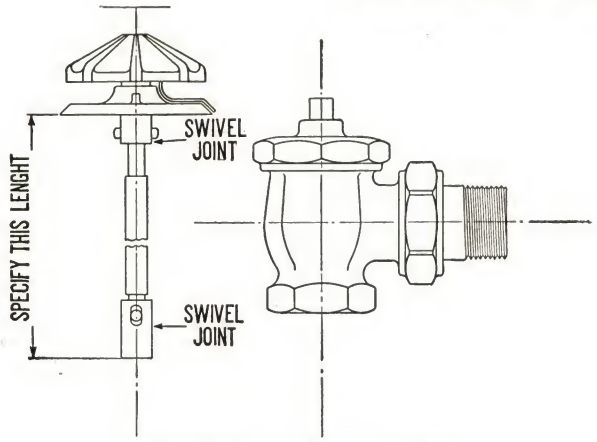


This operation is as follows: With the valve installed, set the percentage of full opening desired. Remove graduating assembly (parts 1, 2, 3 and 4 of the accompanying illustration), replace dial (4) in such position on the valve that indicating field is in full view of operator. Place lever handle bonnet (2) on stem so that indicator (3) is directly against "open" pin (5) on the graduating field side. Replace the screw (1).

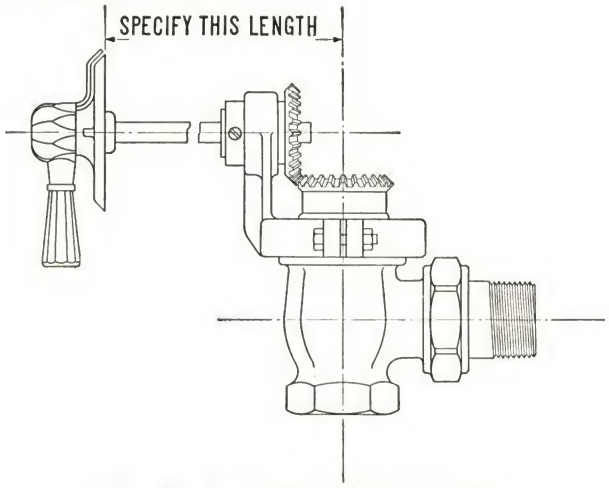
The valve is now calibrated for the desired maximum opening. It is also so arranged that the occupant can change the proportional flow through the valve as desired.

In the case of the Series No. 101 oval wheel graduated valve the operation is similar except in this type the indicator is a separate unit fitted on the stem.

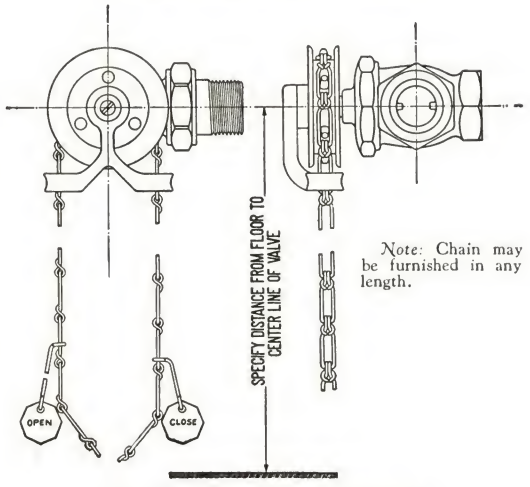
RADIATOR VALVE ACCESSORIES



No. 200 Swivel Extension Stem

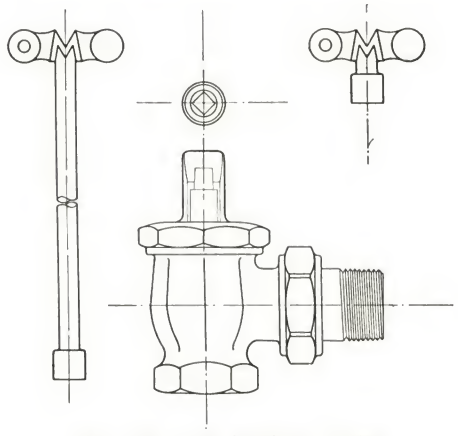


No. 201 Angle Geared Extension Stem



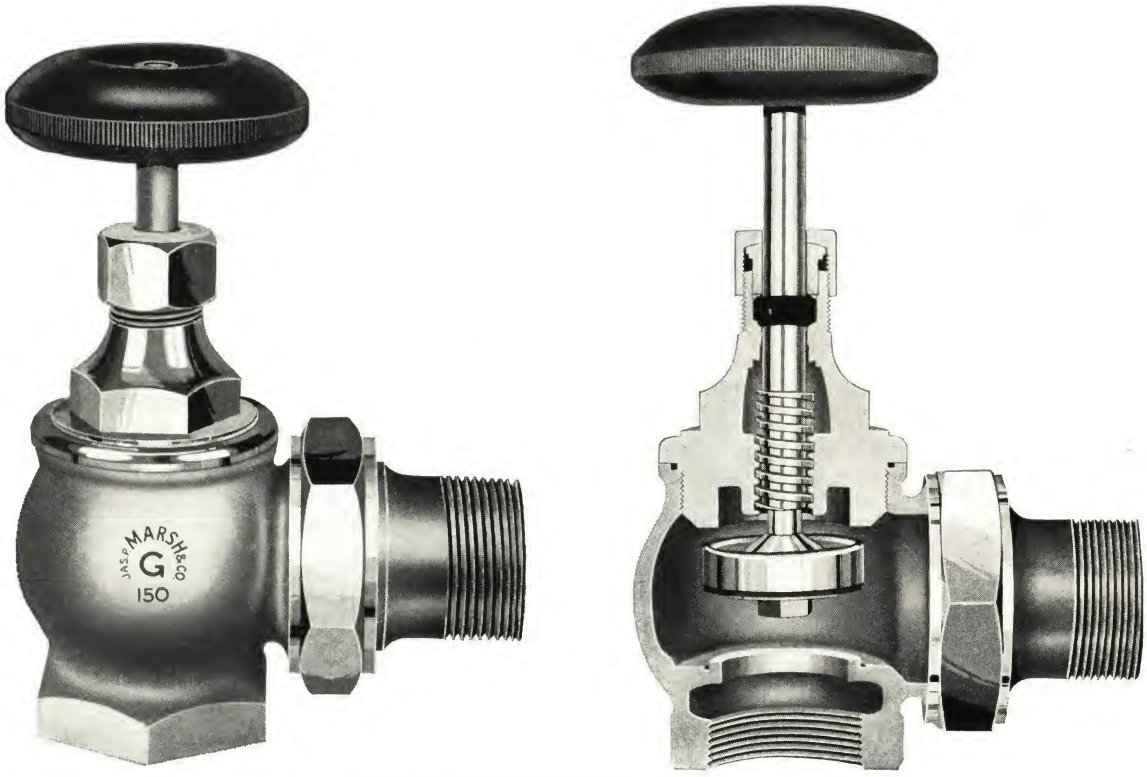
Note: Chain may be furnished in any length.

No. 202 Chain Type Extension



No. 103 Lock Radiator Valve

MARSH TYPE G 150 STEAM RADIATOR VALVE



(Roughing-in Dimensions on Page 31)

GOVERNMENT PATTERN

With Renewable Composition Disc and Round Wheel

THE Marsh Type G 150 radiator valve is a heavy 150-lb. construction steam radiator valve. It is produced to meet the requirements for service where a heavy valve is specified. As shown by the illustration this valve is of rugged construction. The body and bonnet castings are of steam bronze and wall thicknesses throughout are much heavier than usually found in valves of this type. The stem is of large diameter and the operating thread is perfectly machined and is of design to give lasting, smooth operation. The packing gland, follower and nut are of ample proportions and make provision for a lasting joint for service on pressures or vacuum.

Construction

This valve can be packed while the system is under pressure. The valve bonnet and disc holder are so constructed and machined that when the valve is screwed full open a tight joint is formed between the top of the disc holder and the inside surface of the valve bonnet, permitting removal of the packing nut and gland follower and repacking of the valve under pressure or vacuum without leakage. This is often highly desirable and reduces the cost and outlay of time in repacking valves. This feature also prevents any possibility of the valve jamming or sticking in the open position.

The valve is constructed with a high grade composition disc and raised seat.

The union tail piece and nut in keeping with the general construction of this valve are of extra heavy construction and the ball joint makes up tight with ease. The tail piece is provided with lugs for ease in assembling to the radiator.

The valve is nickelplated all over and all finished parts are highly polished.

The round wheel is of ample proportions and assembled to the valve stem with nickelplated plate and hexagon nut.

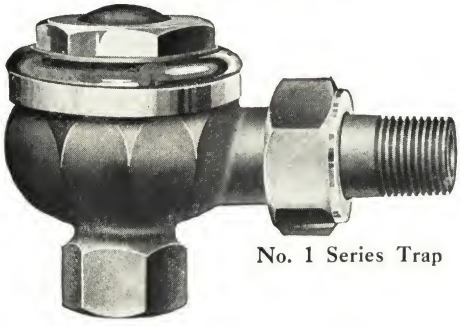
Patterns

The Marsh Type G 150 steam radiator valve is standard in angle pattern only, and in 1 in., 1¼ in., 1½ in. and 2 in. sizes, but can be manufactured in other patterns on special order.

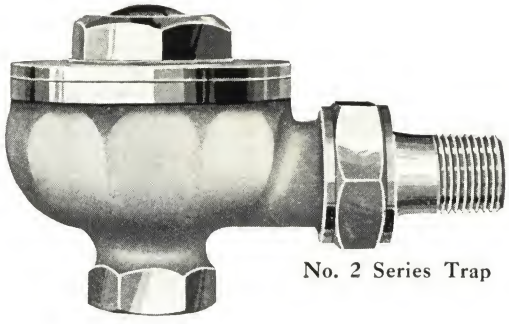
When so ordered this valve can be supplied, also, in lock and shield pattern. Keys are manufactured in several sizes and lengths.

MARSH SYSTEM UNIT RADIATOR TRAPS

THE Marsh System Unit Thermostatic Trap is moulded and finished to match the contour of modern tubular radiators. Like Marsh System Unit Valves, these traps are made in two-tone lustrous polished and satin finish in either chrome or nickel. The two units are synchronous in pattern and blend with the lines of well-designed radiators. The attainment of beauty of line, however, detracts in no way from the traps' dependable performance. It is essential to economical and satisfactory operation of any vacuum or vapor heating system to obtain as much heat as possible from the steam delivered to the radiator. It is the function of the Marsh System Unit Radiator Trap, installed at the outlet of the radiator, to accomplish this by retaining steam within the radiator until it has given up its heat units. It is equally essential that all water of condensate, air and gases be passed out of the radiator into the return system. This is entirely dependent upon the sensitive operation of the thermostatic diaphragm within ranges where steam, water and air are at temperatures varying only slightly from each other. It is the sensitive and proper reaction to these elements and their varying temperatures which makes for the high efficiency of the Marsh System Unit Thermostatic Radiator Trap.



No. 1 Series Trap

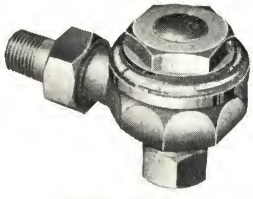


No. 2 Series Trap

Installed upon the radiator it has a second important function; that of automatically maintaining the necessary difference in pressure or vacuum between supply and return systems, assuring circulation throughout the heating system. This function must be promptly and efficiently accomplished with the aid of either the induced vacuum provided by the vacuum pump in a standard vacuum system, or gravity in the vapor system of heating. This service the Marsh System Unit Radiator Trap performs perfectly.

Marsh System Unit Thermostatic Traps are manufactured in two styles: The Marsh No. 1 Series, made in ½ inch connection size only, and the No. 2 Series, made in three sizes, ½, ¾ and 1 in. The No. 1 series is obtainable in the following patterns: Angle, Straightway, Right Hand, Left Hand and Back Offset. The same patterns are supplied in the ½ in. No. 2 series. The ¾ and 1 in. sizes of No. 2 series have the following patterns: Angle, Right Hand, Left Hand and Back Offset.

SIZES AND PATTERNS OF MARSH SYSTEM UNIT RADIATOR TRAPS

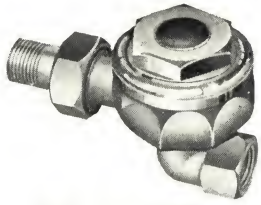


Angle Pattern

CAPACITIES

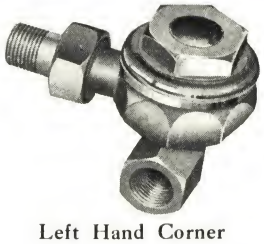
No. 1 Series Radiator Trap	
Sizes	Sq. Ft. C. I. Radiation
½"x½" connection	150

No. 2 Series Radiator Trap	
Sizes	Sq. Ft. C. I. Radiation
½"x ½" connection	200
¾"x ¾" connection	500
1 "x1 " connection	1000

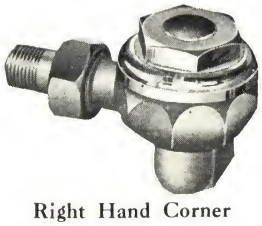


Back Offset Pattern

Straightway Pattern



Left Hand Corner



Right Hand Corner

GENERAL DESCRIPTION OF MARSH SYSTEM UNIT THERMOSTATIC TRAPS

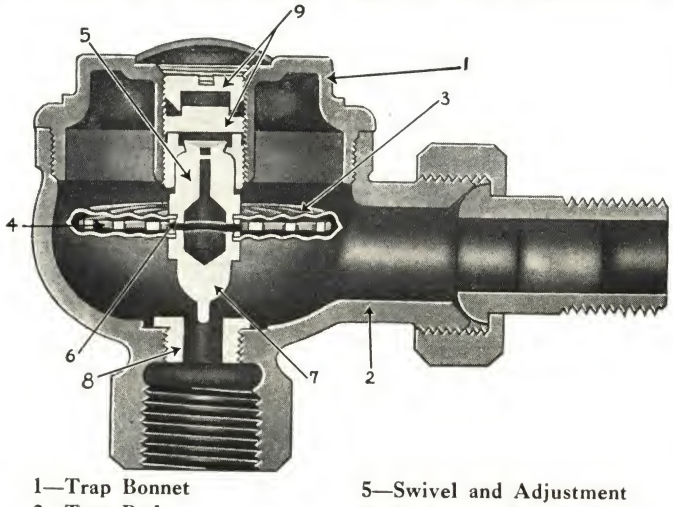
Marsh System Unit Thermostatic Traps consist of two major assemblies: (1) The body with the renewable seat and the union nut and tail piece. (2) The bonnet with the diaphragm assembly and locking arrangement complete.

Thermostatic Diaphragm

The several unique and patented features, which enter into the construction of the Marsh Thermostatic Diaphragm, are largely responsible for the high degree of efficiency and economy in the operation of Marsh Heating Systems.

Marsh Thermostatic Diaphragms operate on the principle of expansion and contraction of a combination of volatile fluids when subjected to varying temperatures. The volatile fluid contained within the sealed diaphragm expands as temperatures are applied, causing the diaphragm to expand carrying the valve needle against the seat, closing the trap. As the lower temperatures of condensate and air come in contact with the diaphragm the volatile fluid contracts, lowering the internal pressure, contracting the diaphragm and allowing the passage of condensate, air and gases.

The expansible portion of the thermostatic diaphragm consists of an upper and lower wafer of tinned phosphor bronze, drawn and spun to perfection of temper. The lower wafer is fastened to the valve needle (7) which consists of a tinned brass screw-machined part, spun and sweated to the diaphragm wafer. The upper diaphragm wafer is sweated to the adjustment screw assembly consisting of two parts combined to form the adjustment screw (5) and swivel. When the two wafers are assembled, projections on the upper post (5) and the valve needle (7) combine to form a matched fit when the diaphragm is completely compressed. An interior reinforcement arrangement (4) forms an inner ring between the upper and lower wafers so that when the diaphragm is completely compressed it is the equivalent of a solid disc. The volatile fluid is injected through the upper post (5) in carefully measured quantities, following which the opening in post (5) is plugged. The entire diaphragm assembly is given an overlay, by an electroplating process, of a thick application of copper metal.



1—Trap Bonnet
2—Trap Body
3—Thermostatic Diaphragm
4—Diaphragm Reinforcement
5—Swivel and Adjustment
6—Diaphragm Locking Seal
7—Valve Needle
8—Removable Seat
9—Adjustment Seal

Bonnet Assembly

The diaphragm is screwed into the bonnet assembly. The construction of the bonnet is designed to permit accurate adjustment of each trap under actual operating conditions and is not a "jig" adjustment. Following adjustment the diaphragm assembly is securely locked into the bonnet, by means of lock washers (9). The bonnet is a brass forging and is accurately threaded and machined to make a steam and vacuum tight assembly with the body.

Body Assembly

The body (2) is a steam bronze casting accurately machined and tested to 125 pounds working pressure. Modern methods of machining on all parts, including the body (2) and bonnet (1) are employed, gaged by micrometer scale which allows all parts to be interchangeable.

Marsh System Unit Thermostatic Traps are built with renewable seat (8) made of a hard brass screw machine part. In actual service this accurately machined seat and the needle valve (7) require no renewal over a period of many years of service. However, should unusually severe service cause the seat to wear after many years of service, it is possible to renew it by merely removing the old seat and screwing in a new one to the locked position.

The union nut and tail piece are both of hard brass forgings. The tail piece construction includes two lugs for easy installation into the radiator fitting.

Tests

Each Marsh System Unit Thermostatic Trap is individually adjusted and tested by experienced operators under actual operating conditions, assuring accurate calibration and perfect operation in actual service.

While Marsh System Unit Thermostatic Traps are intended for pressure up to 25 pounds, laboratory tests have been conducted to determine breakdown points. As a regular part of routine laboratory tests a percentage of each production of diaphragms is subjected to pressure of several hundred pounds before distortion sets in (many times the normal internal pressure). All Marsh System Unit Thermostatic Diaphragms are capable of withstanding 1000 pounds external pressure without distortion.

Finish

Marsh System Unit Thermostatic Radiator Traps are finished in two tone polished and satin nickel or chrome to match Marsh System Unit Packless Radiator Valves.

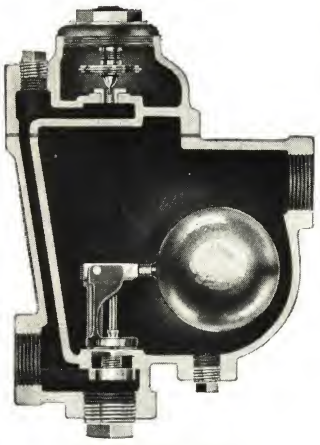
MARSH SYSTEM UNIT FLOAT AND THERMOSTATIC TRAPS

(For Roughing-in Dimensions See Page 33)

Marsh No. 8 Drip Trap

THIS trap is continuous in discharge and is designed to quickly remove condensation and air from drip points on steam mains, steam risers, steam coils, or blast heaters, or for any like service within the capacity of the trap.

The design permits a deep water seal on the discharge valve. This water discharge valve is float controlled and located at a low point in the bottom of the trap and air is removed through a thermostatically controlled port in the cap of the trap. The thermostatic member used is our standard assembly as in the No. 1 Marsh Radiator Trap. Normally air is discharged through a port directly to the outlet connections of the trap. In cases where the trap may be required to discharge to a wet return the air discharge may be connected to a dry return from a special opening tapped in the cap of the trap.



No. 8 Drip Trap

CAPACITIES

Steam pressure in lb.	Capacities in lb. water per hr.
½	500
1	900
2	1400
3	1600
4	1800
5	2000
10	3200
15	4000

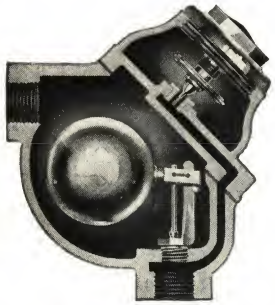
Body of trap is provided with one 1¼-inch tapped inlet and two 1¼-inch tapped outlet openings. These openings are located so as to permit direct connection both to inlet and from outlet.

The trap may be suspended directly in the piping and no other supports are necessary. The thermostatic element screws directly in the cap of the trap and is interchangeable with the element from the No. 1 Radiator Trap.

All interior parts are of bronze or monel with the exception of the float which is a seamless copper float tested for a working pressure of 25 pounds per square inch.

Marsh No. 12 Drip Trap

Designed for removal of air and condensation from short steam mains, branches or riser. Unit heaters, steam coils, etc., are within the limits of the capacity of the trap. The size and weight of the trap permits its installation in the piping without any other means of support. Condensation is removed through a float operated valve located at the lowest point inside the trap body. Air removal is located in a by-pass in the cap of the trap. Air passes through a passageway and out through the trap outlet.



No. 12 Drip Trap

CAPACITIES

Steam pressure in lb.	Capacities in lb. water per hr.
½	350
1	600
2	800
3	1200
4	1400
5	1600
10	2000
15	2800

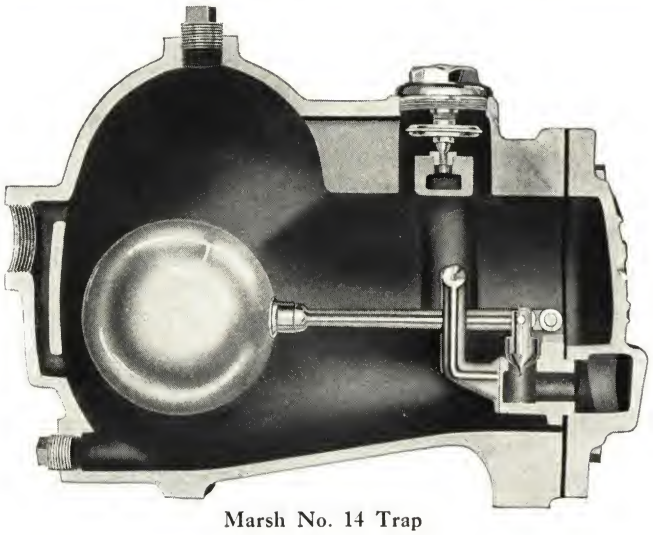
Body of trap is of cast iron and all interior parts are of steam bronze, copper and monel metal. The thermostatic member of the air by-pass is interchangeable with the member of the standard No. 1 Radiator Trap.

Marsh System Unit No. 14 Heavy Duty Trap

The Marsh No. 14 Float and Thermostatic Heavy Duty Trap is designed to handle very large volumes of water and air and for service on air heating coils, hot water and storage heaters, steam headers, large steam mains, etc.

The trap is of the continuous discharge type. Condensation discharge is through a ball float mechanism. Air is removed through a by-pass cast integral with the body. This by-pass, which leads into the outlet connection, is provided with a thermostatic by-pass element which is similar to the thermostatic element incorporated in the Marsh system unit thermostatic radiator trap. By-pass is provided with removable brass seat.

The body and cover are of heavy cast iron. Heavy bosses are cast into the body at all connections and tapped openings. The entire float mechanism is of non-corrosive metal and is attached to the trap cover. The thermostatic by-pass is a self contained unit screwed into the trap body. Connections are provided for in the trap body so that piping need not be disturbed in removing the cover. All traps are provided with a tapped opening in the top of the float chamber. This opening is tapped one pipe size smaller than the main trap connection and may be used for minor drips or as an equalizing connection. The trap body is provided with a tapped blow-off opening.



Marsh No. 14 Trap

CAPACITIES IN POUNDS OF CONDENSATE AT VARIOUS PRESSURE DIFFERENTIALS

Size	1 lb.	3 lb.	5 lb.	10 lb.	15 lb.	20 lb.	25 lb.
1 in.	1900	3260	4180	5800	7100	8000	9200
1¼ in.	4180	7140	9170	12000	14600	17700	19700
1½ in.	6200	8400	12000	18400	24000	29450	34800
2 in.	8200	14500	19000	26500	34900	38400	44700

When so ordered, trap can be provided with water gauge glass.

It is suitable for working pressures up to 25 lb. per square inch. Standard construction, however, is for pressures up to 15 lb. When intended for service on pressures from 15 lb. to 25 lb., state maximum working pressure.

The trap is made in four sizes—1 in., 1¼ in., 1½ in. and 2 in.

MARSH SYSTEM UNIT AIR VENTS

(Roughing-in Dimensions on Page 33)

No. 5 Rapid Vent

On vapor systems and one pipe vacuum systems, this vent is the air expelling unit at the end of the steam main. It is also designed for installation at the ends of steam mains, tops of risers and other similar locations on gravity systems of heating and all locations where large volume of air must be rapidly vented.

This vent is of the float and thermostatic type. The principle of construction and operation is similar to that of the Marsh System Unit Air and Vacuum Valve. It rapidly expels air from the system and then seals it against further intrusion of air when the steam pressure drops.

Body is of cast brass and is nickel plated.

Made with ⅜ in. or ¾ in. connection.

No. 5 Vent

No. 7 Air Eliminator

No. 7 Air Eliminator

This is another form of air expelling unit. On vapor systems, it may be substituted for the Marsh System Unit No. 11 Air Vent Trap, where it is desired to simplify piping.

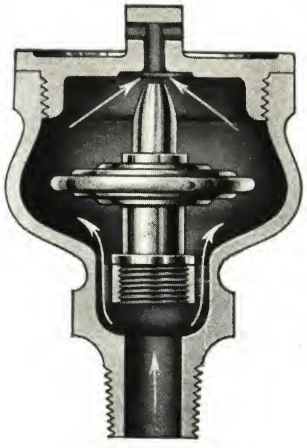
This unit is of the float and thermostatic type and is suitable for installation at the ends of steam mains, top of risers or other similar locations on gravity systems to expell exceedingly large volumes of air.

Constructed of brass and is provided with vacuum feature to prevent the re-entry of air.

Made with ¾ in. or 1 in. connection. The air outlet is tapped with ¼ in. connection to permit piping away the air exhaust.

No. 6 Quick Vent

This unit is of the thermostatic type and is designed for installation at high points in the piping where there is not sufficient head room for the larger float and thermostatic vents and where the float mechanism is not required to prevent the escape of water.



No. 6 Vent

Vent is constructed with thermostatic diaphragm similar in design to that incorporated in the Marsh System Unit Thermostatic Traps and with large port for the quick venting of air.

Constructed either with or without vacuum feature—the latter for installation on sealed systems.

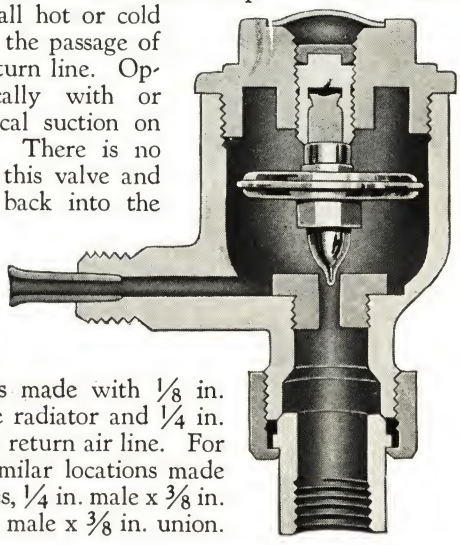
Body is of cast brass and is nickel plated.

Made with ¼ in. or ⅜ in. connection.

Marsh No. 3 Air Line Valve

For installation on radiators of Paul and other air line systems and for venting air from coils, blast units, etc.

Constructed with thermostatic diaphragm similar in design to that incorporated into the construction of Marsh System Unit Thermostatic Radiator Traps. The valve automatically passes all hot or cold air, but prevents the passage of steam into the return line. Operates automatically with or without mechanical suction on the return line. There is no water pocket in this valve and water is passed back into the radiator, assuring a dry return.



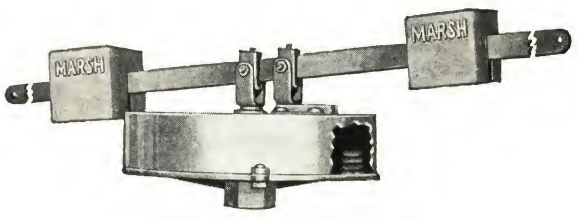
Body is of brass and is nickel plated.

For installation on radiators made with ⅛ in. connection to the radiator and ¼ in. connection to the return air line. For blast coils and similar locations made in two larger sizes, ¼ in. male x ⅜ in. union, and ⅜ in. male x ⅜ in. union.

TYPE D-10 DAMPER REGULATOR

This unit is designed to automatically operate the dampers of manually fired coal burning boilers on vapor, vacuum and gravity systems of heating.

The large, sensitive diaphragm reacts to the finest variations of pressure and the damper regulator can be adjusted to operate the dampers to maintain pressures within a few ounces. This regulator can also be adjusted to operate the boiler under vacuum.



Boiler Damper Regulator

Body and weights are of cast iron. Each regulator is provided with lever, weights, chain and bell cranks.

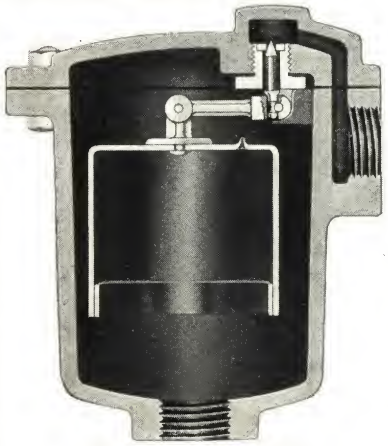
Made with 1 in. female pipe connection.

MARSH MEDIUM PRESSURE STEAM TRAPS AND VENTS

(Roughing-in Dimensions on Page 33)

No. 500 Steam Trap Inverted Bucket Type

THE Marsh No. 500 Inverted Bucket Steam Trap is ideal for installation on all classes of hospital and kitchen equipment or any similar service where considerable volume of condensate is to be handled. This trap is self venting which feature, combined with the large water capacity, permits unusually high efficiency of the apparatus upon which it is installed.



Steam Trap No. 500

The trap is very simple in construction and operation. The motive element is an inverted seamless open bucket operating through a cast brass lever arm to open and close the swivel valve pin.

The trap discharges intermittently. Between cycles of operation the float is in the raised position being filled with steam and air and the valve pin is closed against the seat. As condensate rises in the trap body, the weight of the water forces the steam and air out through the vent opening in the top of the float, filling float with water which causes it to drop. When the condensate has drained from the trap, it fills with steam causing the float to rise once more and the valve pin to close against the seat.

The trap is substantially built to operate satisfactorily under most exacting conditions. Body and cover are of cast iron. Bucket is of seamless copper and levers and clevises are of cast bronze. Pins, valve and seat are stainless steel. Design incorporates a high lever ratio which accounts for the unusually large capacities. All piping connections are made to the body which permits removal of the trap cover without disturbing piping. The entire operating mechanism lifts out with the trap cover making all parts easily accessible.

Standard finish is gloss black. ½ and ¾-in. traps can be furnished in satin finish or polished finish, nickel or chrome plate on special orders.

This trap is suitable for working pressures up to 125 lbs. per sq. in.

The trap is made in three sizes—½, ¾ and 1 in.

Specify maximum working pressure.

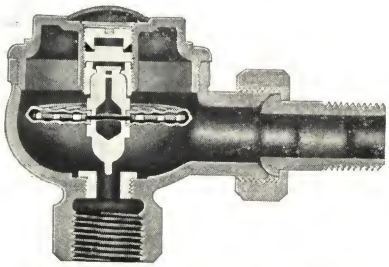
CAPACITIES IN POUNDS PER HOUR AT VARIOUS PRESSURE DIFFERENTIALS

Size inlet and outlet	5 lb.	10 lb.	25 lb.	50 lb.	75 lb.	100 lb.	125 lb.
½ in.	800	1125	1000	670	530	425	400
¾ in.	2800	4200	4000	3000	2500	2000	1450
1 in.	6000	11000	8700	6200	5700	4000	3800

To convert above capacities to square feet of equivalent direct radiation each trap will handle per hour multiply capacities given in table by three. To convert these capacities to lineal feet of 1 in. pipe multiply by nine.

Thermostatic Steam Traps Nos. 501 and 502

Nos. 501 and 502 thermostatic type steam traps are used to discharge air and condensate from heating coils, cookers, or other apparatus using steam at 15 to 100 lbs. pressure. Trap body is of heavy cast brass with heavy union nut and tail piece. Diaphragm is of heavy spun bronze fitted with internal reinforcing ring, and charged with volatile liquid. Needle is of bronze and the seat of monel metal. Both No. 501 and 502, are standard in Angle Pattern only, but can be furnished in other patterns on special order.



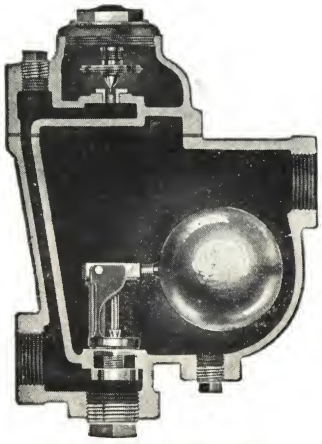
Marsh Thermostatic Steam Trap

NOS. 501 AND 502 THERMOSTATIC STEAM TRAPS

No.	Size, in.	Capacities, pounds condensation per hour at given pressure differential			
		35 lb.	50 lb.	80 lb.	100 lb.
501	½	90	110	115	130
502	½	140	160	200	260
502	¾	300	450	490	580
502	1	700	925	1100	1260

No. 508 Steam Trap

This trap is continuous in discharge and is designed to quickly remove condensation and air from drip points on steam mains, risers, steam coils, blast heaters operating on pressures from 25 to 60 lbs. The design permits a deep water seal on the discharge valve. The valve is float controlled and located at a point low in the trap. Air is removed through the thermostatically controlled by-pass in the cap. The trap may be suspended in the piping, no other support being necessary. All interior parts are of steam bronze and monel metal with the exception of the seamless copper float. Specify highest working pressure.



Steam Trap No. 508

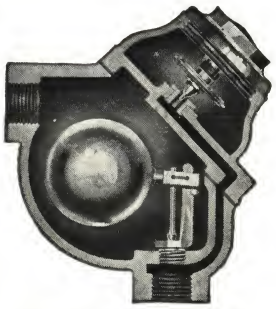
NO. 508 FLOAT AND THERMOSTATIC MEDIUM PRESSURE TRAP
1¼-in. Inlet and Outlet

Pressure differential	40 lb.	60 lb.
Capacities—pounds condensation per hour.....	690	827

Steam Trap No. 512

Designed for rapid removal of air and condensation in medium pressure steam service. The size and weight of the trap permits its installation in the piping without any other means of support.

Condensation is removed through a float operated valve located at the lowest point inside the trap body. Air removal is thermostatically controlled through a by-pass in the cap of the trap.



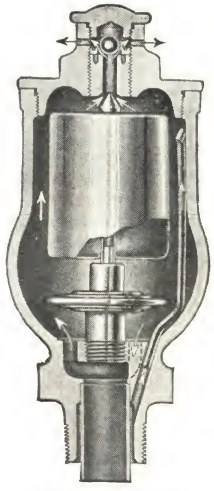
Steam Trap No. 512

Body is of cast iron and all interior parts are of steam bronze, copper and monel metal.

When ordering state highest working pressure.

NO. 512 FLOAT AND THERMOSTATIC MEDIUM PRESSURE TRAP
¾-in. Inlet and Outlet

Pressure differential	30 lb.	50 lb.	75 lb.	100 lb.
Capacities—pounds condensation per hour.....	600	425	360	400



No. 555 Vent

Air Vent No. 555

A medium pressure air vent capable of expelling large volumes of air without passage of water or stream. By expelling air rapidly and automatically, quicker and more efficient heating up is achieved. Body is of heavy cast brass with extra heavy brass float and diaphragm. Equipped with a vacuum top feature to prevent air from re-entering the unit or steam line. Made in one body size having either ⅜-in. or ¾-in. male connection. For pressures up to 125 lbs. In the standard construction, air is expelled through four openings in bonnet. Where it is desired to pipe off the vented air, a special cap is provided having a ¼-in. female connection.

Steam Trap No. 514

A Combination Float and Thermostatic Trap capable of handling large volume of water and air. This trap is for application to coils, large water heaters, or for dripping a battery of industrial heaters and for other applications where higher pressures up to 125 lbs. are utilized.

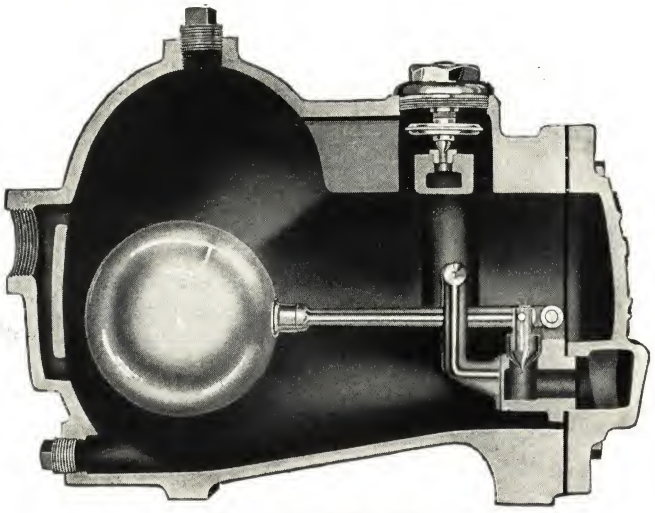
The trap is of the continuous discharge type. Condensation is discharged through a ball float mechanism.

Body and cover are of cast iron. Mechanism is of the compound type with heavy copper float and with bronze and monel operating parts. An integral air by-pass is provided and is equipped with thermostatic by-pass mechanism. The by-pass mechanism is similar to that of the Marsh No. 501 thermostatic steam trap. Seats and valve pieces are of monel metal.

The trap body is so designed that the lowest point where sediment collects is farthest removed from the discharge outlet and is provided with a tapped blow-off opening.

The trap is made in four sizes, 1, 1¼, 1½ and 2-in.

Specify highest working pressure.



Steam Trap No. 514

CAPACITIES IN POUNDS PER HOUR AT VARIOUS PRESSURE DIFFERENTIALS

Size inlet and outlet	30 lb.	80 lb.	100 lb.	125 lb.
1 in.	4750	3860	2460	1380
1¼ in.	7600	6800	5275	3260
1½ in.	11450	9700	7490	5400
2 in.	13500	12240	9230	8140

MARSH STRAINER

The Marsh Self-cleaning Strainer is installed on the inlet side of apparatus for the purpose of eliminating dirt, grit and scale. It is simple in construction and easy to install. The self-cleaning feature permits cleaning by simply removing the plug. The strainer may also be cleaned with a blow-off valve. The construction of the strainer permits it to be installed either horizontally or vertically. The strainer is self-draining when the plug is out or the blow-off valve is open.

The body and strainer plug are of cast iron. The strainer cylinder is a perforated cone. Standard cylinder for steam, water, air, gas and oil is made of brass with $\frac{1}{16}$-in. perforations. For other services cylinders of special metals and with special perforation sizes can be supplied.

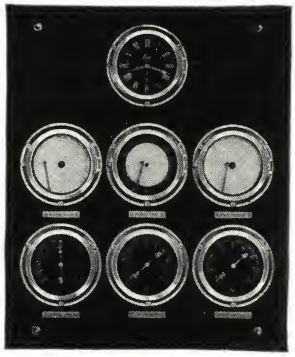
Strainer is made in six sizes: ½-in., ¾-in., 1-in., 1¼-in., 1½-in. and 2-in. connections. The ½ in., ¾ in., 1 in. and 1¼ in. sizes are made with ½-in. blow-off or drain connection. The 1½ in. and 2 in. sizes are made with 1-in. blow-off connection.

These strainers are suitable for service on low, medium and high pressure lines up to 125 lbs.

MARSH GAUGES AND INSTRUMENT PANELS

Marsh Instrument Panels

Materials—Marsh Panels can be furnished in a wide range of materials. They may be specified of electrical, ribbon or Monson slate, white and pink Tennessee or Alabama marble, woods of all kinds, asbestos ebony or steel plates. We recommend asbestos ebony where it is not intended to attain the beauty that marble gives. It will not crack or warp, it is immune to heat, moisture or chemicals and has great dielectric strength. Its appearance is that of highly surfaced ebony or hard rubber and its chief advantage is that it may be used in smaller thicknesses than other materials.



Instrument Panel

Marsh Instrument Panels may also be designed to include other types of instruments not included in the Marsh lines such as flow meters, recording thermometers, electrical instruments and temperature regulation instruments and switches. Panels can be furnished with electric lighting fixtures for illumination.

Marsh Instruments

Gauge Finishes—Marsh Gauges are available in these finishes:

Chromium plated brass case and ring, chromium plated ring with black enameled case, nickel plated brass case and ring, nickel plated ring with black enameled case, polished brass case and ring, polished brass ring with black enameled case, black enameled case and ring, white or colored case and ring.

Dials—Marsh Gauges are equipped with oven baked, white enameled metal dials having dead black numerals, lettering and graduations, with silver dials having black figures and graduations, or black dials having white figures and graduations.

Cases—Marsh Gauges are made with case and ring so assembled as to insure a dust- and moisture-proof instrument.

All gauges are made for either surface mounting or flush mounting for gauge board application.

Flush Mounting

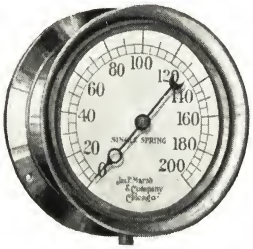
Marsh Nitralloy Gauge

The Marsh Nitralloy Gauge has been produced to meet the increasing demand of modern apparatus for a gauge which will give lasting and accurate service under severe working conditions, such as high pressure and corresponding temperatures, pulsation and vibration.

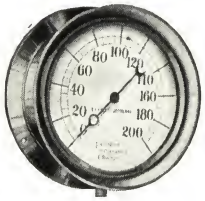
Marsh Nitralloy construction is available in all types of Marsh Indicating Pressure, Vacuum and Water Gauges. It is also available in all types of gauge mountings, for application direct to apparatus or in either surface mounting or flush mounting for installation on panels or similar locations.

Marsh Nitralloy interior construction is built of special hardened process material which gives Marsh Nitralloy Gauges the ability to render consistently long and exceedingly accurate service under all operating conditions.

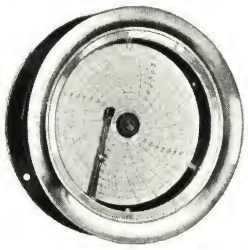
Marsh Gauges



Single Spring Pressure Gauge—Marsh Single Spring Pressure Gauges are made in sizes from 2½ to 16 in., inclusive, suitable for pressure not to exceed 3000 lb. per sq. in., and can also be made for vacuum or pressure and vacuum. Furnished in drawn steel case, cast iron case or cast brass case with bronze movement or nitralloy movement. Guaranteed for their accuracy, and mechanical construction is very exacting in every detail.



Double Spring Pressure Gauge—Manufactured in pressure ranges varying from 60 to 3000 lb. per sq. in. depending upon the service application. Manufactured in plain case and ring, sizes 4½ to 5 in., inclusive, for application to equipment or pressure lines where the instruments are accessible for close reading. Manufactured in larger sizes up to 16 in. in flanged case, flared ring for larger equipment.



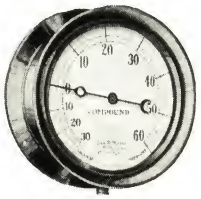
Recording Gauges—Marsh Recording Gauges give an exact record of either pressure or vacuum. These gauges are equipped with a high grade Seth Thomas eight-day clock movement and 24-hour chart. Can be furnished in cast iron case, polished brass case, nickel plated case or chrome plated case and in sizes 6¾ in., 8½ in., 10 in. and 12 in.

The Marsh Combined Indicating and Recording Gauge is very similar to the pressure recorder, excepting, that in addition to the recording pen, it is equipped also with an indicating hand.

Marsh Clocks—Constructed with a choice of several high grade clock movements including Seth Thomas and Chelsea. Also in Telechron Electric construction.

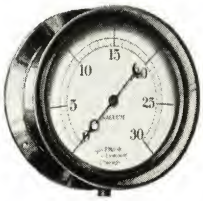
Made in sizes 6¾, 8½, 10 and 12 in. and in all types and finishes.

Standard Compound Gauge—Standard pressures x 0-15 in. or x 0-30 in. up to 600 lbs. x 0-30 in. Sizes 2½, 3, 3½, 4½ and 5 in. in plain case and ring for application to equipment where instruments are accessible for close reading. In larger sizes to 16 in. in flanged case, flared ring for larger equipment for gaugeboard application.



Standard Vacuum Gauge—Dial is graduated 0 to 30 in. in 1-in. divisions and 5-in. numerical intervals. Sizes 2½, 3, 3½, 4½ and 5 in. in plain case and ring for application to equipment where the instruments are accessible for close reading.

Manufactured in larger sizes to 16 in. in flanged case, flared ring for larger equipment for gaugeboard application.



Low Pressure Ounce Graduated Retard Gauges—The compound construction (illustrated) indicates even the first ounce of pressure. It is graduated in 1 oz. divisions up to 5 lb. with a retard travel from 5 to 30 lb. On vacuum side it is graduated in ½-in. divisions up to 10 in. and retarded from 10 to 30 in. Manufactured in 3½ to 12-in. sizes. Also made with pressure reading only.

Hydraulic Gauges—The springs employed in Marsh Hydraulic Gauges are made from special tool steel carefully bored out and machined to size, making them capable of withstanding very high pressures. To prevent injury to the instrument, should there be a sudden application or release of pressure, a Marsh Patented Stabilizer is installed in the shank to overcome this condition.

Marsh Hydraulic Gauges are furnished in sizes 2½ up to 16 in., the 2½ to 3 in. suitable for pressures up to 5000 lb. per sq. in., 3½ in. up to 10,000 lb., and 4½ in. and 5 in. up to 20,000 lb. and 6 in. or larger up to 30,000 lb.

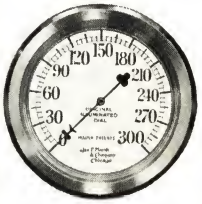
Refrigeration Gauges—Manufactured in both high pressure and low pressure graduations for all types of refrigeration systems to indicate pressures in both suction and compression side. Manufactured in sizes 2½, 3, 3½, 4½ and 5 in. in plain case and ring for application to equipment where instruments are accessible for close reading. Larger sizes to 16 in. for larger equipment and where readings must be taken at a great distance, with flanged case and flared ring for bolting onto apparatus or for gaugeboard application. Can be furnished with corresponding temperature scales when so specified.

Typical Layouts of Marsh Instrument Panels

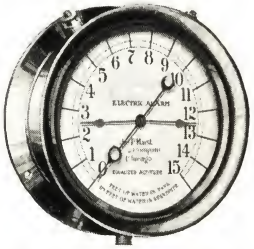
The schedule given below indicates the approximate size of an instrument panel having a given number of instruments mounted thereon. For instance, should a panel require five gauges for the service intended, the gauges being 6-in. size, the schedule indicates a panel of 28x28x1¼ in. thick.

Outside Diam. / Size of Dial	6½″ / 5″	7⅝″ / 6″	8¼″ / 6¾″	10¼″ / 8½″	11¹³⁄₁₆″ / 10″	14″ / 12″	Outside Diam. Layout
Size of Board	12″x12″x1″	13″x13″x1″	14″x14″x1″	16″x16″x1″	18″x18″x1″	21″x21″x1″	
Size of Board	21″x12″x1″	24″x13″x1″	26″x14″x1″	29″x16″x1″	33″x18″x1¼″	39″x21″x1¾″	
Size of Board	30″x12″x1″	34″x13″x1″	37″x14″x1¼″	42″x16″x1¼″	43″x18″x1¼″	57″x21″x1½″	
Size of Board	21″x21″x1″	24″x24″x1″	26″x26″x1¼″	29″x29″x1¼″	33″x33″x1¼″	39″x39″x1½″	
Size of Board	25″x25″x1¼″	28″x28″x1¼″	30″x30″x1¼″	34″x34″x1¼″	39″x39″x1½″	47″x47″x1½″	
Size of Board	30″x21″x1¼″	34″x24″x1¼″	37″x26″x1¼″	42″x29″x1½″	48″x33″x1½″	57″x39″x1½″	
Size of Board	39″x20″x1¼″	45″x22″x1¼″	48″x24″x1¼″	55″x27″x1½″	63″x31″x1½″	76″x39″x1½″	
Size of Board	30″x28″x1¼″	34″x31″x1¼″	37″x34″x1½″	42″x38″x1½″	48″x44″x1½″	57″x53″x1½″	
Size of Board	30″x30″x1¼″	34″x34″x1¼″	37″x37″x1½″	42″x42″x1½″	48″x48″x1½″	57″x57″x1½″	
Size of Board	39″x28″x1¼″	45″x31″x1½″	48″x34″x1½″	55″x38″x1½″	63″x44″x1½″	38″x53″x1½″ Two Panels	
Size of Board	39″x28″x1¼″	45″x31″x1½″	48″x34″x1½″	55″x38″x1½″	63″x44″x1½″	38″x53″x1½″ Two Panels	
Size of Board	39″x30″x1¼″	45″x34″x1½″	50″x37″x1½″	55″x42″x1½″	63″x48″x1½″	38″x57″x1½″ Two Panels	

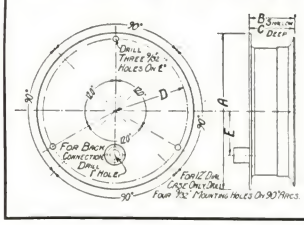
Illuminated Dial Gauges—So constructed with non-breakable glass dial and glass back that with electric light hung down in the gauge, all graduations, numerals and indicating hand stand out clearly in silhouette. With electric light turned off, hand and graduations show up black against the white background. As constructed in flush mounted casing and installed upon gaugeboards, all that shows on the front of the board is the front mounting flange and the dial with graduations and hand. As constructed for mounting directly upon the boiler front, the Marsh Illuminated Dial Gauge is fitted with tripod legs on the case, insulating the instrument away from the heat of the boiler. Manufactured in sizes 6, 8½, 10 and 12-in. dial and in all types and finishes.



Electrical Alarm Gauges—The Marsh Electrical Alarm Gauges are equipped with low and high contact points which may be used to ring a bell when pressure is below a predetermined point, or as the case might be, above a predetermined point. All styles and types of Marsh Indicating Gauges can be fitted with electrical alarm construction. The materials employed in manufacturing this instrument are of the highest grade and the mechanical construction is exacting in every detail. Contact points may be adjusted by the operator to meet a given condition. Made in sizes from 3½ to 12 in.



Dimensions of Marsh Instrument Panel Gauges and Clocks



The template drawing and table given below will supply the dimensions for Marsh Brass Case Gauges and Clocks from 5-in. to 12-in. dial in flanged case.

CAPACITIES

Size	5″	6″	6¾″	8½″	10″	12″
A	6½″	7⅝″	8 7⁄16″	10 1⁄16″	11 13⁄16″	14″
B	2¼″	2½″	2½″	2¾″	3¼″	3¼″
C	3 1⁄16″	4″	4″	4⅛″	4¼″	4⅜″
D	3 1⁄16″	3 17⁄32″	3 31⁄32″	4 29⁄32″	5 19⁄32″	.....
E	1 29⁄32″	2 5⁄32″	2 7⁄16″	2 11⁄16″	2 31⁄32″	2 31⁄32″

Methods of Mounting Marsh Instrument Panels

Framework made of piping and fittings is recommended by JAS. P. MARSH & COMPANY as the best means of mounting instrument panels. This method is superior to angle or channel iron construction, first, because a better framework is secured and, second, because it is more easily and economically set up.

In the three recommended types of construction below 1¼-in. pipe is used. The fittings illustrated herewith and described in the table will fulfill any required position and angle of pipe in constructing a framework.

PIPE FITTINGS
For Panel and Base Mounting

Description	Fig. No.	Size of Pipe			
		A	B	C	D
End clamp for single panel or base..	1	1¼"	...	2½"	1¼"
Intermediate clamp for panels or bases	2	1¼"	...	2½"	1 5/16"
End clamp for single panel and tie rod	3	1¼"	1¼"	2½"	1½"
Clamp for horizontal and vertical pipes at right angles.....	4	1¼"	¾"	1 1/16"	2⅝"
Oval floor flange.....	5	1¼"	...	3½"	2½"
Clamp for fastening horizontal pipe to wall.....	6	1¼"	...	⅜"	2 7/8"
Ball floor brace for tie rod.....	7	...	...	...	...
Ball pipe brace for tie rod.....	8	1¼"	...	...	...
Cap	9	1¼"	...	...	...

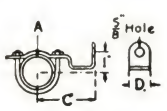


Fig. 1

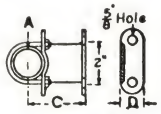


Fig. 2

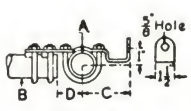


Fig. 3

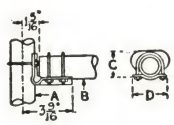


Fig. 4

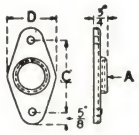


Fig. 5

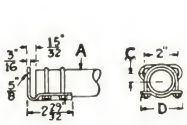


Fig. 6

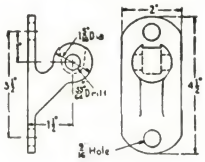


Fig. 7

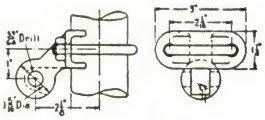


Fig. 8

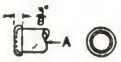
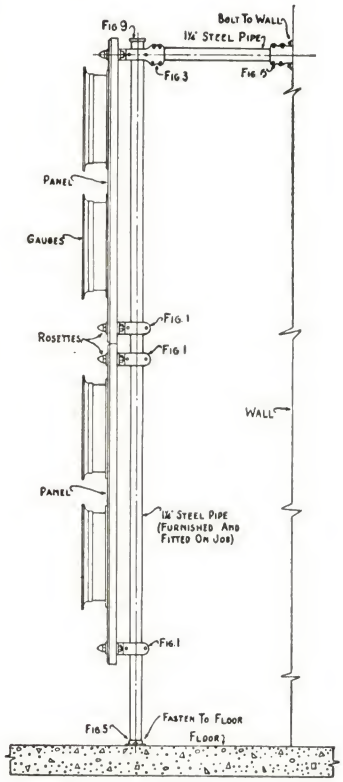
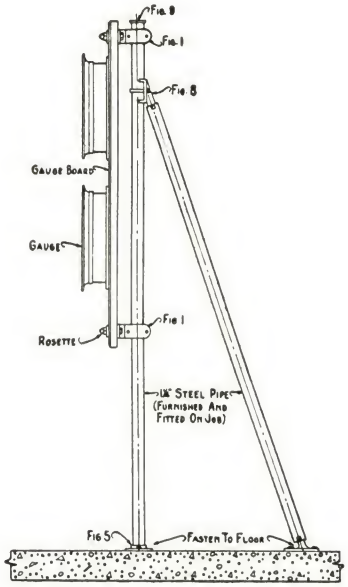


Fig. 9

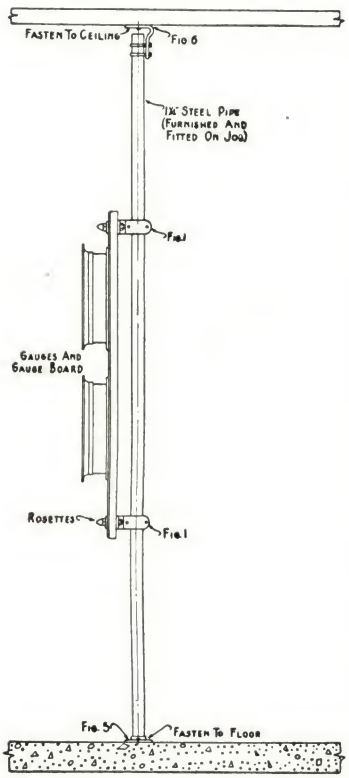
Recommended Methods of Supporting Marsh Instrument Panels



The above application of panel pipe fittings is used when a gauge board is to be located near a wall. The vertical pipe is fastened to the floor with a floor flange and extends to the height of the board, where it is connected with an end clamp and tie rod. To this another length of 1¼-inch pipe is fastened. This is bolted by a horizontal fastening clamp to the wall.



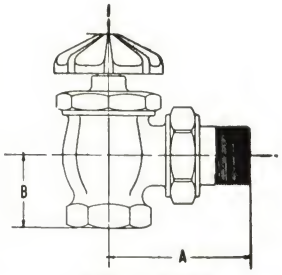
When a gauge board is away from the wall and cannot be fastened to the ceiling, the above arrangement will be found satisfactory. A vertical pipe is extended to the height of the board and is held in place by panel and clamps fastened with bolts and rosettes. This vertical pipe is braced to the floor at a desired angle with a tie rod fitting extending to the floor.



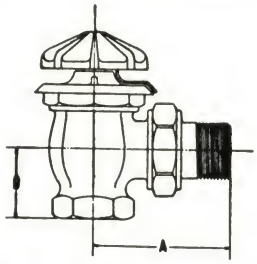
The above may be used where the ceiling is not very high. The 1¼-inch pipe is threaded at one end on which is screwed a floor flange. This is bolted through the floor. The top of the pipe is held in place by a ceiling clamp which is affixed to the ceiling.

ROUGHING-IN DIMENSIONS

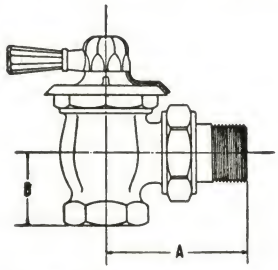
Marsh System Unit Packless Radiator Valves



Wheel Angle
No. 100A and No. W-100A



Wheel Angle Graduated
No. 101A and No. W-101A

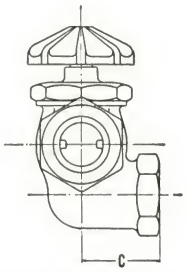


Lever Handle Graduated
No. 102A and No. W-102A

Angle Patterns

DIMENSIONS IN INCHES

Sizes	A	B
1/2"	2 3/8"	1 3/16"
3/4"	2 7/8"	1 3/16"
1 "	3 1/8"	1 9/16"
1 1/4"	3 5/8"	1 3/4"
1 1/2"	3 7/8"	1 1/2"
2 "	4 3/8"	2 3/8"

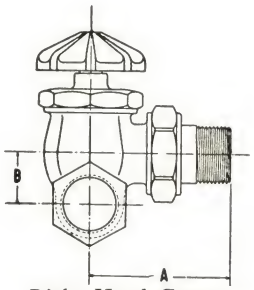


Left Hand Corner
No. 100L and No. W-100L

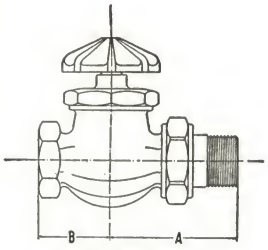
Corner Patterns

DIMENSIONS IN INCHES

Sizes	A	B	C
1/2"	2 3/8"	3/4"	1 3/8"
3/4"	2 7/8"	7/8"	1 3/8"
1 "	3 1/8"	7/8"	1 5/8"
1 1/4"	3 5/8"	1 1/8"	2 "
1 1/2"	3 7/8"	1 1/4"	2 3/8"
2 "	4 3/8"	1 1/2"	2 5/8"



Right Hand Corner
No. 100R and No. W-100R



Globe Pattern
No. 100G and No. W-100G

Globe Pattern

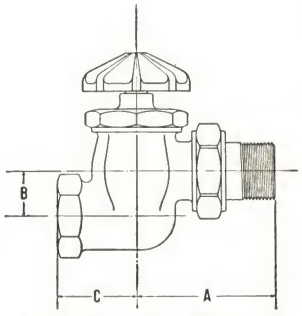
DIMENSIONS IN INCHES

Sizes	A	B
1/2"	2 3/8"	1 3/8"
3/4"	2 7/8"	1 3/8"
1 "	3 1/8"	1 5/8"
1 1/4"	3 5/8"	2 "
1 1/2"	3 7/8"	2 3/8"
2 "	4 3/8"	2 5/8"

Back Offset Pattern

DIMENSIONS IN INCHES

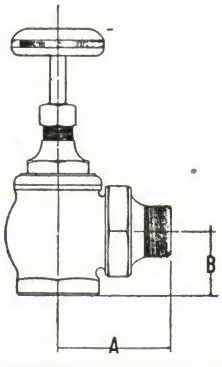
Sizes	A	B	C
1/2"	2 3/8"	3/4"	1 3/8"
3/4"	2 7/8"	7/8"	1 3/8"
1 "	3 1/8"	7/8"	1 5/8"
1 1/4"	3 5/8"	1 1/8"	2 "
1 1/2"	3 7/8"	1 1/4"	2 3/8"
2 "	4 3/8"	1 1/2"	2 5/8"



Back Offset No. 100B and
No. W-100B

Type No. 101 (wheel handle) and Type No. 102 (lever handle) graduated valves as made in left hand corner pattern, right hand corner pattern, globe pattern and back offset pattern have the same roughing-in dimensions shown above for the Type 100 valves in these patterns. Roughing-in dimensions for Type Nos. 103 Lock and Shield Packless Valve and 104 Lock and Shield Graduated Valves in all patterns are the same as Type No. 100.

Marsh G150 Angle Radiator Valve



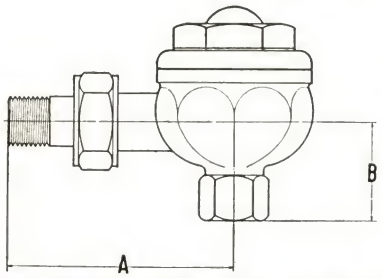
DIMENSIONS IN INCHES

Sizes	A	B
1 "	3 "	1 3/4"
1 1/4"	3 1/2"	1 7/8"
1 1/2"	3 3/4"	2 1/16"
2 "	4 1/4"	2 1/8"

ROUGHING-IN DIMENSIONS
Marsh System Unit Radiator Traps

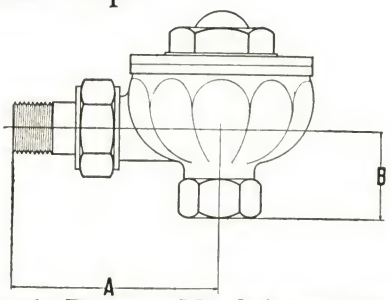
Steam Traps No. 501 and 502

These Medium Pressure Traps are standard in angle pattern only. Dimensions are the same as in 1-A and 2-A shown here.



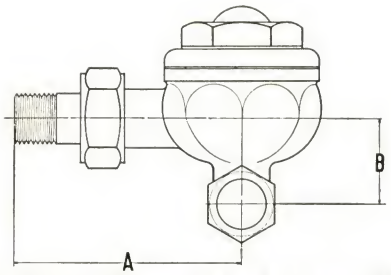
Angle Patterns No. 1-A and W1-A

Size	A	B
½″	3¼″	1½″



Angle Patterns No. 2-A and W2-A

Size	A	B
½″	3¼″	1 7/16″
¾″	3 5/16″	2″
1″	4⅜″	2 1/16″

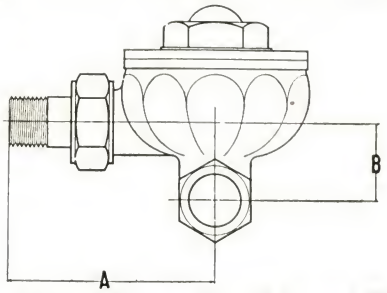


Note: The letter "W" indicates Weather Compensating System units.

Right Hand Corner No. 1-R and W1-R
Left Hand Corner No. 1-L and W1-L

Size	A	B
½″	3¼″	1¼″

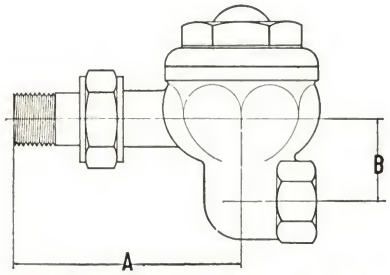
Dimensions on right and left hand pattern are identical.



Right Hand Corner No. 2-R and W2-R
Left Hand Corner No. 2-L and W2-L

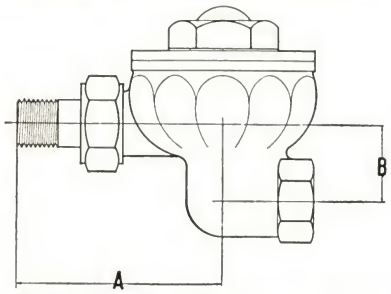
Size	A	B
½″	3¼″	1¼″
¾″	3 5/16″	1⅝″
1″	4 5/16″	1⅞″

Dimensions on right and left hand pattern are identical.



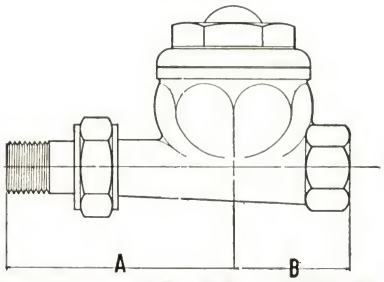
Back Offset No. 1-B and W1-B

Size	A	B
½″	3¼″	1¼″



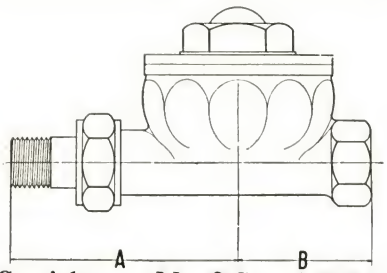
Back Offset No. 2-B and W2-B

Size	A	B
½″	3¼″	1¼″
¾″	3 5/16″	1⅝″
1″	4 5/16″	1⅞″



Straightway No. 1-S and W1-S

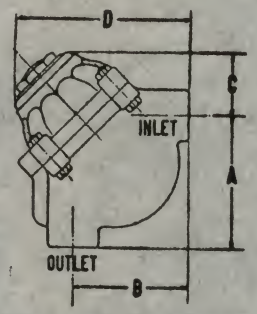
Size	A	B
½″	3¼″	1¾″



Straightway No. 2-S and W2-S

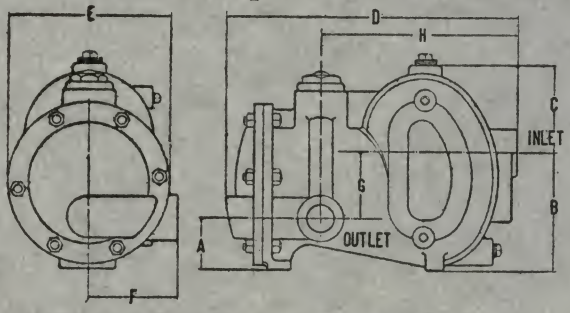
Size	A	B
½″	3¼″	2″

ROUGHING-IN DIMENSIONS
Float Traps, Vents and Strainers



Float and Thermostatic Trap No. 12 and Steam Trap No. 512

DIMENSIONS
CONNECTION SIZES
¾-in. Inlet ¾-in. Outlet
DIMENSIONS
A—4½ in. C—1⅞ in.
B—3⅞ in. D—6 in.

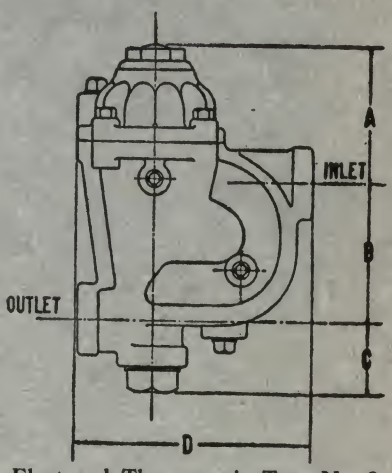


Heavy Duty Trap No. 14 and Steam Trap No. 514

DIMENSIONS

Size inlet and outlet	A	B	C	D	E	F	G	H
1 ″	2 ″	5 ″	5 ″	13½″	7¼″	3½″	3 ″	8¼″
1½″	2¾″	6⅛″	4⅞″	15⅞″	8 ″	4½″	3⅜″	10½″
2 ″	3 ″	6⅜″	6¼″	18½″	9 ″	5 ″	3⅜″	13⅝″

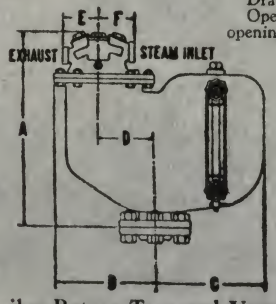
Drain Tapping ½″ on all sizes.
Opening in top of trap one pipe size smaller than inlet and outlet opening.



Float and Thermostatic Trap No. 8 and Steam Trap No. 508

CONNECTION SIZES
1¼-in. Inlet
1¼-in. Outlet

DIMENSIONS
A—4⅜ in.
B—4⅛ in.
C—2¼ in.
D—7 1/16 in.



Boiler Return Trap and Vacuum Equalizer

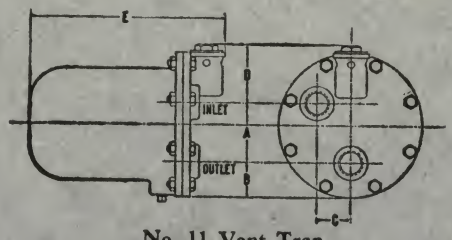
DIMENSIONS

No.	Size	A	B	C	D	E	F
10-A	2000	16¾″	8¼″	9⅜″	4⅝″	3″	3″
10-B	4000						

Steam inlet ¾″. Trap inlet 2″. Exhaust ½″.

		A	B	C	D	E	F
10-C	6000						
10-D	8000	21½″	9¾″	11¼″	5⅜″	3⅜″	3⅜″
10-E	10000						

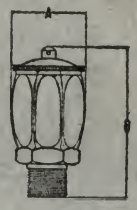
Steam inlet ¾″. Trap inlet 2½″. Exhaust ½″.



No. 11 Vent Trap

DIMENSIONS

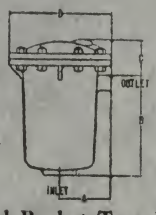
Air outlet	Inlet	Water outlet	A	B	C	D	E
½″	1″	1″	3 7/16″	1¾″	1⅞″	3⅛″	10½″



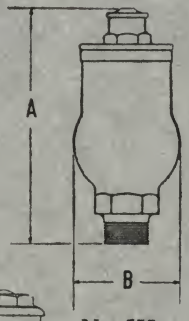
No. 5 Vent

DIMENSIONS

Size inlet	A	B
⅜″	2″	4″
¾″	2″	4″



No. 555 Vent
DIMENSIONS
A—5 1/16 in.
B—2½ in.

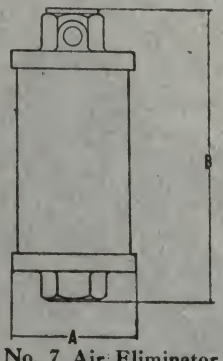


No. 555

Inverted Bucket Trap No. 500

DIMENSIONS

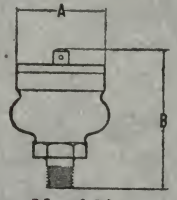
Size inlet and outlet tappings	A	B	C	D
½″	2½″	3½″	1¾″	5 ″
¾″	3 ″	4½″	1 ″	5¾″



No. 7 Air Eliminator

DIMENSIONS

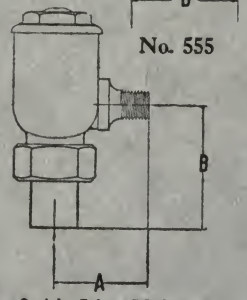
Size inlet tapping	A	B
¾″	3½″	8½″
1 ″	3½″	8½″



No. 6 Vent

DIMENSIONS

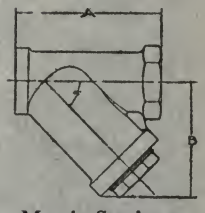
Size inlet	A	B
¼″ and ⅜″	2″	3″



No. 3 Air Line Valve

DIMENSIONS

Size	A	B
⅛″x¼″	1½″	1 9/16″
¼″x⅜″	1 13/16″	2⅛″
⅜″x⅜″	1 13/16″	2 1/16″



Marsh Strainer

DIMENSIONS

Inlet and outlet tappings	A	B
½″	3½″	3½″
¾″	3½″	3½″
1 ″	4¾″	4 ″
1¼″	5 ″	4½″
1½″	6 ″	5 ″
2 ″	6¾″	5½″

½″ Drain connections for ½″, ¾″, 1″ and 1¼″ sizes. 1″ Drain connection for 1½″ and 2″ sizes.

JAS. P.

MARSH

& COMPANY

MINNEAPOLIS HONEYWELL REGULATOR COMPANY

MODUSTAT Automatic Modulating Orifice System of Individual Room Temperature Control

MODUTROL System of Air Conditioning Control

ZONE and UNIT HEATER Control Systems

AUTOMATIC CONTROLS for Oil and Gas Burners, Stokers, Dampers, Refrigeration « « « and Industrial Processes » » »

Branch Offices or Distributers in All Principal Cities
Main Office . . . . . MINNEAPOLIS, MINN.

THE MODUSTAT

A Self-contained Automatic Room Temperature Control Valve for Individual Radiators

Outdoor temperature is by no means the only factor that must be taken into consideration, if all rooms within a building are to be equally heated at all times.

It is obvious that rooms on the shady side of buildings, receiving no warmth from the sun, require more steam to heat them than those benefiting from the direct rays of the sun.

When the rooms in shadow happen also to be directly exposed to the chilling effects of wind, the disparity in steam requirements for different sides of the building is even more aggravated.

Because these factors (wind direction, wind velocity, solar radiation, number of people in a room, etc.) are so shifting, it is impossible in advance to calculate how much steam should be delivered to a room to keep it uniformly warm at all times. The amount of steam admitted to the radiator must be continually altered to keep the room temperature steady by reducing or enlarging the size of the radiator orifice in accordance only with the need of the particular room in which the radiator is located, and without regard to the temperature requirements of other rooms or parts of the building.

That is exactly what the Minneapolis-Honeywell *Modustat* does automatically.

In response to the temperature of the room in which the radiator it is controlling is located, it admits just enough steam through its orifice to offset heat losses from the room and keep that room temperature constant.

The Modustat is finely finished, compact and inconspicuous.

It is as easily installed as an ordinary hand valve on all types of 2-pipe steam, vapor or vapor-vacuum systems.

Type V55-1 Modustat
For direct (exposed) radiation

Every Modustat is equipped with a screen which, inserted in the top of riser, prevents passage of pipe scale.

Type V-55 Modustat

For Direct (Exposed Cast Iron) Radiation

The sensitive thermostatic medium of this model is located in the bottom of an extension of the valve casting itself. It is built to withstand all manner of abuse. The thermal extension is so sturdy that a tension of 250 lbs. at the extreme end is required to bend it and even then its operating efficiency is not destroyed. A baffle, in which a fine hole is drilled, divides the tube into two chambers. The volatile liquid is retained in that portion of the tube which is below the baffle, only the vapor produced by gasifying the liquid being able to pass through the drilled hole.

The baffle virtually isolates the lower chamber in the tube from the upper, and by so eliminating circulation prevents heat transfer by convection from the upper chamber located in the steam space, to the lower chamber located in the air temperature of the room.

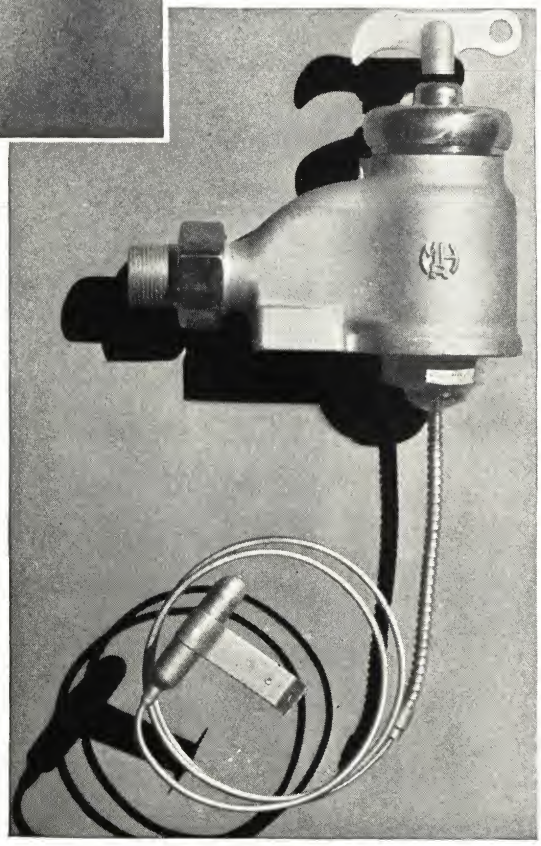
Type V-56 Modustat

For Concealed (Cabinet or Indirect) Radiation

The thermal extension of the valve body is eliminated in this model and a flexible hollow wire with a volatile containing bulb which is protected, when installed, by the radiator cabinet or housing, is substituted. This bulb may be placed in any position that will most nearly represent the temperature of the air returning to the heater.

The bulb may, in indirect systems, be placed above the valve if the hollow wire between the valve body and control valve is so placed as to be exposed to a higher temperature than the bulb itself.

Mechanism is available by means of which the Type V-56 Modustat may be conveniently adjusted from the exterior of the grille or cabinet.



Type V56-2 Modustat
For indirect or cabinet radiation. Key-set adjustment

Economy

In addition to the perfect comfort of the room occupants due to the amazing uniformity of temperature achieved by this automatically modulating orifice system of individual radiator control, extraordinary economy of steam consumption is a natural consequence. Because sufficient radiation must be installed in a building to heat it during the coldest of days (which Government records show approximately only 4% of the entire heating season), it is inevitable that, unless orifices are modulated, the radiators will be delivering more heat than is wanted 96% of the time!

Automatically Lowered Night Temperature

In those buildings whose heating plants are subject to automatic or manual adjustment of boiler pressures or boiler differentials, the Modustat offers the opportunity of reducing the temperature in the building at night through the lowering of boiler pressures or the reduction of differentials. Should, however, the occupant of any office wish to work at night, that one office or any number of offices may, by a single movement of the adjusting mechanism, continue the daytime temperature.

MODUSTAT FEATURES OF DESIGN AND CONSTRUCTION

The Design

Sturdiness, simplicity, protection of all actuating parts, and accuracy, are salient features of the Modustat design. It is built entirely of indestructible metals. All working mechanism being within the sturdy brass housing, it is protected against the possibility of tampering.

Immunity from the effects of conducted heat is achieved without the use of any insulating materials.

The Modustat consists of three units:

(1) The Thermostatic Element—This unit is made in two designs. The Type V-55 is for exposed radiation. The Type V-56 is for concealed radiation.

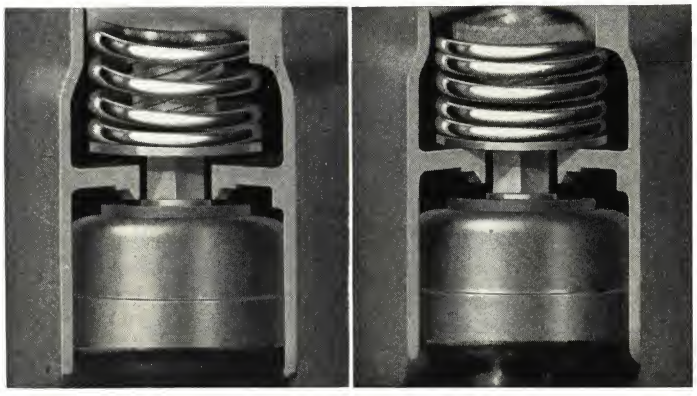
The thermal element in either type may be replaced without removing the valve body from the line.

(2) The Valve Body—This is a sturdy, permanent brass casting.

(3) The Adjusting Unit—This is completely enclosed, with the exception of the hand wheel used in the -1 type. This hand wheel is of bakelite, the only breakable part of the entire valve.

The -2 type, key set, is all metal provided with metal adjusting key.

The thermostatic element is replaceable without removing the valve from the line



The automatically controlled orifice of the Modustat is seldom either completely open or completely closed. This is a true modulating valve, always supplying just enough steam to the radiator to offset heat losses and keep the room temperature precisely uniform

Construction

A nickel alloy bellows forms the flexible or motion transmitting medium through which the expansion or contraction of the volatile liquid is transmitted to the valve disc, causing the disc to move to the seat, reducing the size of the orifice as room temperature increases; and enlarging the orifice as room temperature decreases. Nickel alloy is impervious to the corrosive influence of chemically softened or naturally impure water.

The valve disc is readily replaceable, if necessary, without removing the valve body from the line; though no disc, after three years' service, has ever required replacing.

The spring designed to counteract the volatile expansion super-induced by room temperature rise is of selected stainless steel. It is oversized and is worked far below its distortion limit.

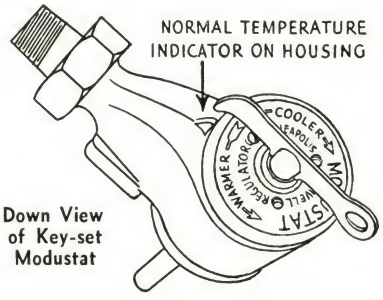
The so-called "packed packless" type of seal is used because of its reliability and popularity among those experienced in valve strength and weakness.

The packing cone is under constant spring tension insuring a tight valve under either vacuum or pressure.

The Adjusting Unit

It is extremely simple to adjust the Modustat so that it will maintain the room temperature desired by the occupant of each room, without regard to the temperatures maintained in other rooms or parts of the building. The hand wheel indicates the normal setting which suits most people but the Modustat can be set at any point desired between 80° and 40°.

The 40° minimum temperature setting prevents the possibility of freezing of the radiator or plumbing fixtures.



Down View of Key-set Modustat

With Zone Control

In many buildings the steam flow main and riser loss form a not inconsiderable part of the total heat losses. Under such conditions, Minneapolis-Honeywell zone or sectional control will carry Modustat individual radiator control a step farther. See pages 7 and 8 for zone control.

INSTALLATION AND SPECIFICATION FOR MODUSTAT TEMPERATURE CONTROL VALVES

INSTALLING THE MODUSTAT

Diagrams show how the Modustat is installed to control individual room temperature by automatic modulation of the heat supply to every common type of radiator and convection heater, The Modustat system is designed for use *only with two-pipe* (direct or indirect) steam, vapor or vapor-vacuum heating, operated on pressure not to exceed 10 lbs. and vacuums not to exceed 10 in. The Modustat, ½-in. and ¾-in. sizes, control up to 100 sq. ft. of cast iron radiation or its equivalent. The 1-in. and 1¼-in. sizes control correspondingly greater amounts.

How Installed

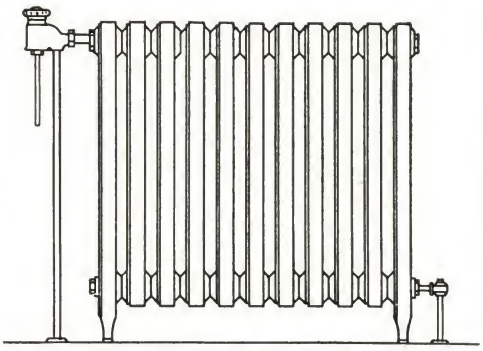
Installation of the Modustat in any large building, old or new, is as simple as that of any ordinary hand-operated valve. In most cases, the ordinary hand-valve need merely be removed and the Modustat installed, without any changes in piping or extra fittings. The Modustat is placed on the riser and attached to the radiator inlet. The only remaining operation is then to establish the normal orifice necessary to produce the proper temperature for the individual room.

The requirements of the occupant, according to his needs or individual preferences, determine the degree of temperature desired.

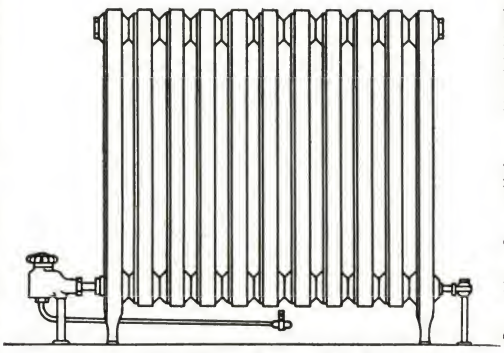
Adjustment of the Modustat is made by a simple manipulation of the hand-wheel or key. The normal setting for comfort is indicated on the instrument, and easily varied to meet individual preferences. Thereafter, the Modustat operates automatically to keep the room temperature precisely uniform, enlarging or decreasing the orifice to compensate immediately for variations in heat loss.

For Every Type of Radiator or Convection Heater

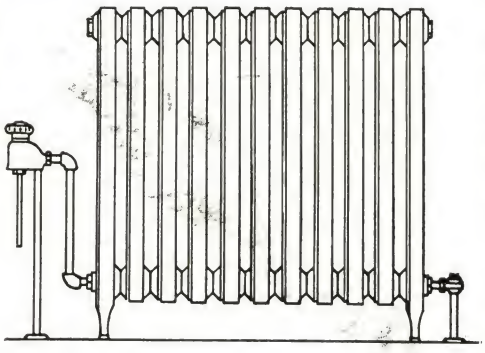
Because it is made in both the "self-contained" and "remote" types, every existing form of radiation on a *two-pipe system* can be Modustat controlled. Roughing-in requirements are no different than those of an ordinary hand control valve.



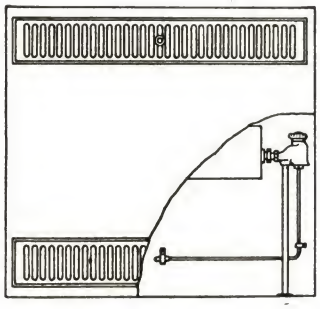
Installation of V-55 on Top Feed Radiator

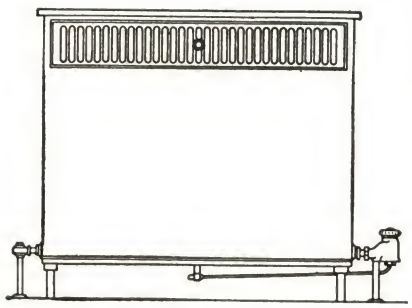


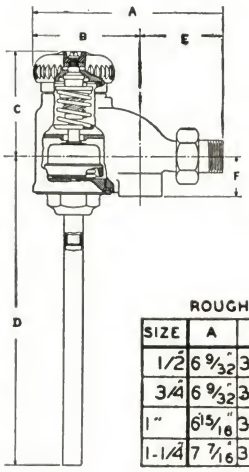
Installation of V-56 on Bottom Feed Radiator



Installation of V-55 on Bottom Feed Radiator







Drawing of V-55 Modustat and Roughing-in Dimensions

(Body dimensions of Type 56 are identical with those of Type 55)

ROUGHING IN DIMENSIONS

SIZE	A	B	C	D	E	F
1/2	6 9/32"	3 17/32"	3 1/4"	9 3/4"	2 3/4"	1 13/32"
3/4	6 9/32"	3 17/32"	3 1/4"	9 3/4"	2 3/4"	1 5/16"
1"	6 15/16"	3 5/16"	3 3/8"	10 1/2"	3"	1 7/8"
1-1/4	7 7/16"	3 15/16"	3 3/8"	10 1/2"	3 1/2"	1 3/4"

SPECIFICATION FOR MODUSTAT TEMPERATURE CONTROL VALVES

1. This contractor shall furnish and install on each unit of direct radiation throughout the building an individual, self-contained radiator control valve, of size as indicated on the tapping schedule. The valves shall be sturdy, compact, tamper-proof and so constructed that both actuating mechanism and thermostatic element shall be completely enclosed. The valves shall be of the vapor tension type. They shall maintain within two (2) degrees the desired room temperature, adjustable for a range of 40° F. to 80° F. The valves shall be guaranteed to be free from defects in either workmanship, material or performance for a period of one year from the date of completion of the installation.

2. *(For exposed cast iron radiators)*—
The valves shall be MINNEAPOLIS-HONEYWELL REGULATOR COMPANY'S type V-55 Modustats equipped with:

a. Bakelite hand wheels with or without high limit stops.

b. Lock shield adjustment with sufficient number of adjusting keys.

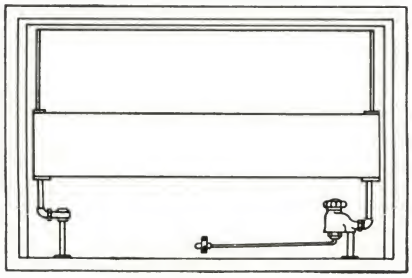
3. *(For concealed or recessed radiators)*—
The valves shall be MINNEAPOLIS-HONEYWELL REGULATOR COMPANY'S type V-56 Modustats equipped with:

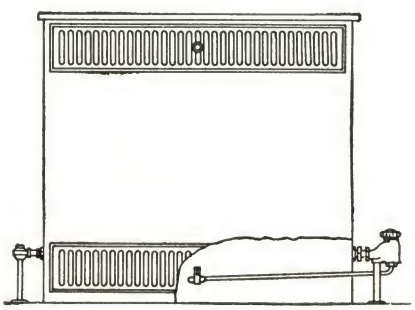
a. bakelite hand wheels with or without high limit stops.

b. Lock shield adjustment with sufficient number of adjusting keys.

c. Extension handwheel adjustment operated from exterior of cabinet or grille, as shown.

d. Extension lock shield adjustment unit operated from exterior of cabinet or grille, as shown.





THE MODUTROL SYSTEM

of Automatic Ventilating and Air-conditioning Control for Unit Ventilators—Central Distributing Systems

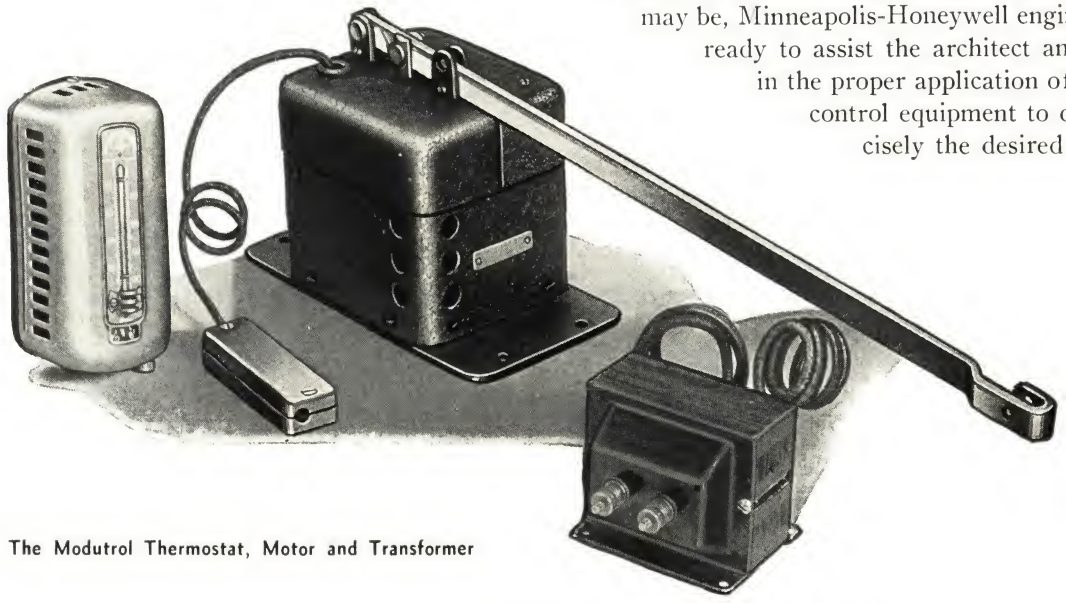
Electrical modulation of mixing and fresh air dampers in Unit Ventilators or Plenum Chamber Systems, or of heating or tempering coils, is the Minneapolis-Honeywell response to the need for more flexible, more sensitive, dependable air conditioning control. Heating-ventilating equipment has been greatly improved during the past few years, but its completely satisfactory operation, in the final analysis, depends upon the use of properly engineered automatic electric control.

The Minneapolis-Honeywell Modutrol System is a complete line of electrically operated modulating controls for air conditioning and heating-ventilating equipment. It meets the problem which has grown from the increased use of air conditioning equipment in schools, theatres, stores, auditoriums, banks and other large spaces. Correct, dependable, automatic control of heating-ventilating systems now widely used in schools, long considered a difficult problem, now consists only of the proper application of the precise, flexible Modutrol System.

The correct design of a system of temperature control is primarily based on two factors: exposure and occupancy. Differences in outdoor temperature, wind direction, wind velocity, exposure, and solar radiation impose an individual set of conditions on every building installation. Seldom are two applications identical.

From the complete Modutrol System the heating engineer chooses the right controls to meet the specific requirements of each installation. Modutrol Thermostats, Aquastats, and Pressurestats are available to cover a wide field of application in space heating, air conditioning and industrial process control, where true modulation, accuracy, dependability and minimum upkeep are desirable.

Whatever the exact control requirements of the job may be, Minneapolis-Honeywell engineers stand ready to assist the architect and engineer in the proper application of automatic control equipment to deliver precisely the desired results.



The Modutrol Thermostat, Motor and Transformer

MODUTROL MANUFACTURERS SPECIFICATIONS

Modutrol Thermostat

Type No.: T 91-1.
Scale Range: 60°-80° F.
Finish: Height: Width: Depth:
Dimensions: 2¼-in. wide, 2½-in. deep, 5¾-in. high.
Capacity: 5 watts @ 20 volts.

Type T 91-1—Bellows actuated variable resistance Potentiometer type.

Completely modulating, operation of sensitive bellows varies resistance of Potentiometer unit which determines position of Modutrol Motor.

Transformer

Primary: 110 volts, 60 cycle A.C. Std. See Motor specifications for specials.

Secondary: Control circuit 5 W. @ 20 V. Motor circuit 15 W. @ 20 V.

Modutrol Motor

Type No.: M 91-1.
Operation: Modulating.
Note: To be used with Type No. T 91-1 Thermostat only.
Dimensions: See Chart page 9.
Torque: 10 lbs. at end of 15½-in. lever arm.
Stroke: 2½ in. at end of arm.
Current characteristics: 20 volts, 60 cycle A.C. model is standard.

Furnished for other voltages and frequencies at slight extra cost. Not available for D.C.

Type No.: M 80-1.

Specifications same as for Type M 91-1 except Motor is non-modulating two position type for use with Series 40 mercury switch control instruments or on manual operation.

Series 10 mercury tube type limit controls may be used with either Type M 91-1 or Type 80-1 Motors.

THE MODUTROL MOTOR

Function

The Modutrol Motor operates as a Modulating Control of dampers, louvers, valves, etc.

Operation

The Type M 91-1 Modutrol Motor (modulating type) is for use only with the Type T 91-1 Modutrol Thermostat.

The operation of the Modutrol Thermostat and Motor is as follows:

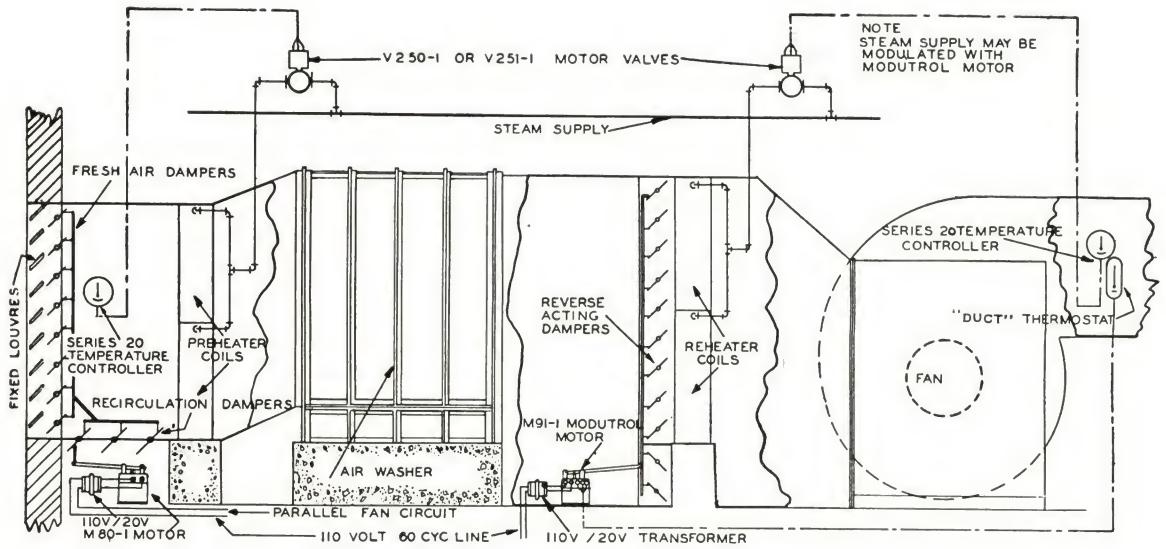
The thermostat contact blade is moved across the potentiometer in the thermostat as the room temperature varies minutely. As this blade moves, it varies the current flow through the resistance windings of two warp switches in the motor, causing them to move in relation to heat variation in these windings. This varies the position of the motor contact blade in relation to the inclined contact plate.

Contact between warp switch contact and inclined contact plate on the drivepost completes the circuit through the heating unit. The resultant gas pressure in the motor operating unit raises the drivepost. The drivepost continues to rise until contact is broken on the inclined contact plate. The motor arm then remains in the position to which the drivepost has moved it until variation in the Potentiometer Thermostat resistances, as above described, causes it to assume another position. The motor develops the same power regardless of temperature increase demanded. Current flow through the motor heating unit is interrupted when the motor arm has assumed the position called for by the thermostat. Continued absence of pressure in the bellows allows the arm to progress toward the "off" position until contact on the inclined contact plate is re-established by continued or renewed demand by the thermostat.

Advantages

(1) Extreme accuracy of control.
(2) Absolute silence of operation.
(3) Simplicity of construction.
(4) No lubrication necessary.
(5) Automatic assumption of predetermined position on power failure with automatic return to thermostatic control on resumption of current. Motor may be arranged to assume either open or closed position on power failure.
(6) True Modulation—no over-run.
(7) Large amount of power available.
(8) Automatic cleaning of all contacts.
(9) Low voltage control circuit.
(10) One controller may operate several motors through dual control switches.
(11) Mounting plate enabling motor to be placed in any position, except upside down.
(12) Manual operation of dampers or valves does not damage or interfere with motor operation.
(13) Independence of individual units.
(14) Standard high or low limit controls may be used in circuits.

The Modutrol Motor



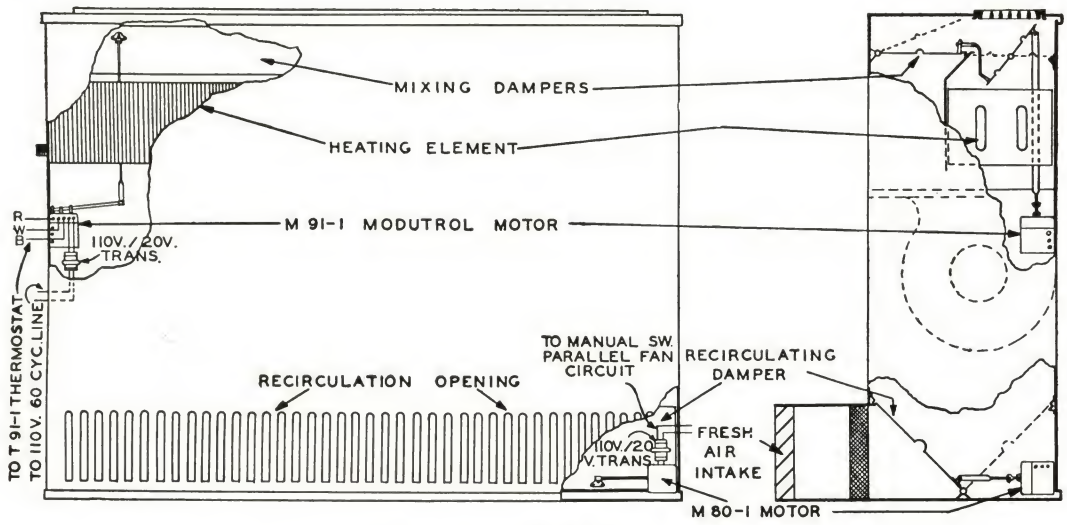
Automatic Control of Central Fan System

Fresh air and recirculation dampers are controlled by an M 80-1 Non-modulating Motor which opens the fresh air and closes the recirculating dampers on starting of the fan. An M 91-1 Modulating Motor may be substituted in this location if proportioning of the fresh air and recirculating dampers is desired. Preheater coils are controlled by an M 91-1 Modulating or V 250-1 or V 251-1 Non-modulating Motor Valves operated by a controller in the fresh air chamber.

The delivered air temperature is maintained at the predetermined point by a Duct Thermostat in the duct beyond the fan. This instrument controls the air flow through the reheating coils by modulation of the reverse acting dampers connected to an M 91-1 Modulating Motor, thus constantly proportioning the volume of heated and bypassed air according to demand of the Duct Thermostat in the discharge duct. Steam delivery to the reheater coils is regulated by either a modulating or non-modulating motor valve under command of a controller in the delivered air duct.

This illustrates and describes only one of many systems of air conditioning.

The extreme flexibility of the Modutrol System allows its adaptation to any control requirement.



Unit Ventilator Application

The control of unit ventilators is easily and perfectly accomplished by the Modutrol.

The Modutrol Thermostat, installed in the correct location on the wall, operates a Type M 91-1 Motor to which are connected the warm and fresh air dampers.

A second motor, Type M 80-1 Non-modulating, is connected in parallel with the fan motor to operate the recirculating damper, opening it as the fan starts and closing it when the fan is turned off. A manual switch may be used in series with the M 80-1 Motor to allow the recirculating damper to be kept closed for quick heating. Convenient mounting brackets and proper linkages for connection are available.

Schematic Drawing Unit Ventilator Control

One common method of controlling unit ventilators such as shown in diagram No. 3 is illustrated. With the closing of the line switch, all of the fan motors are started. At the same time the Modutrol Motors open the recirculating dampers. The Modutrol Motors operating the mixing dampers are separately connected to the fan circuit and each operates on command of its own thermostat. If quick heating is desired, a switch may be placed in the line to the recirculating damper motors, enabling them to be manually closed whenever necessary.

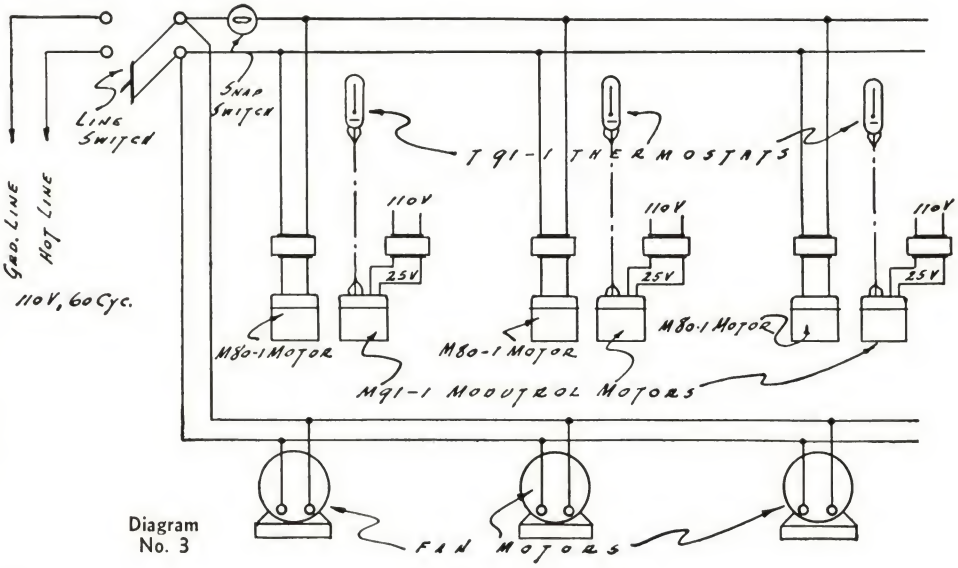
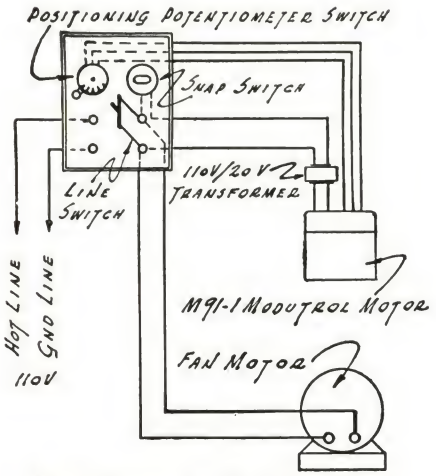


Diagram No. 3



Modutrol Starting and Positioning Control Switch

Modutrol Starting and Positioning Control Switch

Schematic wiring of manual starting and positioning switches (shown at left) is optional, simply providing a means of either running the fan without any control of dampers or louvres, or of manually setting them at a fixed position. The hookup is used with either unit ventilators or central fan hookups.

Vent Stack Control

On many installations it is desirable to have a damper in the vent stack automatically close when the exhaust fan shuts down. This may be accomplished by placing a Type M 80-1 Non-modulating Motor in parallel with the fan or blower. The roof ventilator damper will then open and close simultaneously with the operation of the exhaust fan.

Modustat on Radiator

Cast or concealed radiation may be individually controlled by the Modustat automatic orifice system. Type 55 for exposed top inlet radiators; Type 56 for concealed and bottom inlet radiation. Furnished with hand or key set adjustment as desired. (See pages 1, 2 and 3).

UNIT HEATER AND ZONE OR SECTIONAL CONTROL SYSTEMS

Unit Heater Control Systems

The nature of the unit heater method of delivering heat makes automatic controls an absolute essential if any degree of satisfaction and economy of operation is to be obtained.

Minneapolis-Honeywell controls meet the requirements of all types of installations. The simpler of these is satisfied by the mercury tube type of thermostat, while complete and precise systems can only be obtained through the use of low voltage thermostats, limiting devices, motor valves, and relays. These complete systems of control so govern the unit heater as to make it not only completely automatic, but highly satisfactory and decidedly economical in operation.

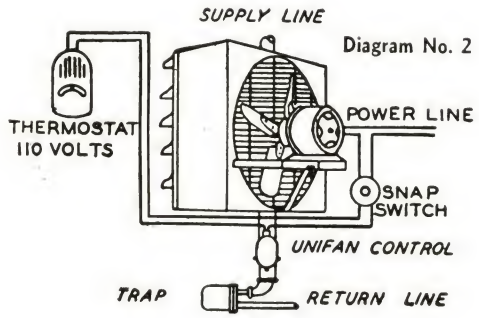
Unit heaters can be controlled either individually or in batteries, and can be grouped with direct radiation under complete control systems, which render fully automatic, not only the direct radiation and unit heaters themselves, but extend their command to the heat producing medium, be it oil, gas or coal. The diagrams illustrate a few of the installations to which Minneapolis-Honeywell controls are adaptable. Each heating system presents problems entirely its own, and there are many control layouts possible which have not been shown. Minneapolis-Honeywell engineers will work with you (at no charge) toward the solution of your problem.

Zone or Sectional Control Systems

Exposure and occupancy are two principal factors determining the correct zone control system. Changes in wind velocity, wind direction, solar radiation, number of people in a section of a building, etc., all effect changes in the heat input requirements of the section at different times.

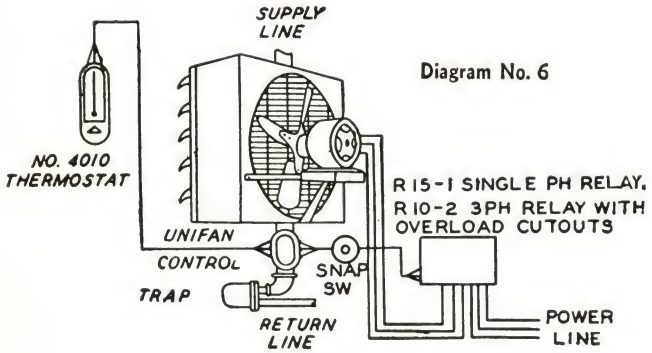
Zone or sectional control may be subject to the command of a plain thermostat which operates at a temperature that is variable by hand setting, or it may be subject to the command of a clock thermostat which will operate at a predetermined temperature for a specified period, at the termination of which the temperature is either raised or lowered automatically to some other predetermined point.

The importance of the exclusive Minneapolis-Honeywell Sectional Control features offered in the combination of Clock Control with Steam Flow Control can hardly be overestimated, when due consideration is given to the fact that under usual working conditions the stand-by period, when all motorized control valves are closed has been shown by test to approximate 69% of the time during the mild weather and not under 42% in severe weather—an average of about 50% of all heating time for the season.



Line Voltage Thermostat with "Unifan Control"

The "Unifan Control" is provided in this system to prevent the operation of the fan whenever the coils chill through failure of the steam supply. Either Type L46-1 (Pressure) or Type L44-1 (Temperature) Unifan Control may be used.



Type 4010 Thermostat, "Unifan Control" and Relay

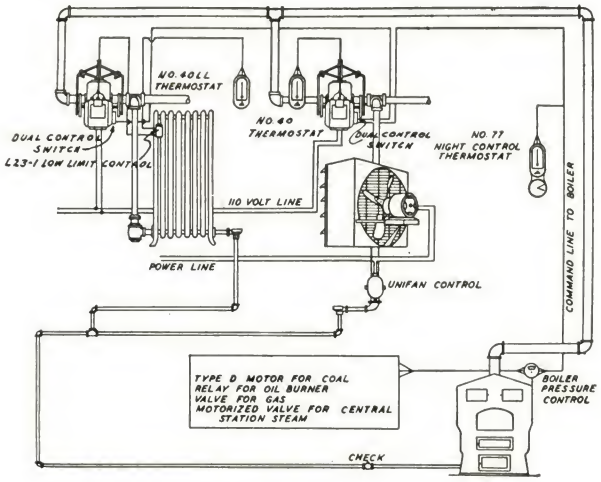
The "Unifan Control" is provided in this system to prevent the operation of the fan whenever the coils are cold due to lack of steam. Type L16-1 (Pressure), or Type L14-1 (Temperature) may be used.

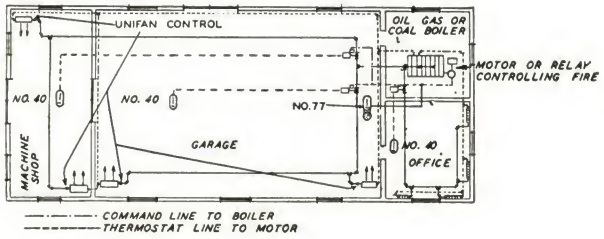
Type R15-1 Relay for 110 volts to 220 volts single phase current; Type R10-2 with overload cutouts for 3 phase current; Type R41-1 for 3 phase current without overload protection.

Battery Unit Heater Control

On some installations it is feasible to group the units in batteries operating under control of a single thermostat. Although this method of control is not often practicable it is used in cases where the units are small, and the space they are to heat may be adequately controlled from one thermostat.

Group Clock Control





In buildings where sectional control of Unit Heaters, Direct Radiation or a combination of the two is desirable and where it is practical to lower at one time the temperature requirements of all sections to the Night Temperature, "Group Clock Control" is recommended.

In Group Clock Control each section is under command of its Thermostat and Steam Flow Control Valve with Unifan Control.

One Type 77 Thermostat is placed in command of all so that at any predetermined hour the temperature requirements are reduced to 55° or 60° and the automatic Gas or Oil Burner, Stoker or Central Steam Plant Line is definitely closed down and held off until a predetermined hour in the morning, unless the temperature falls below the point for which the 77 Thermostat indicator is set. The Type 77 Thermostat with Week End Shutoff permits a low temperature to be maintained over Sunday or both Saturday and Sunday with automatic return to day time temperature Monday morning. The Type 77 Thermostat in Group Clock Control is the medium of night temperature control essential, for example, in protecting thermostatically sprinkler systems, etc., against freezing.

The low limit control, maintaining a minimum radiator temperature, acts to prevent air stratification in the portion of the building heated by cast iron radiation, and by operating the heat supply more frequently effects a much faster pickup when any thermostat calls for heat. This also reduces the peak loads on the boiler, and also lessens still farther the fluctuations in building temperature.

The steam flow control valves should be placed as close to the source of heat—boiler or incoming line—as possible, in order to reduce line condensation loss to a minimum.

The 40LL Thermostat is so designed that in mild weather, the low limit control is inoperative.

Note: *See next page for detailed information on Minneapolis-Honeywell Thermostats.*

MOTORIZED VALVES FOR AUTOMATIC REMOTE TEMPERATURE CONTROL IN LARGE BUILDINGS

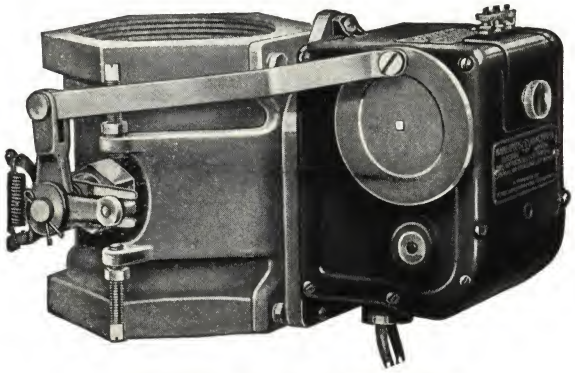
For Hot Water Heating Systems and Low and High Pressure Steam Heating Systems

Type VB20-1 Motorized Butterfly Valve

For Hot Water Heating Systems

Through the use of these valves in conjunction with room thermostats, automatic remote temperature control in large buildings employing hot water systems is possible. Specific temperature requirements in definite sections or on certain floors are accurately regulated. In operation these valves open to permit the flow of hot water to the radiators of only those sections where the room thermostats are calling for heat; otherwise they are closed.

On gravity type hot water installations using the Summer-Winter Control the use of a Type VB20-1 is essential. In this application the valve prevents circulation of the boiler water to the radiator when the room thermostat is not demanding heat. When the thermostat calls for heat the valve opens and hot water flows to the radiators.



Type VB20-1 Motorized Butterfly Valve

Manufacturer's Specifications

Type VB20-1 Series 20—Dual control switch can be supplied for controlling auxiliary series 10 or 20 controls.

**Valve Sizes:* 1½ in., 2 in., 3 in., 4 in., 5 in., 6 in. screwed types only.

D Motor Unit: 110 volts 60 cycles—low voltage control circuit.

Available in other commercial voltages and frequencies at small additional cost.

Standard Timing: Full open to full close 30 sec.

Electric Rating of DS-3 rotary switch: 10 amps. 110 volts.

*The Minneapolis-Honeywell Motor can be used to motorize butterfly valves in sizes above 6-in. produced by standard valve manufacturers.

Types V250-1 and V251-1 Motorized Valves

For Steam Flow Control

Type V250-1

Type V250-1

The application and function of this valve is identical to that of the Type VB20-1, but it is used on steam heating systems. In addition, by changing the valve disc the application of this valve becomes a great deal more diversified as it can be used to control the flow of oil, water, gas or air where operating pressures are not excessive

Manufacturer's Specifications—***Type V250-1 Series 20***—Dual control switch can be supplied for controlling auxiliary series 10 or 20 controls.

Valve Sizes: ½, ¾, 1, 1¼, 1½, 2, 2½ and 3-in., screwed type only.

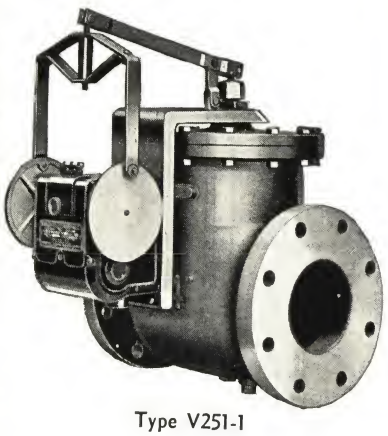
Maximum Operating Pressures:
½-in., ¾-in.: 100 lbs. per sq. in.
1-in., 1¼-in.: 55 lbs. per sq. in.
1½-in., 2-in.: 25 lbs. per sq. in.
2½-in., 3-in.: 10 lbs. per sq. in.

Standard Timing: Full open to full close 30 seconds. D Motor unit: 110 volts 60 cycles—low voltage control circuit.

Electric Rating of DS-3 rotary switch: 10 amps. 110 volts.

Type V251-1

A semi-balanced valve. This motorized valve design enables the V251-1 to operate dependably on higher pressures. Sturdy construction characterizes this valve with its semi-steel valve body, its bronze valve seats and discs, and its stainless steel valve stem. Ribs running parallel to the valve stem serve as guides to insure positive closure of the beveled valve and valve seat.



Type V251-1

Important Feature—The entire assembly (discs and seats) may be removed and replaced without removing the valve body from the line. Thus in case of wear an entire factory ground inside assembly makes quick repair possible.

Manufacturer's Specifications—***Type V251-1 Series 20***—Dual control switch can be supplied for controlling auxiliary series 10 or 20 controls.

Valve Sizes: 3½, 4, 5 and 6-in., flange type only.

Maximum Operating Pressures: 50 lbs. per sq. in., all sizes 3½ to 6-in. inclusive.

Standard Timing: Full open to full close 30 seconds.

MINNEAPOLIS-HONEYWELL RELAYS

The line of Minneapolis-Honeywell relays incorporates magnetic switches of functions and capacities caring for practically all automatic heating requirements. Starting and stopping motors at the command of sensitive low voltage thermostats and limit controls; interconnecting control units in space heating and industrial layouts; acting as conventional remote control switches; single phase and polyphase control with overload protection if desired; these and other functions too numerous to mention suggest the range of usages of this equipment.

MINNEAPOLIS-HONEYWELL THERMOSTATS

40 and 4010 Thermostat

Low Voltage Plain Thermostats

The plain thermostat operates to keep the room in which it is placed at a temperature corresponding to the setting of the thermostat indicator.

These thermostats employ open contacts and are designed only for low voltage operation. They possess the advantage of being calibrated along the entire scale range, permitting their use at any point on the scale without readjustment. Ease of installation features all low voltage thermostats.

Manufacturer's Specifications:

Type 4010 Thermostat (series 10)—
Scale Range: 50° to 90° F. standard. Special scales from 20° to 150° F., with 40° F. range available at small extra cost.
Operating Differential: 2° F. May be increased.
Finish: Statuary Bronze.
Overal Dimensions: Height, 6½ in.; width 2¼ in.; depth 1⅝ in.

Type 4110 Thermostat (series 10)—For special industrial purposes.
Scale Range: 30° to 60° F. standard. Special scales available at small extra cost.

Type 40 Thermostat (series 20)—Identical with 4010 except arranged for Series 20 operation.

Type 192A Thermostat (series 80)—2-wire low voltage. Otherwise same as 192.

Type 192B Thermostat (series 20)—Otherwise same as 192.

64G Thermostat
Height 5¼ in. Width 3¾ in. Depth 2¼ in.

Line Voltage Plain Thermostats

Employ mercury switches. Provide exceptionally close control for this type of instrument.

Manufacturer's Specifications—***Type 192 Thermostat (series 40)***—2 wire line voltage.
Scale Range: 55° to 90° F.
Operating Differential: 2° F. Adjustable.
Rating: Motor loads, 1/20 hp. R.I.
Resistance Loads: 2 Amp. at 110 volts; 1 Amp. at 220 volts.
Finish: Statuary Bronze.

192 Thermostat
Height 4⅞ in. Width 2¾ in. Depth 2½ in.

Type 135 Thermostat (series 40)—2 wire line voltage.
Scale Range: 55° to 90° F.
Operating Differential: 2° F. Fixed.

Type 137 Thermostat (series 60)—3 wire line voltage. Identical with Type 135 except arranged for three wire line or low voltage operation.

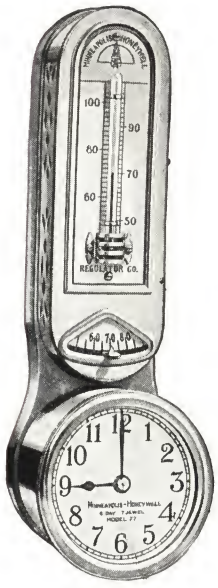
High Capacity Room Thermostat

Type 64G incorporates a 10-amp. Con-Tac-Tor Mercury Switch. Can be wired up to a main line circuit direct without a relay up to ratings given below.

Manufacturer's Specifications—
For line voltage circuits.

Type 64G (2 wire)—Bronze.
Resistance Loads: 10 Amp. 110 Volts; 5 Amp. 220 volts.
Motor Loads: 100-250 volts ½ hp. R.I., ⅛ hp. S.P. or D.C.
Adjustable Ranges: 58° to 82° F.; 38° to 62° F.

CLOCK THERMOSTATS



Type 7710

Greatest fuel economy, convenience and practicability are provided by Clock thermostats, which automatically, at any predetermined hour at night, move the temperature indicator to a lower setting, and automatically, at any predetermined hour early in the morning, restore the warmer, desired daytime temperature setting.

Week-end and Holiday Shut-off is available, by means of which the fuel-saving "night" temperature is continued throughout the day or days that a building is unoccupied, and the warmer, normal daytime temperature setting is not restored until the morning of the day that the building is again occupied.

Thermostats may also be equipped with automatic Low Limit Cutout feature, which, by cutting the low limit control out of operation whenever the temperature in the section of the building rises slightly above the point at which the thermostat is set (and during the hours in which the section is unoccupied), prevents a low limit control from causing overheating.

Electric Clock Thermostat

Utmost convenience is provided by the Electric Clock Thermostat, operated from 60 cycle current through our special transformer. Has self-starting, silent, reliable motor. A perfect timekeeper, combined in a beautiful, compact unit with an accurate thermostat.

Where 60-cycle regulated current is not available, eight-day clock type thermostat, having 7-jewel, accurate, dependable clock made by Minneapolis-Honeywell, should be used.

Manufacturer's Specifications

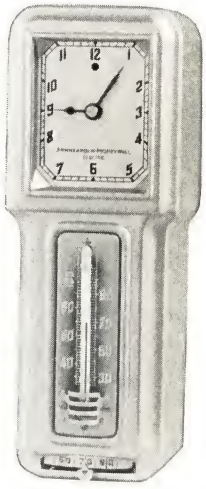
Type T12-1 Electric Clock Thermostat—To be used with equipment having: Series 10 wiring circuit.

Self-starting 20-volt Motor: Operated through transformer from 60-cycle A. C. regulated current.

Thermostat contact mechanism like Type 4010 (see opposite page).

Overall Dimensions: Height, 7¾ in.; width, 2⅛ in.; depth, 2⅜ in.

Finish: Silver.



Type T12-1

Type T22-1 Electric Clock Thermostat—Identical with T12-1, except wired to be used with series 20 equipment.

Type 7710 Eight-day Clock Thermostat—To be used with equipment having Series 10 wiring.

7-jewel temperature compensated clock, providing 16 automatic temperature-setting changes per week without rewinding. Can be arranged to provide 32 temperature changes, 4 instead of 2 per day if desired; but in this event clock must be wound twice a week.

Thermostat portion identical with Type 4010 (see opposite page).

Overall Dimensions: Height 9⅜ in.; width, 3 in.; depth 3 in.

Finish: Silver.

Type 77—Identical with 7710 except wired to operate with Series 20 equipment.

UNIFAN CONTROLS

For Controlling the Fan Motors of Unit Heaters

Functions

With Unifan Control the fan motor is permitted to operate only when there is a sufficiently high temperature or pressure in the return line of the heater to insure warm air being circulated. Thus, in case of daytime steam failure or when the steam supply is shut off at night, there is no possibility of cold-air blasts being delivered by the Unit Heater.

There are two types of Unifan Controls. On steam heating systems the Unifan Pressure Control is used. The control of the fan motor in this case is obtained through variations in steam pressure. If it is desired to operate the fan only when there is a sufficient temperature in the coils the Unifan Temperature Control is used. This control is generally used on Vacuum, Vapor and Hot Water Systems.

Unifan Pressure Control

The expansion and contraction of a corrugated metal bellows, through pressure changes, within the housing, makes or breaks the circuit to the fan motor. Besides being simple to install, setting of the operating range of the control is easily made. The operating differential of the Pressure Control is about 5% of the maximum scale range. A strain release is provided to absorb all abnormal stresses, and stresses occurring in operation. Both models of the Unifan Pressure Control are Mercury Switch equipped which assures positive switching action at all times.

Unifan Temperature Control

This unit is extremely accurate, due to improved scientific construction which insulates the thermostatic element from surrounding temperatures. The Unifan Temperature control can be mounted on either a horizontal or vertical pipe. Temperature changes in the Unit Heater return line are transmitted through the metal cup at the back of the control. Expansion or contraction of the bimetal element housed in this cup result and the circuit to the fan motor is completed or broken. An adjustment lever extends through the bottom of the case for setting the operating range of the control.

Being a surface type control, it is exceptionally easy to install, as it is not necessary to tap or drain the system. Like the Unifan Pressure Control, switching action is provided by a Mercury Switch.

Manufacturer's Specifications

Type L16-1 Series 10 Low Voltage Control—

Operating Range: ¾ to 15 lbs. per sq. in.

Electric Rating: 3 amps. at 20 volts.

Connection threaded for ¼-in. pipe (male).

Over-all Height: 8-in.

Type L46-1—For line voltage control, otherwise identical to Type L16-1.

Motor Rating: ¾ hp., 100-250 volts R.I. ⅙ hp. 100-250 volts s-p. or d-c.

Resistance Rating: 10 amps. at 110 volts. 5 amps. 220 volts.

Type L14-1 Series 10 Low Voltage Control—

Temperature Range: 100° to 200° F.

Differential fixed, and dependent upon the rate of temperature change in the pipe on which it is mounted.

Electric Rating: 3 amps. at 20 volts.

Over-all Dimensions: Height, 5⅜ in.; width, 4⅜ in.; depth, 2½ in.

Type L44-1—For line voltage control. Same as Type L14-1 except for electric rating.

Motor Rating: ¾ hp. 100-250 volts. R.I. ⅙ hp. 100-250 volts s-p. or d-c.

Resistance Rating: 10 amps. at 110 volts; 5 amps. at 220 volts.

MINNEAPOLIS HONEYWELL REGULATOR COMPANY

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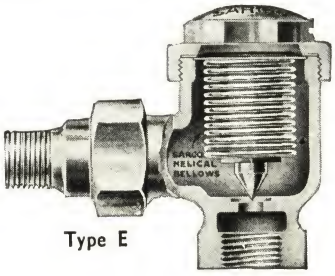
SARCO COMPANY, INC.

Manufacturers of Steam Specialties
183 Madison Avenue, NEW YORK, N. Y.
BRANCHES IN ALL PRINCIPAL CITIES

Products

Sarco Radiator Traps, Bellows Packless Inlet Valves, Float and Thermostatic Traps, Temperature Regulators and Self-cleaning Strainers. Also Air Eliminators; Alternating Receivers; and Dial and Recording Thermometers.



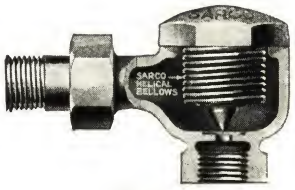
Type E

Sarco Radiator Traps

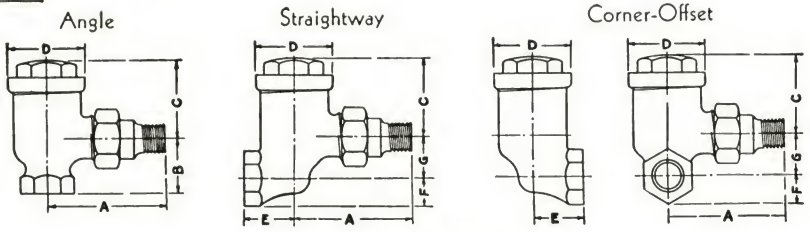
For vacuum, vapor and gravity heating systems, pressures up to 25 lbs. Available in right and left offset and straightway patterns.

Special features are the flexible bellows, made from a single piece of seamless, helically coiled bronze tubing of large diameter and heavy wall. Also the self-aligning valve head which assures perfect seating. Valve has a full ¼-in. lift, securing exceptionally large capacity.

The body is of heavy brass, nickel plated with polished trimmings.



Type H



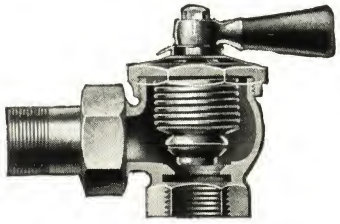
Roughing-in Dimensions

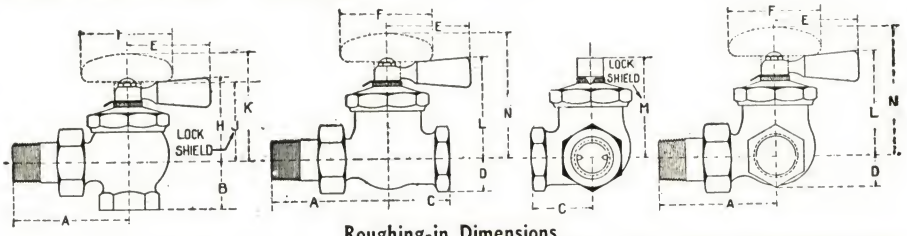
Type	Size	Dimensions in inches							Capacity, square feet		
		A	B	C	D	E	F	G	Vacuum	Vapor	List price
H	½	3¼	1½	1 3/16	2	1 3/8	5/8	1 1/8	100	125	$ 5.00
E	½	3¼	1½	2⅛	2¼	1 3/8	¾	1 1/8	250	200	6.00
E	¾	3¼	1½	2⅛	2¼	1 3/8	¾	1 1/8	800	600	8.00
E	1	3½	2	3¼	2¼	.....	.....	.....	1800	1500	15.00

Sarco Bellows Packless Valves

These valves are of the truly packless, quick-opening type. The valve stem is sealed to the cap by a flexible bellows made of the same seamless, helically coiled tubing used in Sarco Traps. No possibility of leakage, binding or sticking—no attention or maintenance. The disc is of high temperature asbestos composition, cone shaped and fully protected. Lever or round handles, or lock shield furnished. Angle, straightway or corner patterns available.

The body is of heavy brass, nickel plated with polished trimmings.





Roughing-in Dimensions

Size, in.	Dimensions in inches												Capacities, feet direct radiation	Price	
	A	B	C	D	E	F	H	J	K	L	M	N		Angle	Offset or Straightway
½	2¾	1¼	1 9/16	11/16	2⅛	2⅜	2 3/16	2	2 13/16	2 11/16	2½	3 5/16	0–25	$ 5.50	$ 6.50
¾	3	1¼	1 9/16	13/16	2⅛	2⅜	2 3/16	2	2 13/16	2 11/16	2½	3 5/16	26–75	6.00	7.00
1	3 3/16	1½	1¾	1	2⅛	2⅜	2 5/16	2⅛	2 15/16	2 11/16	2½	3 5/16	76–125	7.50	8.50
1¼	3½	1 5/8	.....	.....	2⅛	2⅜	2⅝	2 7/16	3⅜	.....	.....	.....	126–200	9.50	10.50
1½	3¾	1¾	.....	.....	2⅛	2⅜	2⅝	2 7/16	3⅜	.....	.....	.....	201–300	12.00	13.00

Sarco "FT" Float and Thermostatic Traps

Sarco "FT" Trap

For dripping ends of mains, risers, stacks, unit heaters, hot water tanks, etc. Have internal thermostatic air by-pass. Valves are underslung for large capacity and to reduce clogging. Made in two sizes: "FT-1," 1¼-in., and "FT-2," 2-in. inlet and outlet.

List prices: "FT-1," $25.00; "FT-2," $60.00.

Sarco Temperature Regulator

A simple, self-contained automatic valve for regulating temperature of water in storage heaters, or for room control. Made in sizes ½ to 6 in. for temperatures 30 to 300° F.

Sarco Strainers

Strainers in pipe lines are effective insurance against interruption in service, injury to valves, and expensive breakdowns.

Suitable for steam, water, and oil lines.

Write for Catalogue AL-40

STERLING ENGINEERING COMPANY

3738 North Holton Street
MILWAUKEE, WIS.

"THE THERMOTROL"

A Thermostatic Type of Room Temperature Control Applied to Individual Radiators

Description and Operation

The THERMOTROL is an automatic, self-contained, thermostatic type of regulating supply valve, and is readily applicable to two-pipe steam, vapor, vacuum or hot water heating systems. It can be as readily installed as any ordinary radiator valve.

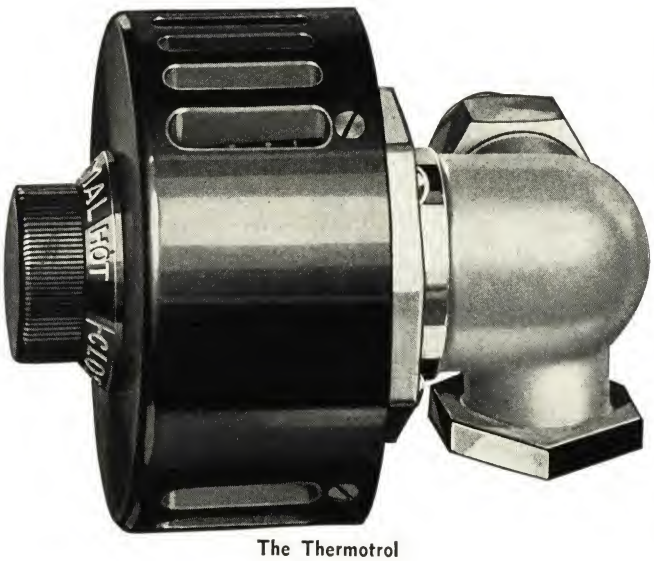
The THERMOTROL is equipped with a dial which can be turned to whatever temperature the room occupant desires. The adjustment of the THERMOTROL is extremely simple, and when once made need never be disturbed unless a higher or lower temperature is desired. In installing the THERMOTROL, the control dial should be turned to "normal." If this adjustment is not the desired one, a slight turn toward "hot" or "cold" will give the desired change. If no heat is desired, turning the adjustment dial to "closed" will shut the valve off entirely.

The THERMOTROL reacts to any slight change in the room temperature and increases or reduces the rate of flow of steam or hot water to the radiator. Once it is adjusted to the desired temperature, it automatically maintains that temperature without any further attention.

The THERMOTROL will accurately control the room temperature within one and one-half degrees of the desired point, thus preventing the waste of steam through overheating, which will result in a surprisingly large saving in fuel. The THERMOTROL will pay for itself over and over again in the fuel that is saved during the life of a building. 20% is a conservative estimate of the fuel that can be saved on any installation through this efficient temperature regulator.

In addition to the fuel saving derived from the use of the THERMOTROL, there is a far greater benefit—and that is, the comfort and health of the room occupants.

The automatic control of the radiator prevents over-heating of the room, as well as a continual change in the room temperature caused by opening of windows and doors; thus eliminating the cause of colds and subsequent ills.



The Thermotrol

Construction

The unit consists of a bronze valve with tapered seat and a guided stem upon which is mounted the thermostatic control. The valve is so constructed that it operates easily at common heating pressures. The valve mechanism is effectively insulated from the thermostatic unit by means of a metal baffle, bakelite flanges and the bakelite housing.

The actuating diaphragms are of special composition and contain a volatile liquid which expands and contracts with change in temperature.

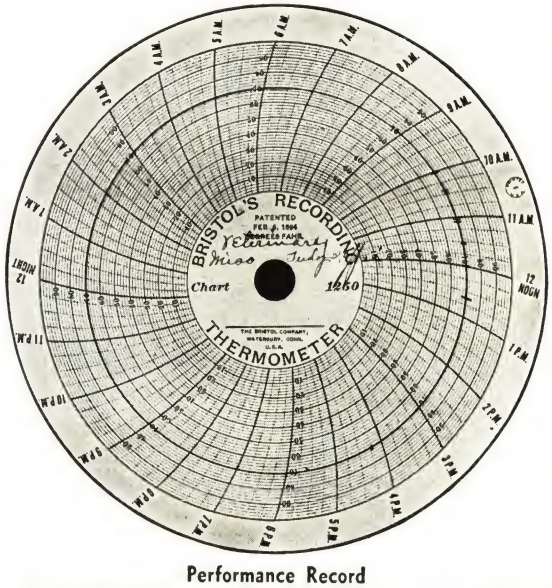
The air about the radiator passes through the bakelite housing and causes expansion or contraction of the compound actuating diaphragm.

As room temperature rises, these diaphragms expand and transmit the motion in a straight line directly to the valve stem through a Bakelite baffle plate and rolled copper bellows, thereby closing the valve and cutting off the supply of steam.

There is no valve stem stuffing box to leak and affect the accuracy of the thermostatic unit, for the motion of the actuating bellows is transmitted to the valve stem through a rolled copper bellows which forms a positive steam seal.

The diaphragms and valve are so designed that the unbalanced pressure above and below the valve tends to open the valve.

A light spring adds to its tendency to open. This provision is made to provide positive manual control if automatic features are inoperative.



Performance Record

A recording thermometer chart showing the results of tests made at the University of Pennsylvania, illustrating the accuracy with which the Thermotrol governs room temperature. Note that the maximum temperature variation did not exceed 1° in a 24-hour period

Guarantee

The STERLING ENGINEERING COMPANY guarantees that the THERMOTROL will control the amount of heat given off from the radiator to which it is attached, so as to maintain a room temperature within 1½° F. above and 1½° F. below the point of adjustment provided:

(1) That the temperature of the room is not affected by any source of heat other than the radiator to which the THERMOTROL is attached.

(2) That all doors and windows are kept closed.

(3) That a sufficient and continuous supply of steam is furnished to the radiator, and that there is sufficient radiation to heat the room to the required temperature.

(4) That the radiator is continuously properly vented and properly drained.

(5) That the THERMOTROL is installed in accordance with directions furnished by the Company.

The temperature of the room shall be determined by means of a recording test thermometer placed at approximately the center of the room and five feet above the floor but not within eight feet of the radiator or within three feet of an outside wall.

The STERLING ENGINEERING COMPANY guarantees the THERMOTROL to be free from defects in workmanship and material under normal use and service. The Company's obligations under this guarantee are limited to repairing or refurnishing at its factory any part or parts, which shall, within three years after delivery of equipment to the original purchaser, be returned, transportation prepaid, and which on examination shall disclose to its satisfaction to have been thus defective.

This Guarantee will become null and void if the THERMOTROL, or THERMOTROLS, which are claimed defective, have been taken apart or repaired by others than the Company.

Hand Adjustable Type

Easily set for any desired heat by moving a plainly marked dial to the desired position. This type may be adjusted within limits by the room occupant

Loose Key Type

Designed for installations where it is desired to keep heat control in the hands of authorized persons. It is adjusted by means of a loose key and may not be changed without it

Standard Specification

Install at the supply end of each radiator a THERMOTROL temperature control valve, as manufactured by the STERLING ENGINEERING COMPANY of Milwaukee, Wisconsin.

This control valve consists of a bronze valve on which is mounted a thermostatic unit consisting of a compound diaphragm enclosed in a Bakelite housing and equipped with an adjusting dial. (Either Hand Adjustable or Loose Key Type).

The control valve shall be of the straight line type so constructed that the action of the diaphragm is conveyed to the valve stem along a straight line.

The valve shall have no levers, cams or other devices for changing the line of direction in transmitting the diaphragm motion to the valve stem.

The control valve shall be so designed that it can be tightly closed, manually, when it is desirable to prevent any heat from entering the radiator regardless of room temperature.

The control valve shall be designed to maintain any desired room temperature between ...° F. and ...° F. and shall be guaranteed to be free from mechanical defects.

Note to Architects and Engineers—THERMOTROLS will operate on any vacuum, vapor or two-pipe steam heating system and can be furnished to operate at any desired room temperature. The stock control is designed to close when in the wide open position at approximately 8° F. above the temperature at which it would close when set at the point marked "normal" on the regulating dial.

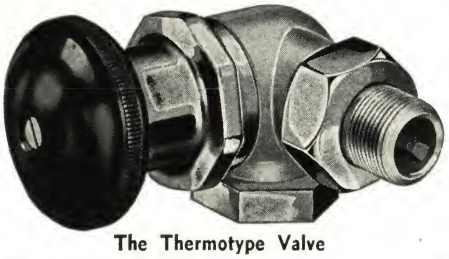
STERLING THERMOTYPE PACKLESS VALVES

A Valve That Is Installed on Any Two-pipe Heating System and at Any Later Time May Be Equipped with the "Thermotrol" Feature

Adding the Thermostat

With this valve we offer architects, engineers and building owners an opportunity to obtain automatic temperature control with the THERMOTROL at any time in the future, by using in their original specifications, our THERMOTYPE Valve.

By installing this valve in modern buildings, which, at the time they are built cannot stand the expense of thermostatic control, it becomes unnecessary to scrap hand valves if at any future time it is decided to add the thermostatic feature.



The Thermotype Valve

Description of Valve

The THERMOTYPE Valve is a packless valve that has the same body and interior mechanism as the body on our THERMOTROL, but is furnished with a bonnet and hand wheel. At any later date, the automatic feature can be added to the system by removing the hand wheel and bonnet, and attaching the housing section of the THERMOTROL, which contains the thermostatic members.

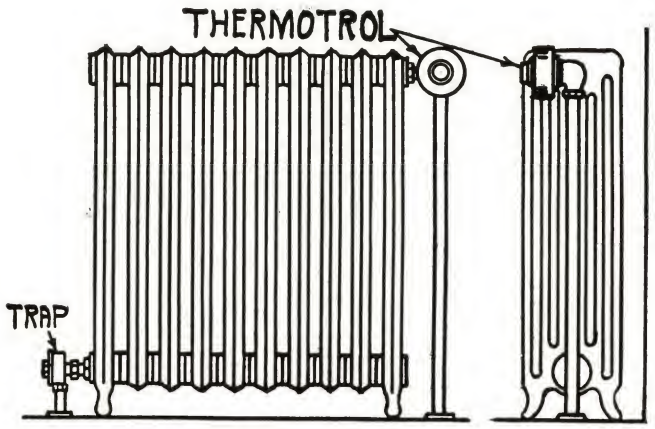
It is not necessary to disturb the pipe connections in any way whatever, neither is it necessary to scrap a complete hand valve.

Standard Specifications

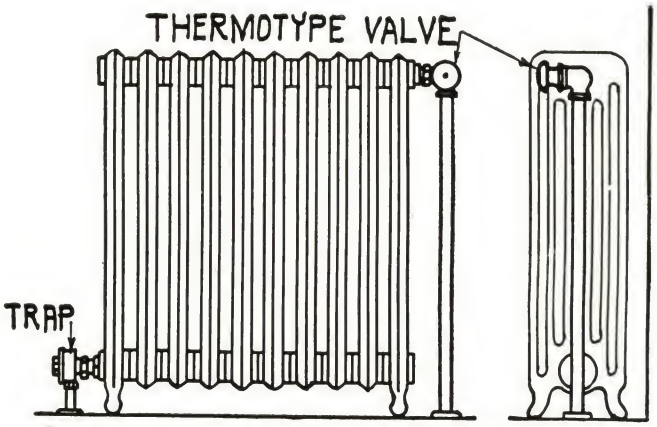
Install at the supply end of each radiator, a THERMOTYPE packless valve as manufactured by the STERLING ENGINEERING COMPANY of Milwaukee, Wisconsin.

This valve consists of a bronze body with ground joint union connection, and composition handle. The body and interior mechanism to be so constructed that the bonnet and hand wheel can be removed at any time, and a THERMOTROL housing containing the necessary thermostatic element attached, instead, thus converting the valve from a hand operated one, to one that is automatically controlled.

Note: On the following page are shown typical installations, sizes, capacities and dimensions of the Sterling "Thermotrol" and "Thermotype" valves.



Typical Installation of the Thermotrol on a Cast Iron Radiator

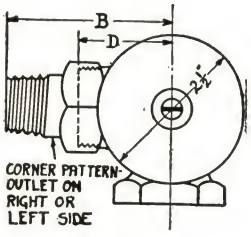


Typical Installation of the Thermotype Valve on a Radiator

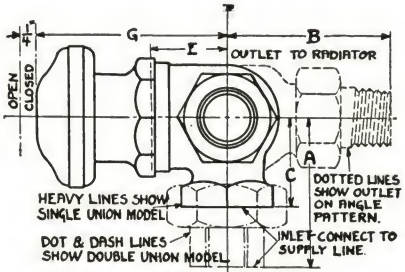
THERMOTROL USED ON CONCEALED RADIATORS

The Thermotrol can be used on any type of concealed radiator. Due to the many forms of concealed radiators now on the market, various methods of installing the Thermotrol must be used. Upon request we will submit information and drawings showing how to install the Thermotrol on any specific type of concealed radiator.

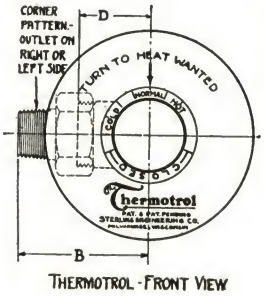
SIZES, CAPACITIES AND DIMENSIONS OF STERLING THERMOTROLS AND THERMOTYPE VALVES



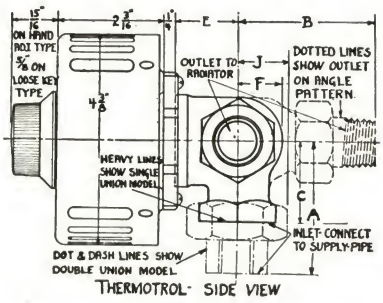
FRONT VIEW THERMOTYPE VALVE



THERMOTYPE VALVE - SIDE VIEW.



THERMOTROL - FRONT VIEW



THERMOTROL - SIDE VIEW

Inlet, in.	Outlet, in.	Capacity, sq. ft. of rad.	Body styles furnished	Models furnished (see note below)	A, in.	B, in.	C, in.	D, in.	E, in.	F, in.	G, in.	J, in.
½	½	60	L.H. Cor., R.H. Cor., angle, str-way	Double union	2⅝	2⅝	1 9/16	1⅜	1 5/16		3⅝	1 1/16
½	¾	60	L.H. Cor., R.H. Cor., angle, str-way	Double union	2⅝	2¾	1 9/16	1⅜	1 5/16		3⅝	1 1/16
¾	½	60	L.H. Cor., R.H. Cor., angle, str-way	Single and double union	2¾	2⅝	1 9/16	1⅜	1 5/16	1 5/16	3⅝	1 1/16
¾	¾	100	L.H. Cor., R.H. Cor., angle, str-way	Single and double union	2¾	2¾	1 9/16	1⅜	1 5/16	1 5/16	3⅝	1 1/16
1	1	200	L.H. Cor., R.H. Cor., angle	Single and double union	3	3	1 11/16	1 11/16	1½	1 1/16	3 13/16	1 3/16
1¼	1¼	275	L.H. Cor., R.H. Cor., angle	Double union	3½	3½	2	2	1 5/16		4¼	1 7/16
1¼	1½	275	L.H. Cor., R.H. Cor., angle	Double union	3½	3¾	2	2	1 5/16		4¼	1 7/16
1½	1¼	275	L.H. Cor., R.H. Cor., angle	Double union	3¾	3½	2	2	1 5/16		4¼	1 7/16
1½	1½	300	L.H. Cor., R.H. Cor., angle	Double union	3¾	3¾	2	2	1 5/16		4¼	1 7/16

Single union THERMOTROLS furnished with body tapped for inlet pipe, and male union outlet nipple.

Double union THERMOTROLS furnished with female union inlet nipple, and male union outlet nipple, except THERMOTROLS having 1½-in. inlet and outlet, which are furnished with male union nipple on both inlet and outlet.

1¼x1½-in. THERMOTROLS have double seated balanced valves.

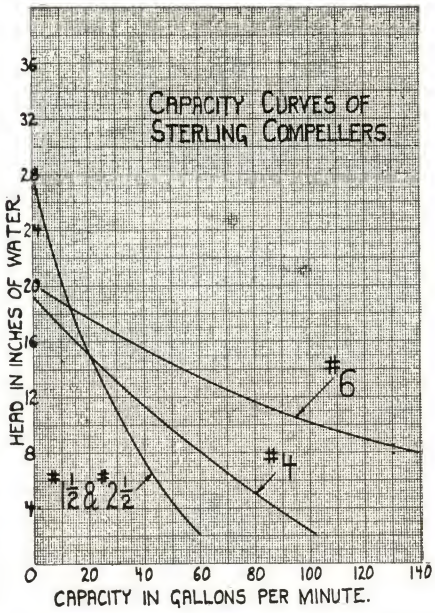
Any of the above THERMOTROLS can be furnished in either Hand Operated or Loose Key type.

THE STERLING COMPELLER

A Positive Water Circulator

Advantages—The COMPELLER is a positive water circulator for circulating the water in hot-water heating systems, in domestic water systems either hot or cold, or for the circulation of water or other liquid in any other type of a closed system. It has successfully stimulated the circulation of water in hot-water heating systems to such an extent as to turn an inefficient, poorly heating system into a highly satisfactory one.

Not only is greater satisfaction derived from hot-water heating systems when a COMPELLER is used, but a material saving in fuel results. The COMPELLER will cause all radiators to heat evenly, from top to bottom, regardless of their location in the system, such as radiators on the same level as the boiler or a considerable distance from the boiler. The radiators heat up almost as fast as the water in the boiler and the temperature at the radiator is only a few degrees below the temperature of the boiler water. Hot-water heating systems are thus made as responsive as steam systems with none of the objections that are frequently raised against steam heating systems; such as, quick cooling of radiators, poor venting, etc.



Description—The COMPELLER consists of a bronze impeller, mounted on a stainless steel shaft, running in oil lubricated bronze bearings, which is connected to a motor through a flexible coupling.

This impeller is enclosed in a housing having a slightly larger diameter than the pipe in which the compeller is installed, so that when the COMPELLER is not running, the net area of housing less the area taken up by the impeller is at least equal to the full area of the pipe. Therefore the natural gravity flow of the system is in no way interfered with when the compeller is not running.

When running, all the water in the pipe is drawn in by the impeller and forced in the direction of flow, as there is only a small clearance between the impeller blades and the housing which prevents any back flow.

Installation—The COMPELLER can be installed in either the supply or return lines of any hot water heating system, either pressure or gravity type. It can be used on an entire system or applied to certain lines on which improved circulation is desired. When installed on only a part of a system the operation does not affect the normal working of the rest of the job. Install the COMPELLER the same as a tee and elbow, in either a vertical or horizontal pipe. When used on an entire system all the return lines or supply lines must be brought together before entering the COMPELLER. *No check valves are required or no by-passes needed.* When the COMPELLER is not operating the system will circulate normally and will not restrict the flow of water.

Operation—Inasmuch as the COMPELLER need only be run during the heating up period, some means of controlling the motor is necessary. This can be hand-operated through an electric switch or Automatically Controlled by the same thermostat that operates the draft dampers, oil burner, or gas burner so that the COMPELLER will run only when one of these heating devices is operating. COMPELLER can also be run on a separate thermostat located in the room. The operating cost is extremely low as the motor need be run but a few hours each day on the average heating system.

Domestic Hot Water Installations

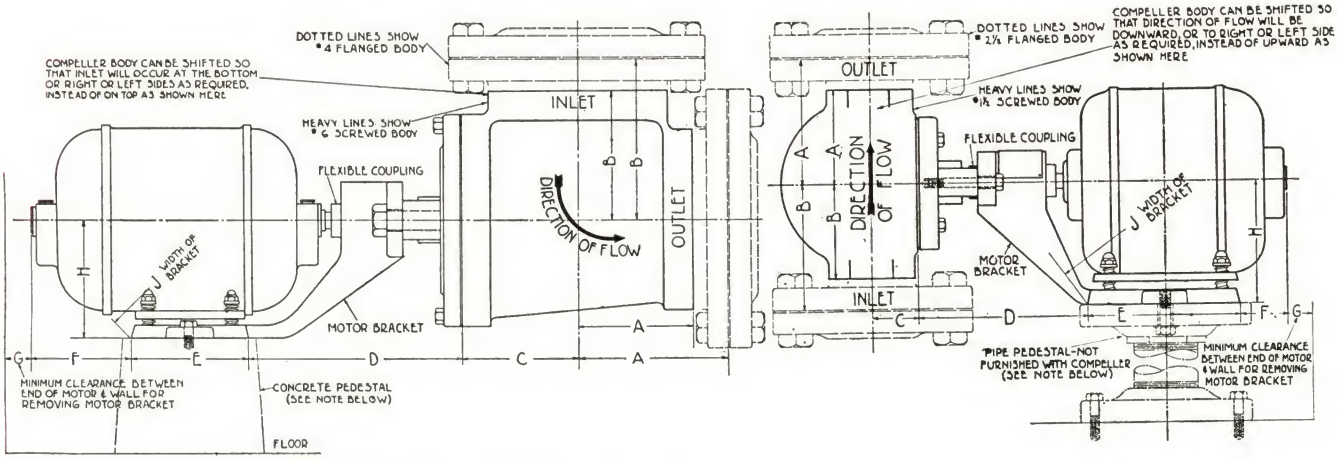
On domestic hot water systems, the COMPELLER can be installed in the pipe between the hot water heater or heating coil in boiler, and the storage tank; and in the circulating lines from the ends of the hot water supply pipes. In this way both the capacity and efficiency of the heater are increased, and a continuous supply of hot water is instantly available throughout the entire piping system by the use of a COMPELLER.

When the COMPELLER is used, hot water storage tanks need not be placed above the heater, but can be set level or even below the hot water heater.

When used in a Domestic Hot Water System, the COMPELLER may be started and stopped by hand, or automatically controlled by an aquastat operated by the temperature of the water in the pipe near the COMPELLER.

SIZES, CAPACITIES AND DIMENSIONS

No.	Pipe connections, in.	Style of body	Operating watts	A, in.	B, in.	C, in.	D, in.	E, in.	F, in.	G, in.	H, in.	J, in.
1½	2, 1½	Screwed, globe	140	3¼	3¼	1¾	6⅛	5¼	1⅝	3½	4¼	9
2½	2½, 2, 1½	Flanged, globe	140	4⅜	4⅜	1⅞	6⅛	5¼	1⅝	3½	4¼	9
4	4, 3½, 3	Flanged, angle	160	5½	5½	2½	6⅛	5¼	1⅝	6	4¼	9
6	6	Screwed, angle	350	5	5	5	8¼	4½	3¾	8½	4 9/16	10½
	5	Screwed, angle	350	4 7/16	5	4 9/16	8¼	4½	3¾	8½	4 9/16	10½



COMPELLER motor may be mounted as received with motor bracket attached to body without any other support. Where it is desired to eliminate all possibility of motor vibration being transmitted to the piping, the motor bracket can be detached from the COMPELLER body, and mounted as a separate pipe or concrete pedestal as shown.

When ordering, state maximum pressure or head of water at COMPELLER

WEBSTER TALLMADGE & CO., INC.

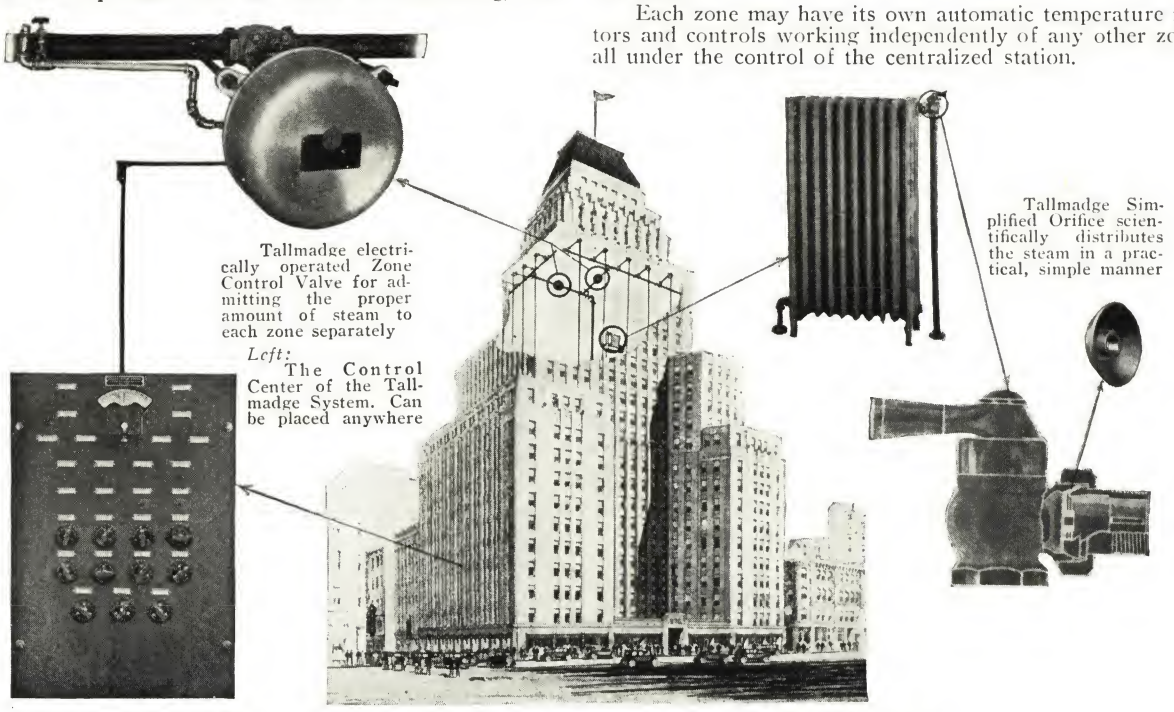
50 Church Street, NEW YORK, N. Y.

THE TALLMADGE ZONE HEATING SYSTEM

With Simplified Orifice Distribution and Remote Electrical Control

General

With the Tallmadge method, the heating system is divided into zones (see illustration below). The zones are separately controlled from a centrally located control board reducing the heat released from the radiators in any zone to the exact requirements, maintaining proper distribution to all radiators on that zone. This is desirable since, for the greater part of the heating season, the outside temperature demands less than 30% of the heating system capacity and the demand of each zone varies with relation to the others with every change in weather condition. With the ordinary heating system, such control and distribution is impossible and the result is overheating, discomfort and a waste of steam which is saved with the Tallmadge System.



Simplicity Predominates in the Tallmadge System of Zoned Heating

The devices illustrated are the only ones used

Parts of the System

(a) One control valve and mechanism for the steam inlet to each zone. (b) An orifice for the inlet of each radiator. (c) Central control board with necessary instruments.

Orifices

The size of each orifice is exactly proportioned to the size of the radiator. Any portion of full load steam admitted to the zone is equally and precisely distributed to all radiators. The orifice is universal as illustrated or may be incorporated in a disc and fitted into any make of radiator valve or tailpiece, nipple or bushing which does not limit purchaser to any particular make of radiator valve; orifices are interchangeable between radiators of the same size regardless of location. There are no orifices in the mains or risers and therefore no unbalancing of steam distribution by changing or shutting off radiators.

Valve Control Mechanism

The amount of steam admitted to a zone is governed by zone valve control mechanism mounted on steam supply pipe, electrically connected to and controlled from control board.

It is so designed that more than full flow cannot enter any radiator and hence radiator traps and vacuum are unnecessary. It automatically increases or decreases the total steam supplied to the zone as radiators are turned on or off maintaining the same constant *(not intermittent)* flow to all the remaining radiators, thus making it impossible to unbalance the system by turning off, changing, adding or removing, radiators.

It is motor driven, taking current from the lighting circuit, opens slowly to prevent noise and hammering from too quick starting, closes slowly to prevent the blowing of boiler safety valve and reduces the peak demand on district steam supply. Valve and mechanism construction is such that a by-pass is not required, operates on any initial pressure thus eliminating reducing valves and permitting smaller supply mains up to control valve.

Each zone may have its own automatic temperature regulators and controls working independently of any other zone but all under the control of the centralized station.

Piping

The steam and return pipe sizes are those ordinarily used in good standard practice. It is not necessary to zone the returns, they may be common to all zones.

Cost

The initial cost is low due to simplicity of the devices and piping design; small number of parts necessary; low cost of installation in new or old systems. Cost often offset by elimination of equipment otherwise necessary. Depreciation is practically nil due to few moving parts.

Zoning

Zoning is justified by great saving of steam otherwise wasted. Each group of radiators subject to the same general condition of exposure, occupancy, and operation is considered a zone, which is separately controlled, so that more heat can be supplied to the windy side and less to the protected or the sunny side according to existing temperature and conditions. Vertical zoning permits compensation for chimney or flue effect due to the heat rising in tall buildings from lower to upper stories. Occupancy zoning permits heating only that portion of building which is occupied, such as first floor stores apart from office space, or supplies heat according to the kind of occupant.

Extent of zoning depends on value placed on comfort, initial expense and desired return on investment.

MODERN HEATING

1931-32 EDITION

Warren Webster & Company, Camden, N. J.
Pioneers of the Vacuum System of Steam Heating
60 U. S. Branches—In Canada, Darling Bros., Ltd., Montreal

ESTABLISHED 1888

WARREN WEBSTER & COMPANY

Steam Heating Systems and Steam Specialties

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CAMDEN, NEW JERSEY

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TORONTO HALIFAX TIMMINS, ONT. CALGARY VANCOUVER WINNIPEG LONDON, ONT. WINDSOR QUEBEC OTTAWA

THE ATMOSPHERIC STEAM HEATING CO., LTD., 22 Broadway, WESTMINSTER, LONDON, ENG.

Products and Services

"A Heating System for Every Need and Purpose" including Improved Webster Vacuum and Type "R" Systems of Steam Heating.

Effective central controls for Heating Systems including Webster MODERATOR Control, HYLO Variator Control and Key-Room Thermostatic Control.

Webster System equipment including Radiator Supply Valves, Return Traps, Drip and Heavy Duty Traps, Dirt Strainers, Boiler Return Traps, Vent Traps, Boiler Protectors, Damper Regulators, Lift Fittings, Expansion Joints, Vacuum Governors, Air Separating Tanks, etc. Series "78" Traps for process pressures (10-125 lbs. per sq. in.).

TRADE-MARK
-since 1888
Webster
Systems of
Steam Heating

"A Heating System for Every Need and Purpose"

Webster Systems and Webster Systems Equipment are fully covered by patents and patents pending

The Company

We solicit consideration for Webster Systems, Controls and Equipment by architects, engineers and building owners on the basis of an enviable record of service, backed by 44 years of experience (since 1888), an ample modern plant and resources, and sales and service offices in over 60 United States cities and in Canada. Webster Systems have been specified by fully one-third of the country's leading architects, and installed in more than 65,000 outstanding structures by more than 2,800 heating contractors. The greater portion of the company's business consists of repeat orders. Webster engineers are prepared and able to cooperate effectively with architects.

Webster Systems of Steam Heating

The brief data on the next page is intended only to assist the architect or engineer in identifying the various Webster Systems. No detailed reference has been made therein to the various Webster steam heating appliances which form a fundamental part of each system as each of these is described separately in the latter part of this catalogue and their particular application to any system is outlined in the detailed description of each system given on the pages indicated.

Although the systems described consist of complete installations it should be noted that WARREN WEBSTER & COMPANY do not manufacture, sell or assume responsibility for boilers, piping or radiation. These should be selected and specified by the architect in the usual way. For suggested basic specifications for each Webster System, including all necessary items, see Webster Page 16.

A HEATING SYSTEM FOR EVERY NEED AND PURPOSE

Heating requirements vary so widely that no one type of heating system or no one control can be expected to provide comfort, economy and maximum investment return for all types and sizes of buildings. Realizing this, Warren Webster & Company have consistently developed an entire group of Webster Systems of Steam Heating together with effective central controls—each built to meet certain conditions, each a combination of service, experience, equipment and engineering methods for the heating requirements of the individual installation.

IMPROVED WEBSTER HEATING SYSTEMS

The distinguishing characteristic of the Improved Webster Systems is the inclusion of accurately sized metering orifices in each radiator supply connection, and, where required, at intermediate points in branch mains. These orifices provide definitely balanced or equalized distribution of steam to all radiators in proper proportion regardless of size of radiator, of piping schedule, of distance from source of steam supply, and, in tall buildings, of altitude. This equalization of distribution in itself markedly improves the heating results even where no special heat regulation or control is provided. More important, however, is the fact that it makes possible successful application of a single centralized control of the throttling or gradual-acting type. The provision of control of this type produces marked economy with reduction of the excesses of underheating and overheating to a minimum.

Application—Improved Webster Systems may be applied to the heating of practically all types and sizes of buildings where direct radiation (either cast iron or lightweight type) is employed.

Improved Webster Vacuum Systems

The Improved Webster Vacuum System is a basic two-pipe system of steam circulation utilizing a vacuum pump in the return piping to remove air from the system and return water of condensation to the boiler or discharge it to waste.

Application—Improved Webster Vacuum Systems are applicable to large buildings of every type, to groups of buildings, particularly spread-out groups supplied from a central heating plant and to the direct radiation portion of industrial plant heating installations.

For detailed data see Webster page 3.

Improved Webster Type "R" Systems

The Improved Webster Type "R" System is a basic two-pipe system of steam circulation in which air and condensate return to the basement by gravity. The Webster Boiler Return Trap, Vent Trap, and related equipment are installed in the basement to vent the air from the system and assure return of water to the boiler. This basement equipment is the distinguishing feature of the Type "R" System.

Application—Improved Webster Type "R" Systems are applicable wherever all or a substantial portion of direct radiation is installed. Basement equipment is divided in five sizes for installations up to 16,000 sq. ft. equivalent direct cast iron radiation.

For detailed data see Webster page 3.

Standard Webster Vacuum Systems

The standard Webster Vacuum System is the same as the Improved Webster Vacuum System with the omission of the metering orifice provisions already described.

Application—The standard Webster Vacuum Systems are applicable to large buildings of every type where indirect radiation, unit heaters or ventilating equipment are employed to such an extent that the even distribution provided by the orifice feature is considered unnecessary.

Standard Webster Type "R" Systems

This is the same as the Improved Type "R" System except that the metering orifice feature is omitted.

Application—Includes installations where the even distribution obtained by the Improved Systems are considered unnecessary and also where indirect radiation or unit heaters are extensively employed.

WEBSTER CONTROLS

Webster Hylo Vacuum Variator Control

The Webster Hylo Vacuum Variator is a *manual,* throttling, centralized control device used in conjunction with the Improved Webster Vacuum Systems. It gives the operator a "throttle" to adjust *manually* the amount of steam supplied to the entire heating system. Where semi-automatic operation is desirable the Hylo Variator may be supplemented by an exclusive Webster Key-Room Thermostatic Control.

Application—Hylo Variator Control is especially desirable for small and medium sized buildings and where the additional first cost may not warrant installation of Webster Moderator Control. Hylo Variator Control can be applied either to new buildings or to the modernization of heating systems in existing buildings.

For detailed data see Webster page 4.

Webster Moderator Control

Webster Moderator Control automatically varies the amount of steam supplied to the entire heating system in accordance with outside weather or temperature. It is a single, centrally located, gradual-acting control. An automatic roof thermostat takes care of all factors for which automatic regulation is suitable; supplementary manual control provides flexibility to meet unexpected operating conditions. The Moderator System actually puts the heating of the building under "Control-by-the-Weather."

Application—Webster Moderator Control is applicable to all types of Webster Heating Systems of 5,000 sq. ft. or more of equivalent direct cast iron radiation.

For detailed description see Webster page 5.

IMPROVED WEBSTER SYSTEMS OF STEAM HEATING

The Improved Webster Systems are basic two-pipe systems of steam circulation *with the addition* of an accurately sized metering orifice at the radiator supply connection, and, in such installations as require it, intermediate metering orifices at points in branch mains. Metering orifices, when properly selected and installed, effect even distribution of steam to all parts of the heating system and permit the successful application of a centralized, gradual-acting control.

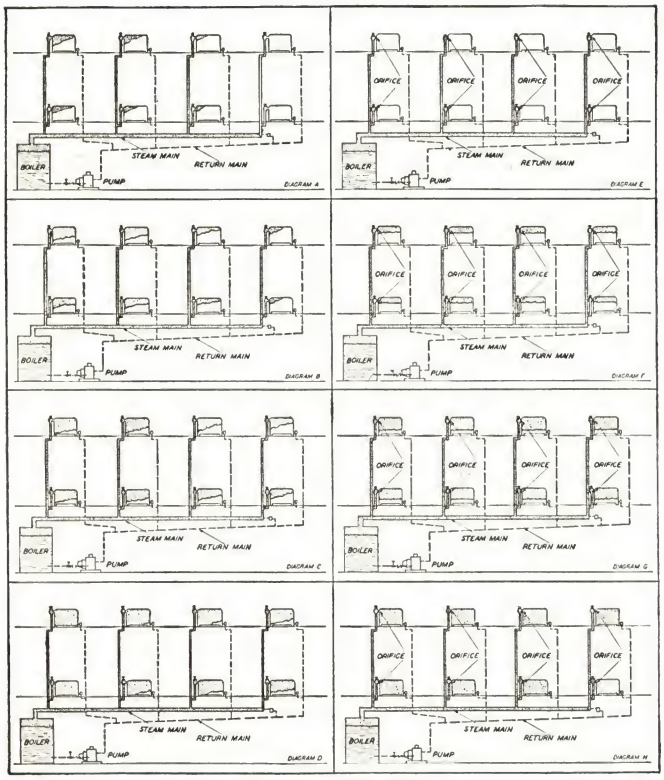


Fig. 1. Comparison

Comparison of steam distribution to radiators during heating-up period in an ordinary vacuum system and an Improved Webster Vacuum System. Diagrams A to D show distribution in an ordinary system at the start of the heating-up period, two intermediate periods and full load. Diagrams E to H show these same periods with an Improved Vacuum System using standard metering orifices. Note particularly that the supply of steam to each radiator is *so equalized and balanced* that *all radiators get steam at the same time and in substantially the same proportion, regardless of distance from the boiler.*

How Even Distribution Is Accomplished

In the older types of systems the nearest radiators become warm first while the farthest radiators do not begin to get warm until the others are filled. Now, in the Improved Webster Systems, *all radiators get steam at the same time and substantially in proportion to the need for steam.* In Fig. 2 it can be seen that the metering orifice in radiator A is quite small. When steam reaches this radiator the amount that can enter is therefore restricted. As a result the remaining steam quickly flows on through the piping to the next radiator B. Here the opening is slightly larger because the pressure of the steam by the time it reaches radiator B is lower. So it goes, radiator by radiator, to the farthest point. The "pressure drop" to each radiator has been equalized or balanced by installation of the correctly sized metering orifice. The result is that each radiator receives the required amount of steam.

Improved Systems Are Controllable

Any type of control works better with the Improved Webster Systems. As a matter of fact, an Improved Webster System without any control will be worth while because of its solution of distribution problems. But, in assuring steam consumption economy, *control of heating system operation* is the vitally important factor. The mere installation of a so-called "key-room" thermostat to open a burner or valve does not give adequate control of operation. To start with, you must have a system that is controllable. The Improved Webster Systems are controllable which assures economy of steam consumption and *moderates* excesses of over-heating and under-heating.

Where definite temperature control is desired at each individual radiator, the temperature control equipment may be used in conjunction with Improved Webster Systems.

Webster central controls are described on Webster pages 4 to 8.

Flexible in Application

Improved Webster Systems are basic systems of steam circulation and use steam from boilers, engine or turbine exhaust, street lines, etc. They can be used with almost all types of direct radiation generally employed in steam heating practice.

The Improved Systems operate as vacuum, open-return or gravity systems with respect to their return line piping.

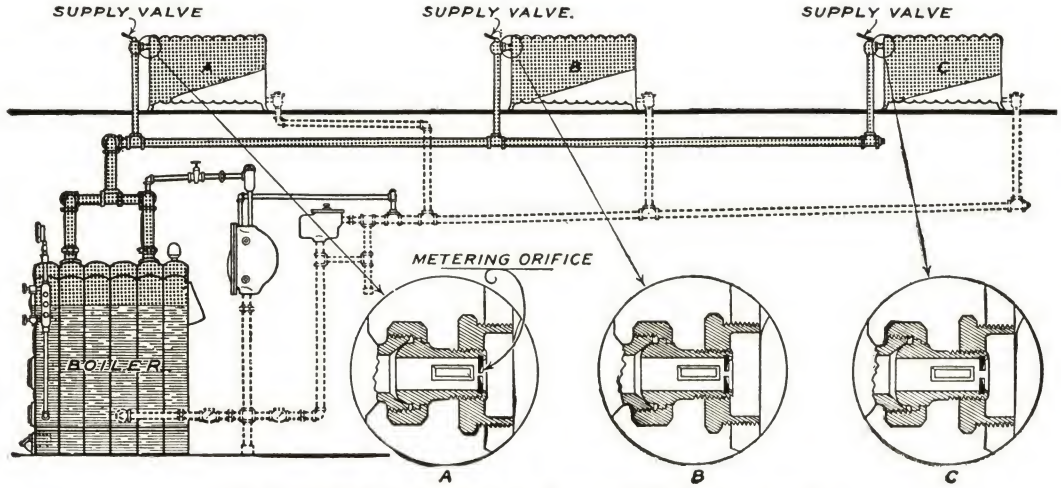


Fig. 2. Diagrammatic Sketch of the Improved Type "R" System

Showing how "pressure drop" is *equalized* or *balanced* by installation of standard metering orifices of proper size

WEBSTER HYLO VACUUM VARIATOR CONTROL

The Hylo Variator has a lever arm provided with two sliding weights which are adjusted manually by the operator. Each end of the lever arm has a graduated scale divided into two sections. The left hand sections are for *heating up* and *cold weather;* the right hand sections for *moderate* and *mild weather*. The position of the weights on the scales determines the difference in pressure to be maintained between the supply and return lines and thus controls the amount of steam delivered to the system.

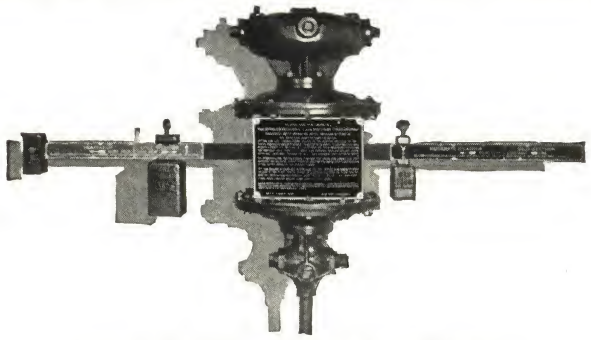


Fig. 3. The Webster Hylo Vacuum Variator

Note adjustable weights. Scale on beam is clearly marked reading from left to right "HEATING UP" "COLD WEATHER" "MODERATE WEATHER" and "MILD WEATHER," making adjustment simple and understandable by unskilled operators

The Hylo Variator will vary the steam supply for heat requirements from 33 per cent to 140 per cent of normal.

The Webster Hylo Vacuum Variator is a *manual*, throttling centralized control device used in conjunction with Improved Webster Vacuum Systems. It provides a means for regulating manually the amount of steam supplied to the entire heating system. Two sliding weights are moved by the operator to various positions on a graduated beam, each position representing a pressure difference for a certain condition of outside weather or temperature.

The Hylo Vacuum Variator is especially desirable for small and medium sized buildings and where the additional first cost may not warrant installation of Webster Moderator Control. Hylo Variator Control can be applied either to new buildings or to the modernization of heating systems in existing buildings.

Operating Results

An Improved Webster Vacuum System with properly operated Hylo Variator Control gives economy of operation surpassed only by Moderator Control. Installations in existing buildings have shown substantial savings in steam consumption when compared to previous uncontrolled operation.

It is, of course, impractical to make a specific statement about steam consumption economy which would apply in general to all heating systems. The wide variation in building construction, operating requirements and climatic factors make such a statement unreliable.

Webster Engineers will gladly provide definite estimates of steam consumption for any installation.

Another important result frequently overlooked is the greater degree of comfort obtained with gradual acting centralized control. While in no sense a temperature control device, the Hylo Variator with an Improved Webster Vacuum System produces unusually even room temperatures.

How the Webster Hylo Vacuum Variator Control Works

The basic system of steam circulation is an Improved Webster Vacuum System with distribution balanced by Webster Metering orifices. A diagram of such a system is shown in Fig. 4. Fig. 98 Boylston Reducing Valve (2) is set to maintain a predetermined pressure in the supply main. The Hylo Variator (1) is installed between the vacuum pump and the return piping with the two diaphragms and is connected respectively to both supply and return lines. A Webster Hylo Trap (4) in the return line functions as a separator of the air and condensate, and permits condensate to pass directly to the Vacuum Pump (10) but by-passes the air through the Hylo Variator valve before it finally reaches the vacuum pump.

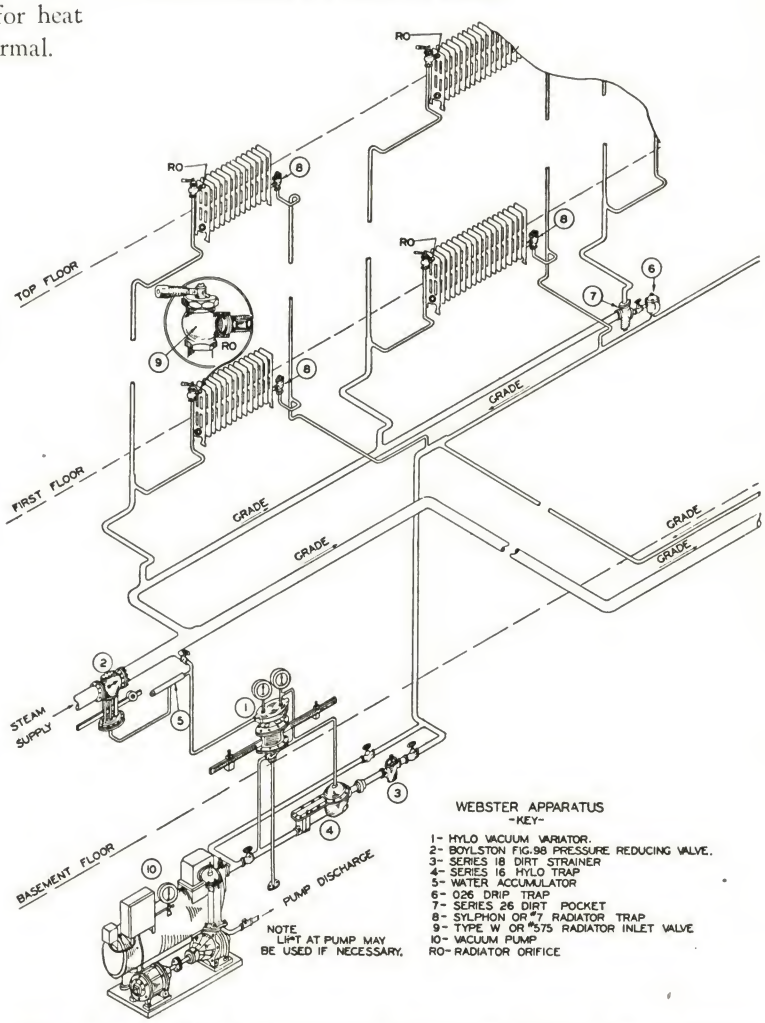


Fig. 4. Diagrammatic Arrangement of the Improved Webster Vacuum System

Using the Webster Hylo Vacuum Variator and Radiator Metering Orifices

WEBSTER MODERATOR CONTROL

Definite Advantages of Moderator Control

Improved Webster Systems with Moderator Control provide a number of definite advantages over uncontrolled vacuum systems, systems which attempt to vary the temperature of steam in filled radiators, intermittent on-and-off control systems and systems involving a multiplicity of decentralized mechanisms. The advantages of Moderator Control are obtained in:

(1) Improved heating service at the radiator;
(2) Centralized control and operation;
(3) Reduced steam consumption, maintenance and operating expense.

Improved Heating Service At the Radiator

During coldest weather and heating-up periods in all weather of 40° F. or less, radiators are completely filled with steam, giving the heat delivery obtained with the standard Webster Vacuum System.

During mild weather, the heat delivery is reduced automatically to the amount required by the prevailing outdoor temperature, plus a slight excess sufficient to compensate for minor variations in exposure, occupancy, etc. During mild weather, exceptionally low radiator temperatures are obtained *with either gravity or vacuum operation* through the jet effect of the orifice and resulting thorough intermixture of steam and air. Moderator Control provides a close approach in heating effect under fractional loads to that obtained with hot water, *without resort to high vacuum* or unusual tightness of piping.

Heat delivery at an individual radiator can be reduced by the room occupant simply by shutting off the supply valve but *cannot be increased* beyond the amount fixed by Moderator Control. Opening windows does not result in increased condensation inasmuch as steam delivery is governed entirely by the size of the orifice and the *controlled* pressure drop through it.

Comfort is assured through moderation of excesses of overheating and underheating. While not definitely maintaining temperatures within fixed limits, Moderator Control maintains comfortable conditions throughout the entire building.

Centralized Control and Operation

The automatic Moderator Control is truly gradual and thus superior to on-and-off control as the heat delivery is conformed gradually to changes in demand which are themselves mostly gradual. There is no alternative over-delivery and under-delivery characteristic of non-gradual, on-and-off systems. There is not the heating and cooling of piping and radiation with repeated expansion and contraction strains.

All mechanical equipment is concentrated in a few units, each highly perfected for its purpose and easily accessible for maintenance and repair. All necessary manual operations are provided for at a basement control panel.

Centralized control permits organization of operation and reduction of total heating hours to a minimum. It also permits use of a simple but effective system of Heating Cost Accounting, providing for complete and accurate record of heating system operation.

Reduced Steam Consumption

Experience with Moderator Control has indicated that substantial savings by comparison with conventional uncontrolled systems is a reasonable expectation. It is, of course, impossible to make a general statement concerning savings to be expected without first knowing the individual requirements of the building in question. Webster engineers are available to make surveys of existing installations in order to determine probable steam consumption with Moderator Control. They will estimate this figure for new structures also.

Lower Maintenance Cost

Maintenance cost of Moderator Control is low because there are fewer mechanisms and these are centrally located and fully protected from public mishandling. There are no special requirements as to tightness of piping. There is less load on all parts of the system because the control is continually conforming steam delivery to the requirements of the building. Condensate temperatures are at all times kept at the lowest level consistent with the heating requirements. Moderation of over-heating markedly lessens depreciation of interior trim, furniture and equipment.

Flexibility

Moderator Control is sufficiently flexible to permit the application of supplementary control for exposure or for zoning. Such supplementary control as zone valves of either manual or automatic type, local inside thermostatic control of radiators of the on-and-off type may be readily applied.

Limitations

Moderator Control and orifices should not be employed with certain types of thermostatic supply valves which require a fixed supply pressure for proper operation. Moderator Control *should not be employed* with high vacuums as air leaks into the piping system and causes error in distribution. Vacuum is used in Moderator Control Systems only to obtain required pressure difference for full load operation.

Zoning

Our experience with Moderator Control has indicated that zoning may be dispensed with in most cases and particularly for all parts of the building having the same normal hours of occupancy. The control of steam delivery to the building as a whole by one central means lessens materially the need for supplementary control of various zones. However, in certain types of buildings where a section or two of the building requires heat for a much longer period than the main portion of the building, provision can be made by (1) making this section a separate zone with suitable valve arrangement to shut off the portion not in use or (2) *not* placing the section under Moderator Control. If either of these provisions is not made, steam must be kept on the entire building for unnecessarily long periods and waste will result.

If two or more zones are desired they may be provided with Moderator Control by means of Manual Branch Control Valves (Variable Orifices) installed just beyond the single Moderator Main Steam Control Valve. These branch control valves provide manual control for modifying delivery of steam to each zone. Each branch valve may be set at any position from 0 to 150 per cent of normal. Corrections for sun, wind, etc., on certain portions of the building may thus be made by hand. *At the same time, the Roof Thermostat will continue to vary the supply of steam to the building as a whole in proportion to outdoor temperature.*

Automatic Zoning—If manual zoning is not considered sufficient, semi-automatic zoning may be provided by means of electrically or pneumatically operated valves. The main is divided beyond the Moderator Main Steam Control Valve and each branch provided with a Zone Control Valve connected to a key-room thermostat in the zones served (and also to a switch in the control panel). A bypass is provided around this valve with a fixed orifice of size sufficient to permit enough steam to flow into the zone to heat the mains and risers.

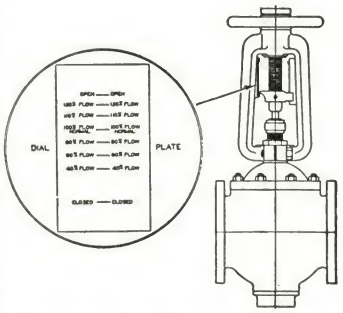


Fig. 5. Webster Manual Branch Valve for Zoning

"Three-Point" Valve—Where demand for heat cannot be predicted or where an unusual degree of flexibility is desired, the Webster "Three-Point" Valve can be used to advantage. This is a radiator supply valve which is, in effect, a zoning valve on each radiator. To meet various demands for heat, the valve may be set at *shut, normal* or *excess* position, the latter giving 140 per cent of normal steam requirements. For detailed description see Webster page 11.

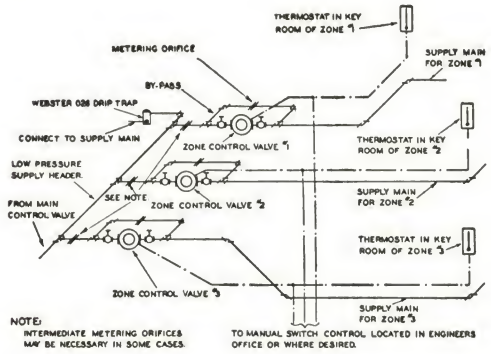


Fig. 6. Diagrammatic Arrangement of Supplementary Automatic Zone Control

How the Webster Moderator Control Works

(See detail drawing on page following)

Air Circulating System—The Air Compressor (1) maintains a constant pressure on a small air line leading to the Roof Thermostat (2). The amount of air flowing past the valve of the Roof Thermostat (2) and into the line A-B is varied by changes in outdoor temperature. This air is continuously discharged to the atmosphere at (B) through a restricted opening. When the temperature falls, the amount of air flowing into line A-B increases and the pressure ahead of (B) is correspondingly increased. When temperature increases, amount of air flowing into A-B decreases and pressure ahead of (B) is correspondingly decreased.

The area of the restricted opening at (B) may be changed by the operating engineer by merely moving the Variator lever (C). Reducing the opening raises the pressure ahead of (B); increasing the opening decreases the pressure. The pressure ahead of (B) is therefore always under the influence of both the Roof Thermostat and the Variator; the operation of one does not nullify the effect of the other, but the air pressure produced ahead of (B) is always the result of operation of both units.

Control Panels—The air pressure ahead of (B) is transmitted to a Sylphon Bellows. A change in the pressure ahead of (B), resulting from a change in outdoor temperature or in Variator setting, expands or contracts the Sylphon Bellows and thus produces a mechanical movement.

Pilot Valve—The mechanical movement produced by the Sylphon Bellows is transmitted to the Pilot Valve (E), causing a flow of oil through the oil circuit.

Oil Circuit—Oil pressure is maintained by a pump built into the Air Compressor Unit (1). Movement of the Oil Pilot Valve (E) in one direction sends additional oil to the operating piston of the Main Steam Control Valve (4), opening this valve and increasing the steam supply until the difference in pressure between supply and return is maintained equal to the air pressure ahead of (B). Movement of the Oil Pilot Valve in the opposite direction produces an opposite effect by permitting oil to flow from the operating piston of the Main Steam Control Valve back to the Oil Reservoir at (1).

Sylphon Bellows—A second Sylphon Bellows is connected to the steam main and a third Sylphon Bellows to the return main. These two Sylphon Bellows are rigidly connected with a third Sylphon Bellows (subject to the air pressure at (B)) in such a manner that a movement of either operates the Oil Pilot Valve. In other words an increase in steam pressure, due to shutting off certain radiators or to increase in boiler pressure or other causes, results in a mechanical movement of the bellows which operates the Oil Pilot Valve.

Orifices—The amount of steam delivered to all or any part of the system is dependent on the difference in pressure between the point from which the flow starts and the point at which the flow terminates.

With the Moderator Control at mild outdoor temperatures, say 60°, the amount of steam passing the Main Steam Control Valve would be very slight and in the normal system would fill only the main and possibly a few of the nearest radiators. By introducing resistance to flow at appropriate points (called Metering Orifices) we assure that any change in steam flow through the Main Steam Control Valve will be reflected in a corresponding change to every radiator. Intermediate Metering Orifices are installed in the branch mains and riser laterals. Radiator orifices are installed in the nipple of each radiator supply valve.

The Variator—The Variator is the only manual control necessary in the standard Moderator System. Normally the Moderator System furnishes enough heat to all parts of a building to maintain comfortable temperature without excessive overheating and without underheating for condition of average wind and daylight. For unusual

conditions, such as excessive wind or dark clouds, added heat can be provided by moving the Variator Lever from normal (or 100 per cent) to a higher percentage. For heating up quickly in the morning, the Variator can be moved to double heat, or 200 per cent. For night load conditions it is usually desirable to shut off heat completely, but where this is not possible the Variator can be set as low as 50 per cent to keep a moderate heat on the building.

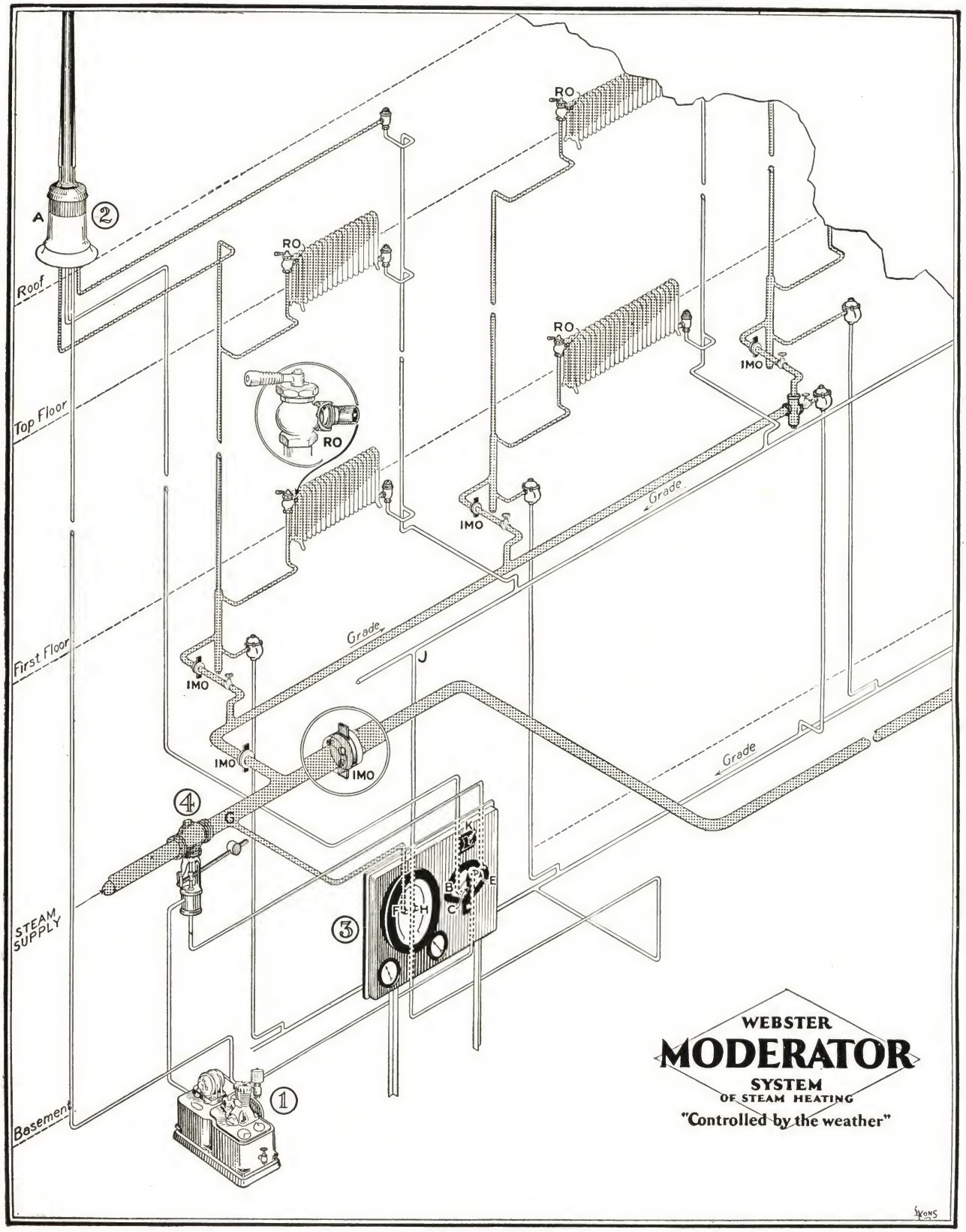


Fig. 7. Diagrammatic Arrangement of Elements of Webster Moderator Control

Webster Moderator Control Equipment

The basic Moderator System Control Equipment consists of a Roof Thermostat, a Control Panel, an Air Compressor and Oil Pump Unit, a Main Steam Control Valve and Special Metering Orifices.

Fig. 8. Roof Thermostat

The Roof Thermostat

The Roof Thermostat gives the *"Controlled-by-the-Weather"* feature of the Moderator System. The thermostat elements consist of an outer steel tube and an inner brass tube. The difference in linear expansion of these metals operates the air valve, varying the flow of air in proportion to changes in outdoor temperature.

The entire unit is supported on a rugged cast iron base and provision is made to protect all working parts from the weather. Constant temperature of valve parts is assured by steam jacketing. The air valve is protected by an easily accessible, fine mesh screen.

Control Panels

Made in a number of different models, each designed for particular operating conditions and size of buildings.

No. 2 Control Panel—For installations from 10,000 sq. ft. to the very largest where piping arrangement permits conventional grouping of equipment in the basement with one Main Steam Control Valve. This Panel includes a variator, a mercury balance to indicate and record either air pressure produced by combined action of roof thermostat and variator or steam and return pressure difference, also two gauges indicating respectively steam pressure and return pressure. Three Sylphon Bellows operate the oil pilot valve which is also provided with the manual shut-off.

No. 4 Control Panel—Applicable for installations of minimum size up to 20,000 sq. ft. of radiation, where conventional arrangement of equipment is possible and Main Steam Control Valve can be located in a basement. Includes the Variator, and the three Sylphon Bellows which operate the standard Oil Pilot Valve. This panel is particularly to be preferred where the likelihood of operating attention is at a minimum, such as is usually the case with the smaller boiler-fired jobs using relatively low cost fuel. It will be noted that No. 4 Panel performs all of the operating functions of the No. 2 Panel but does not provide for any record or indication of pressure.

No. 3 Panel—Similar to the No. 4 Panel except that it has, in addition, a mercury column used to indicate but not record steam and return pressure difference.

No. 5 Control Panel—A secondary control panel. The secondary panel cannot be used alone but only in conjunction with other panel equipment. This type of panel is used to operate main Steam Control Valves where these are located at a remote distance from the basement. Three Sylphon Bellows operate the Oil Pilot Valve. There is no Variator included.

No. 6 Control Panel—Used in conjunction with a secondary control panel. Similar to No. 2 Panel with omission of oil pilot valve and Sylphon Bellows assembly located in secondary control panel.

The selection of these panels depends upon the operating conditions of the individual installation. However, No. 6 meets most of the requirements of this type of panel.

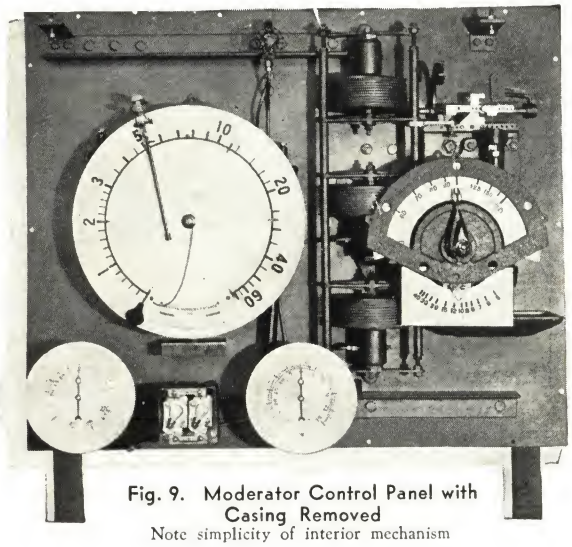
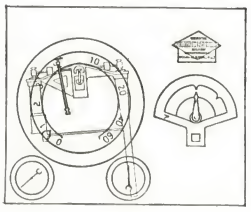


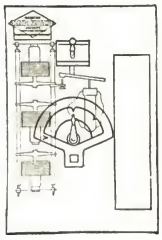
Fig. 9. Moderator Control Panel with Casing Removed
Note simplicity of interior mechanism

Air Compressor and Oil Pump Unit Type "B"

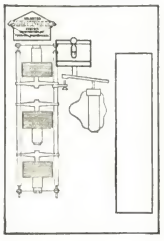
The standard Air Compressor and Oil Pump Unit Type "B" consists of a single cylinder, air cooled compressor, driven through a twin V-rope drive by a ¾ h.p. General Electric motor. Included in the base of the unit is an oil tank holding ten gallons of oil in the operating range and ample storage space for oil that returns when the system is shut down. An oil relief valve of the weighted type assures constant pressure to the Oil Pilot Valve. An oil level gauge, visible at all times, provides full instructions for filling the tank with oil and the periodical drawing off of water and sludge. The oil pump is of the piston type driven by a cam on the crank shaft of the air compressor. All assemblies are removable as units through the top of the base and can be replaced by new units with the minimum amount of pipe work.



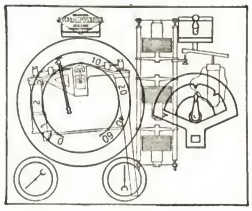
Left:
Fig. 10. Complete No. 2 Control Panel
Primary and secondary combined, with pressure indication and record.



Right:
Fig. 11. Complete No. 4 Control Panel
Primary and secondary combined, *without* pressure indication and record.



Left:
Fig. 12. Secondary No. 5 Control Panel
Without pressure indication and record.



Right:
Fig. 13. Primary Control Panel
Used in conjunction with secondary panel. Has pressure indication and record.

Where arrangement of equipment is such that it is desirable to have separate sources of compressed air and oil supply, the air compressor and oil pump can be furnished as individual units.

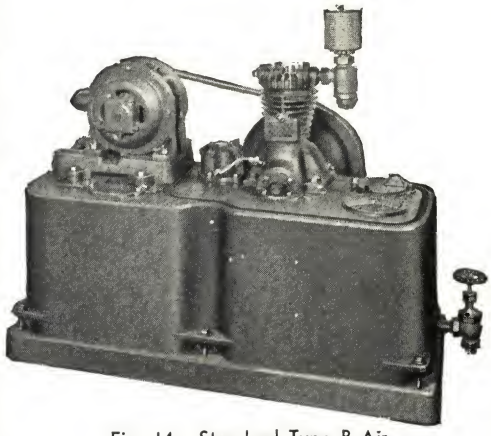


Fig. 14. Standard Type B Air Compressor and Oil Pump Unit

Special Main Steam Control Valve

The main steam control valve is a piston or sleeve type valve fitted for minimum clearance at the actual operating temperature of the valve. The sleeve is fitted with V ports specially designed to pass a predetermined quantity of steam. This valve is non-wire drawing at high pressure and is also seatless. It is provided with a suitable piston for hydraulic operation together with necessary counterweight.

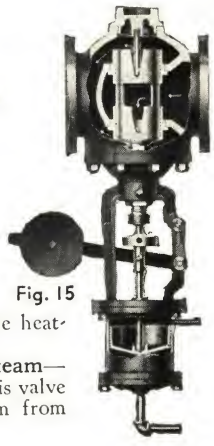


Fig. 15

Control Valve for "Low Pressure" Steam—If control system is thrown out of operation this valve automatically *opens* wide and allows steam to circulate through the heating system.

Control Valve for "High Pressure" Steam—If control system is thrown out of operation this valve automatically *closes* to protect heating system from excessive pressures.

STANDARD WEBSTER VACUUM SYSTEM

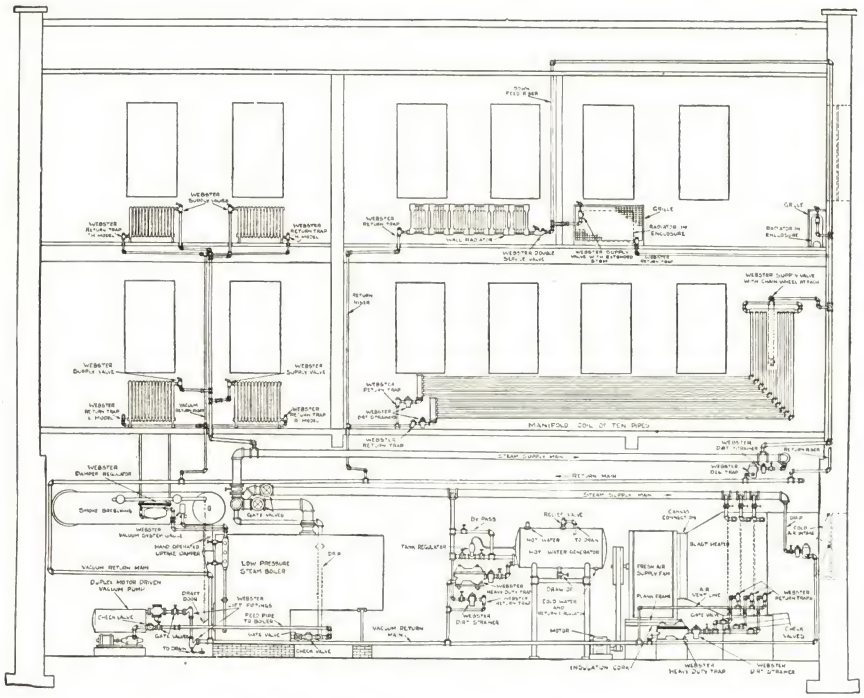


Fig. 16. Typical Webster Vacuum System

Diagrammatic layout using a low pressure boiler and motor-driven vacuum pump, with up-feed riser shown at left and down-feed riser at the right, illustrating two of many possible arrangements. The flexibility of Webster Vacuum System permits many variations in piping arrangements, radiation and other equipment.

A two-pipe system, the return mains of which are joined together and connected to the suction end of a vacuum pump which draws out the condensate and air, returning the condensate to the boiler.

For large buildings of every type, for industrial plants, for groups of buildings and for many varied conditions.

Adapted for use with unit heaters of either the floor or suspended types, concealed light-weight radiation, with cast iron and pipe coil radiators.

Operation

A partial vacuum is created and maintained by a steam or power driven vacuum pump. Steam is admitted to radiators or other heating units through Webster Supply Valves. Condensation and air are discharged from each heating unit through Webster Return Traps which close to prevent the passage of steam, thus preventing waste.

Water of condensation and air are removed from the system through the return piping by the vacuum pump. The air is discharged to the atmosphere and the water is returned to the boiler by means suited to particular conditions.

STANDARD WEBSTER TYPE "R" SYSTEM

This system is adaptable to almost every type of building, except the very largest—practically the only limitation being the necessity for a basement or other depression so that the boiler may be placed with its water line below the level of water of condensation flowing back to it. For use with cast iron or steel boilers burning any type of fuel.

The simplicity of the piping arrangements and the safety provided by the Webster Boiler Return Trap and Vent Trap combination, together with the elimination of power consuming devices, all combine to make the Webster Type "R" System particularly suitable for many installations.

Operation

Initial steam pressure may be controlled by a sensitive Webster Damper Regulator. Steam is admitted to radiators through Webster Supply Valves. Condensation and air are discharged from radiators by Webster Return Traps, and carried to a Webster Vent Trap, which automatically vents air from the system through a vent valve, permitting operation under partial vacuum for long periods under certain conditions.

Return of water to boiler is assured by Webster Boiler Return Trap.

Provided for installations up to 16,000 sq. ft. of equivalent direct cast iron radiation. Adapted for use with unit heaters of either the floor or suspended types, concealed light-weight radiation, as well as with cast iron and pipe coil radiators.

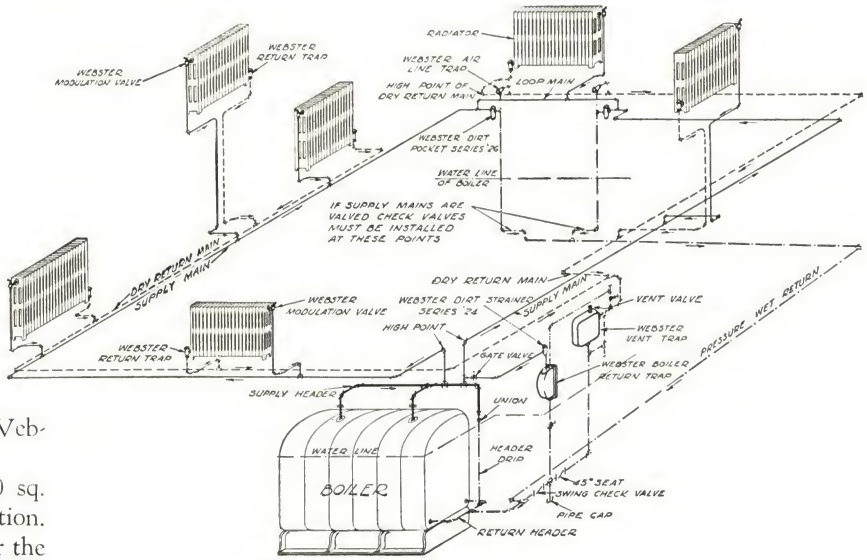


Fig. 17. Typical Webster Type "R" System

Showing the supply and return mains graded in opposite directions, the supply away from the boiler and the return line toward the boiler. The ends of the mains are dripped through a Webster Dirt Pocket and the air that collects at the ends of the mains is relieved through a Webster Thermostatic Trap. The returns from these drips are carried back to the boiler through a pressure wet return line. Both the vent trap and boiler return trap are placed adjacent to the boiler.

WEBSTER SYSTEM EQUIPMENT

Used as needed in Webster Systems of Steam Heating and includes the following:

Webster Type "W" Radiator Valve

This is a valve of the highest quality both in design and construction. So designed that admission of steam is varied in progressive volume with the lift of the valve piece. Is quick-opening—opening and closing in less than a single turn of the handle.

With the exception of the disc and handle, all parts are of high grade steam brass. Outside is nickeled and has attractive satin finish. Standard wheel handles are all bakelite.

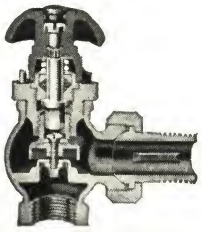


Fig. 18. Webster Type "W" Valve

Made in angle, right-hand, left-hand—straightway single-union and straightway double-union models with either lever, wheel, lockshield and extension stem handle. Sizes ½ to 1¼ in. See tables I and II for ratings.

Specification—Each radiator shall be provided with a Webster Type "W" Radiator Supply Valve of the size and model called for on the plans. Installation shall be made according to the standard practice of the manufacturer who will provide contractor with service details showing approved methods of connection.

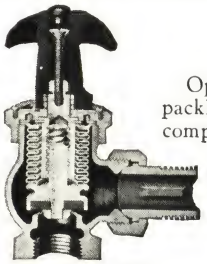


Fig. 19. Webster Sylphon Packless Valve

Webster Sylphon Packless Radiator Valve

Opens with less than a turn of handle. Positively packless, having flexible laminated Sylphon bellows completely enclosing stem. Body of steam brass, composition disc, Bakelic handle.

Made in ½ to 2-in. sizes.

Made in angle, right-hand, left-hand and straightway single-union models with lever, wheel, lockshield and extension stem handles.

See tables I and II for ratings.

Specification — Each radiator shall be provided with a Webster Sylphon Packless Radiator Supply Valve of the size and model called for on the plans. Installation shall be made according to the standard practice of the manufacturer who will provide contractor with service details showing approved methods of connection.

Webster Type "B" Valve

A radiator supply valve, simple in design but of good quality. Is of the quick-opening, non-rising stem type. A screwed gland takes up wear of molded ring packing. Steam brass body with forged brass cap. Union nipple is made from brass bar stock and has oversized lugs for strength. Union nut is a brass forging. A composition disc is assembled with shake-proof center to permit easy renewal.

Made in ½, ¾ and 1 in. sizes with angle, left corner, right corner, and straightway single-union and double-union body models. Standard all-bakelite wheel handle. Lockshield, chain wheel and extended stem handles available.

Specification—Each radiator shall be provided with a Webster Type "B" Supply valve of the size and model called for on the plans. Installation shall be made according to the standard practice of the manufacturer who will provide contractor with service details showing approved methods of connection.

Ratings of Valves for Standard Webster Systems (Not Orificed)

The ratings given in Table I, following, apply to all Type "W," Type "B" and Sylphon Packless Valves when used *without* orifices in Standard Webster Systems.

TABLE I—RATINGS OF UNORIFICED WEBSTER SUPPLY VALVES IN SQ. FT. E. D. R.

Valve size, in.	Residences, small buildings, Type "R" system	Large buildings, schools, apartments, factories, Type "R" or Vacuum System
	Press. diff.—4 oz.	Press. diff.—8 oz.
½	35 sq. ft.	50 sq. ft.
¾	80 sq. ft.	110 sq. ft.
1	130 sq. ft.	185 sq. ft.
1¼	225 sq. ft.	315 sq. ft.

All dimensions in inches and subject to slight variation.

Selection of Valves for Improved Webster Systems (Orificed)

The schedule of valve sizes given in Table II, following, apply to all Type "W," "Three-Point," Type "B" and Sylphon Packless Valves when used with orifices in Improved Webster Systems.

TABLE II—RATINGS OF ORIFICED WEBSTER SUPPLY VALVES IN SQ. FT. E. D. R.

Valve size, in.	A—Standard	B—Optional
	Sq. ft. E. D. R.	Sq. ft. E. D. R.
½	0–50	0–35
¾	Above 50–110	Above 35–80
1	Above 110–185	Above 80–130
1¼	Above 185–315	Above 130–225

All dimensions in inches and subject to slight variation.

Direct Radiators—With Improved Systems, the supply valves of radiators are provided with an orifice in either (1) the nipple of valve or (2) the valve sleeve, as in the "Three-Point" Valve. Valves should be selected of such size that practically no pressure drop occurs through the valve itself. Steam delivery then depends upon the size of the orifice and the pressure difference across it. The suggested sizes in Table II-A can be used for most installations.

There may be applications where it is desirable to have valve sizes larger. Occasionally a larger valve may be preferred for appearance. In such cases, Table II-B may be used.

Light-Weight Concealed Radiators—When light-weight radiators have end connections similar to direct radiators, it is possible to use either nipple or sleeve type orifice with valves selected from Table II.

However, with bottom connections, valves should be larger than those listed in Table II. For these radiators, special orificed nipples are generally used. Sleeve-type orifices ("Three-Point" Valves) cannot be used.

Nothing smaller than a ¾ in. valve should be used for bottom connected light-weight radiation. It is suggested that a ¾ in. valve be used on loads not over 80 sq. ft. Over 80 sq. ft., use 1 in. valves.

Webster Metering Orifices

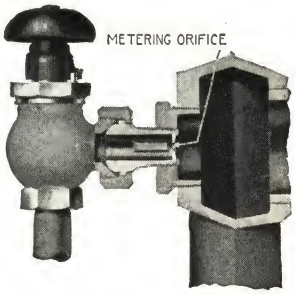


Fig. 20. Metering Orifice in Nipple of a Webster Supply Valve

These are discs built into radiator valve nipples, each with a restricted opening, the size of which is determined by the amount of radiation, the distance (equivalent pipe length) of the radiator from the source of supply and, in tall buildings, the effect of altitude. The size of orifices to be installed at each radiator is selected by the engineers of the nearest Webster branch office, who are equipped with complete data to make possible a proper selection. Webster Metering Orifices should not be confused with so-called "regulating plates," "adjustable modulating valves" and similar means for obtaining rough approximate "balance." Regulating plates ranged merely for a certain number of sq. ft. of radiation will not give the even distribution of properly applied Webster Metering Orifices.

The discs are of heavy gauge Monel Metal to resist erosion and corrosion, amply thick to be free from vibration and shaped for silent operation. Nipples with the discs securely inserted are carried in stock in a wide range of standard sizes to fit Webster Type "W," Type "B" and Sylphon Packless Valves. For modernizing installations using earlier types of Webster Valves and for all valves of other make these Orifices may be obtained on order made up in special nipples.

Metering Orifices in Extra Heavy Pipe Nipples

Webster Metering Orifices are also made up in extra heavy brass pipe nipples of standard dimensions and also in nipples of standard brass union elbows. They may be obtained on special order made up in extra heavy pipe nipples of special dimensions. These orifices in pipe fittings are used in connection with light-weight radiation in cabinets, radiation that is recessed and grilled, where the supply valve is located beneath the basement ceiling, or where supply valves are omitted entirely.

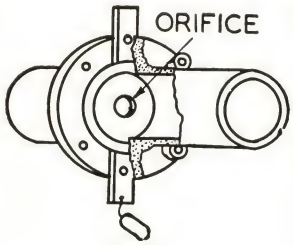


Fig. 21

Intermediate Orifice in Branch Main Union Flanges. Pipe and Flange are broken away to show Orifice.

Intermediate Metering Orifices

Provided for installation in the branch mains to assist in primary distribution. These Intermediate Orifices are made of brass plate and provided with two attached copper asbestos gaskets and suitable lugs for mounting in pipe lines between union flanges and between companion flange and gate valve. They are supplied on special order in standard pipe sizes commonly used in heating systems.

Sleeve Type Orifices

Where desired, Sleeve Type Orifices may be used in place of the Nipple Type Orifices described above by adopting Webster Three-Point Supply Valves. These Sleeve Type Orifices (See Fig. 23) are shipped separately from Three-Point Valves, to be installed by the contractor in accordance with schedule furnished by the Webster Branch Office responsible for the selection of Orifices and sizes. For more complete details see the description of Webster Three-Point Supply Valves.

Webster "Three-Point" Valve

Designed expressly for Improved Webster Systems where orifices are used to obtain correct steam distribution. This valve includes a sleeve orifice fitting into the seat opening and easily replaceable if radiation or occupancy changes require a new orifice size. Valve may be set at *shut, normal* and *excess* position, the latter giving 140% of normal steam requirements. This feature is especially desirable for hospitals, hotels, etc., where quick heating-up or higher temperature are desired in different rooms.

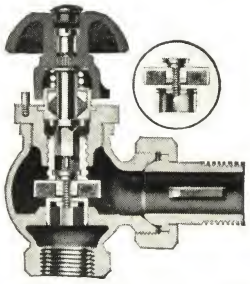


Fig. 22. Webster Three-Point Valve

Orifice sleeve in circle replaces temporary sleeve after installation.

Three-Point Valves are shipped as standard "off-and-on" radiator supply valves. After system has been tested, temporary sleeves are replaced by orifice sleeves to correctly balance steam distribution. The "Three-Point" feature is quickly and simply obtained by reversing dial plate and changing shut position of valve.

With the exception of the disc and handle, all parts are of high grade steam brass. Outside is nickeled with attractive satin finish. Standard Wheel Handles are all-bakelite.

Made in angle, right-hand, left-hand and straightway models with either standard wheel, lever or lockshield handles. Sizes ¾, 1 and 1¼ in.

Specification—Such radiators as are designated on the plans shall each be provided with a Webster Three-Point Valve. Each of these valves shall be furnished with a sleeve-type orifice, the size of which shall be selected by the manufacturer. The valve and orifice shall be installed according to the standard practice of the manufacturer who will provide contractor with service details showing approved methods of connection.

Webster Double Service Valve

The purpose of this valve is to simplify piping connections in down-feed risers as used in one-story buildings, where they effect important savings in pipe-fitting labor. It performs double service

Ratings of Double Service Valves in Sq. Ft. E.D.R.

(For press. diff. across valve from ¼ lb. per sq. in. to 1 lb. per sq. in.)

Size	Press diff. in lbs. per sq. in.		
	¼	½	1
¾"—173	87	124	175
1" —174	147	204	294
1¼"—175	252	360	504
1½"—176	365	516	728

In above table ratings are given in Equivalent Direct Radiation (E.D.R.) based on 240 B.t.u. per sq. ft. per hour.

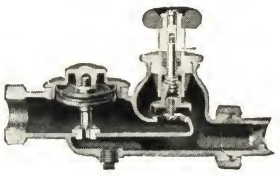


Fig. 23. Webster Double Service Valve

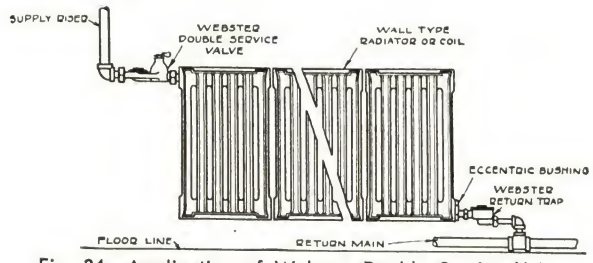


Fig. 24. Application of Webster Double Service Valve

—combines a thermostatic trap with a quick-opening valve. Acts as trap for draining down-feed riser and as a radiator supply valve.

Specification—Webster Double Service Valves shall be provided for such radiators as called for on the plans. Installation shall be made according to the standard practice of the manufacturer who will provide contractor with service details showing approved methods of connection.

Webster Traps

A number of different types of low pressure traps are provided for use in Webster Systems to discharge condensation and air from radiators, drips, unit heaters, blast radiation, etc., giving a choice to meet every operating condition.

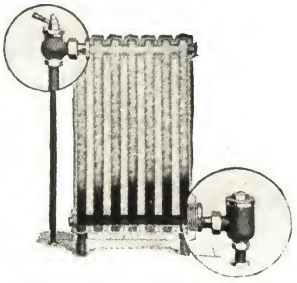


Fig. 28. Application of Webster Supply Valve and Trap to Typical Installation

Webster Sylphon Trap

Original and highly perfected type of low pressure thermostatic bellows trap. Effectively discharges all condensation and entrained air from radiators or coils without permitting passage of steam.

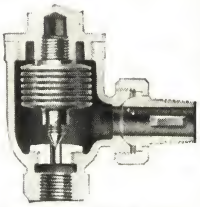


Fig. 29. Webster Sylphon Trap

Operation is by means of a liquid contained in the rugged Sylphon Bellows.

Factory adjusted, and made in ½ and ¾-in. sizes.

Maximum pressure 10 lb. per sq. in.

For normal operating pressures not exceeding 5 lb. per sq. in.

See table IV for Ratings.

Specification—The return of every radiator shall be provided with a Webster Sylphon Trap. The size of the trap shall be as called for on the plans. Installation shall be made in accordance with the standard practice of the manufacturer who will provide the contractor with service details showing approved methods of connection.

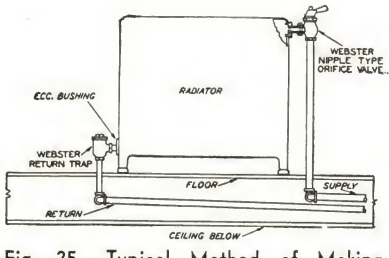


Fig. 25. Typical Method of Making Supply and Return Connections to Radiators

Using Webster Supply Valves with standard nipple-type metering orifices and Webster Return Traps.

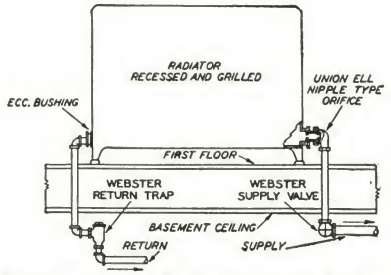


Fig. 26. Another Typical Method of Making Supply and Return Connections to Radiators

Using Webster Supply Valve, Webster Return Trap and standard metering orifice in nipple of brass union elbow.

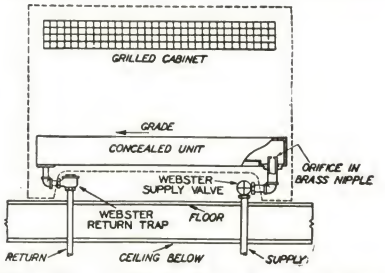


Fig. 27. Typical Method of Making Supply and Return Connections to Light-weight Radiation

Using Webster Supply Valve, Webster Return Trap and standard metering orifice in brass pipe nipple.

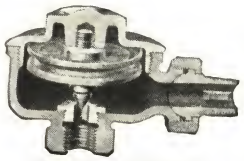


Fig. 30. Webster No. 7 Trap

Webster Series "7" Return Trap—A perfected diaphragm-type thermostatic trap unusually strong in construction. A notable record of trouble-free service (almost a million now in use) has led to its adoption by hundreds of architects and engineers. Uses as operating member a triple-sealed, phosphor bronze diaphragm. Important feature is cone valve and renewable sharp-edged seat. Each trap is individually adjusted and tested at factory. Made in ½ and ¾ in. sizes. Maximum pressure—10 lb. per sq. in. For normal operating pressures not exceeding 5 lb. per sq. in. See table IV for ratings.

Webster Series "7-M" Trap—This trap is used where normal operating pressures will prevail up to 15 lb. per sq. in. The maximum occasional pressure is 25 lb. per sq. in. The series "7-M" Trap is similar to the Standard Series "7" Type but has been still further reinforced to meet the higher pressures by heavy gauge monel metal diaphragm, cone valve piece and seat insert. See table V for ratings.

Table IV. Ratings of Sylphon and Series "7" Traps in Sq. Ft. E.D.R.
(For press. differences across trap from 1/10 lb. per sq. in. to 10 lb. per sq. in.)

Size	Press diff. in lb. per sq. in.							
	1/10	1/5	¼	½	1	2	5	10
½"—502 & 702	85	120	132	190	265	380	600	860
½"—512 & 712	112	160	179	251	358	508	800	1150
¾"—513 & 713	112	160	179	251	358	508	800	1150
¾"—523 & 723	213	300	335	480	680	950	1500	2150

In above table ratings are given in Equivalent Direct Radiation (E.D.R.) based on 240 B.T.U. per sq. ft. per hour. For Improved Webster Systems using metering orifices, it is recommended that the selection of traps be based on 1/10 lb. per sq. in. pressure difference.

Table V. Ratings of Series "7-M" Traps in Sq. Ft. E.D.R.
(For press. difference across trap from 1/10 lb. per sq. in. to 25 lb. per sq. in.)

Size	Press. diff. in lb. per sq. in.										
	1/10	1/5	¼	½	1	2	5	10	15	20	25
½"—702-M	85	120	132	190	265	380	600	860	1040	1210	1360
½"—712-M	112	160	179	251	358	508	800	1150	1400	1620	1800
¾"—713-M	112	160	179	251	358	508	800	1150	1400	1620	1800
¾"—723-M	213	300	335	480	680	950	1500	2150	2650	3000	3400

In above table ratings are given in Equivalent Direct Radiation (E.D.R.) based on 240 B.T.U. per sq. ft. per hour.

Specification: The return end of every radiator shall be provided with a Webster Series "7" (or "7-M") Return Trap. The size of the trap shall be as called for on the plans. Installation shall be made in accordance with the standard practice of the manufacturer, who will provide the contractor with service details showing approved methods of connections.

Webster 026-T Drip Trap

A heavy duty trap, capable of handling large volumes of condensation and air, and at the same time compact and light in weight. Suited for drips of mains, blast radiation, unit heaters and similar applications. The specifications calling for a heavy duty float-type trap is fully met, while the advantages of the thermostatic element and ease of installation are both retained.

Outlet opening 1¼ in. on end permits the discharge of water, or water and air. An opening in the cover of the trap is provided so that air may be discharged separately when desired. In the bottom of the trap are two plugged openings which serve for cleaning and flushing.

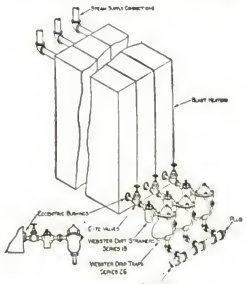


Fig. 31. Dripping Blast Heaters Through Webster 026-T Drip Traps

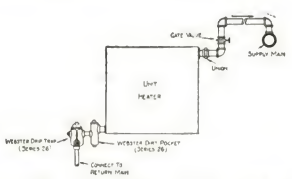


Fig. 32. Dripping Unit Heater Through a Webster 026-T Drip Trap and a Dirt Pocket

Two inlet openings of 1¼ in. are provided. Weight complete only 18 lbs., so that it may be handled easily and mounted in pipe line without other support. Maximum working pressure, 15 lb. per sq. in.

Webster 026-O Drip Trap

Similar to the 026-T Drip Trap but without thermostatic element.

Preferred for all applications where concentration of air does not occur, such as on ends of mains and risers, flash tanks and dripping gravity heating systems into vacuum return lines.

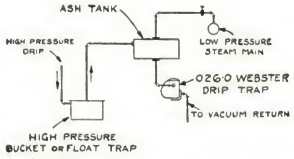


Fig. 33. Dripping a Flash Tank Through a Webster 026-O Drip Trap

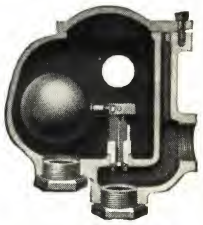


Fig. 34. Webster 026-O Drip Trap

Table VI. Ratings of Webster 026 Drip Traps

Press. diff., lb. per sq. in.	1/10	¼	½	1	2	5	7½	10	15
Lb. per hr., condensation	330	500	650	900	1170	1460	1630	1800	2200

Select trap by rating not by pipe size. For Improved Webster Systems using metering orifices, it is recommended that the selection of traps be based on 1/10 lb. per sq. in. press. diff.

Specification: The ends of mains, drip points, return ends of blast coils and unit heaters shall be provided with Webster 026-T Drip Traps. The sizes of these traps shall be as called for on the plans.

At drip points where concentration of air does not occur, Webster 026-O Drip Traps shall be provided. They shall be installed according to the standard practice of the manufacturer, who will provide contractor with service details showing approved methods of connection.

Webster Heavy Duty Trap, Series 19-T

Used to remove condensation where it accumulates in large quantities, as in large steam mains, hot water generators and fan heater coils. Operates on the float principle for discharge of condensation and has a large water outlet to withdraw it quickly from the unit to be drained. Air is discharged through thermostatic bypass. Sizes, ¾ to 2 in.

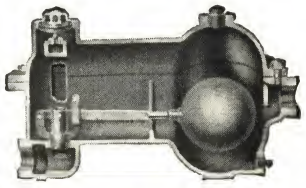


Fig. 35. Webster Heavy Duty Trap, Series 19-T

Webster Heavy Duty Trap, Series 16

Similar to Series 19-T, but has no thermostatic means for discharge of air. Used to discharge condensation from gravity heating systems into vacuum return lines.

Table VII. Ratings of Webster Heavy Duty Traps, Series 19-T

Size of trap	Pressure difference through the valve									
	1/10 lb.	¼ lb.	½ lb.	1 lb.	2 lb.	3 lb.	4 lb.	5 lb.	10 lb.	15 lb.
	Pounds of water per hour									
0019-T	305	490	700	1000	1400	1700	2000	2200	3150	3900
019-T	550	880	1250	1800	2500	3050	3600	4000	5700	7000
119-T	930	1470	2100	3000	4200	5100	6000	6700	9500	11700
219-T	2450	3950	5600	8000	11200	13600	16000	17900	25300	31100

No allowance made for pressure drop in the connecting piping between radiation and trap or from trap through run-out to return.

Select trap by rating not by pipe size. For Improved Webster Systems using metering orifices, it is recommended that the selection of traps be based on 1/10 lb. per sq. in. press. diff.

Specification: The ends of mains and drip points shall be provided with Webster Heavy Duty Drip Traps as called for on the plans. They shall be installed according to the standard practice of the manufacturer, who will provide contractor with service details showing approved methods of connection.

Webster Dirt Strainers

Placed in return lines of steam heating systems to catch dirt, rust, scale and other particles, preventing them from impairing the tightness of traps. More dependable than pockets made of pipe and fittings, cost less to install, and are more readily cleaned.

Sizes from ½ to 2 in.

Specification: Dirt Strainers shall be provided at points indicated on the plans and in the sizes specified. Installation shall be made according to the standard practice of the manufacturer, who will provide contractor with service details showing approved methods of connection.

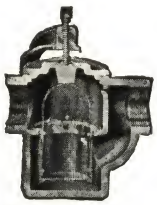


Fig. 36. Webster Dirt Strainer

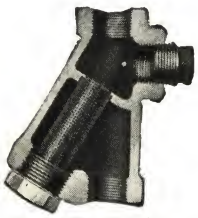


Fig. 37. Webster Series "78" Dirt Strainer

Webster Series "78" Dirt Strainers

The Webster Series "78" Dirt Strainer has been designed to be placed ahead of every Webster Series "78" Trap located at a drip point in the supply piping or attached to apparatus which is likely to contain core sand, pipe scale, or sediment.

Specification: (See Webster Series "78" Traps.)

Webster Type "R" System Basement Equipment

Quick circulation, despite variations in boiler pressures, is assured in Webster Type "R" Systems through the combination of the Webster Boiler Return Trap and Vent Trap. Air escapes from the system through the Webster Vent Valve. Water returns direct to the boiler by gravity at low pressures. An increase of pressure causes the Webster Boiler Return Trap to fill and operate, equalizing the pressure and making positive the prompt return of water to the boiler. Units are made to provide five sizes of the Webster Boiler Return Trap and Vent Trap combination, having the range of capacities given in Table VIII.

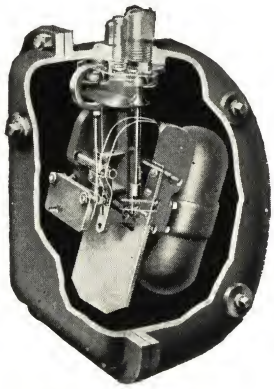


Fig. 38. Webster Boiler Return Trap

Webster Boiler Return Trap

Positive acting reciprocating device for returning water to boilers in Webster Type "R" Systems.

Construction of smaller sizes is shown in Fig. 38. Larger sizes vary slightly from this construction. The float is of heavy gauge metal with no exposed seams. The entire mechanism is held in place by two studs and is removable as a unit. It turns on a single Monel Metal shaft. Steam valve opens quickly when high level is reached. No wire drawing. Valves are all-metal and self-aligning. Operation is silenced by stainless steel bumper springs and large area baffle.

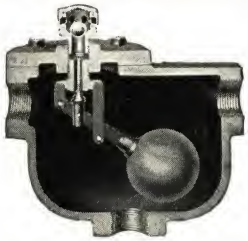


Fig. 39. Webster Vent Trap with Vent Valve

Webster Vent Trap with Vent Valve

Used in conjunction with the Webster Boiler Return Trap, to provide a dependable method of removing air from heating systems and automatically preventing its return, at the same time making overflow of condensation impossible.

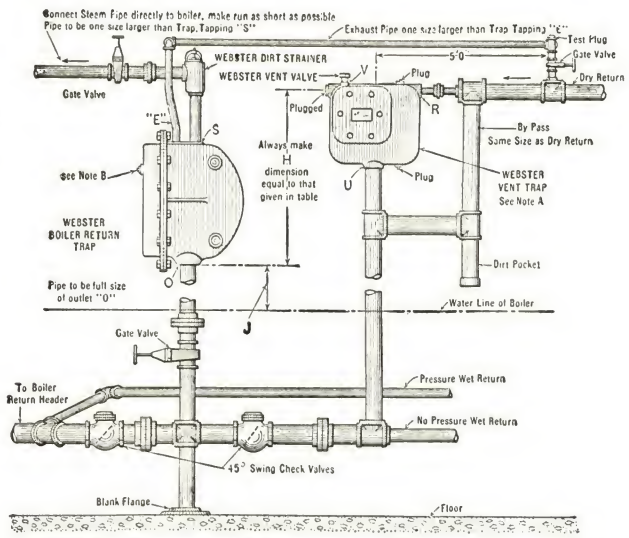


Fig. 40. Conventional Arrangement of Webster Type "R" System Equipment

Table VIII. Data and Ratings for Webster Type "R" System Basement Equipment (Refer to Fig. 40*)

Rating sq. ft. dir. rad.	Size Boiler Return Trap	Size Vent Trap	Number of ½-in. Vent Valves	Size Dirt Strainer	Size 45° Check Valves (2 valves)
0— 1500	0023	0023	1	024	1¼
1501— 2500	023	023	1	124	1½
2501— 4000	123	123	1	124	2
4001— 8000	223	223	2	224	2½
8001—16000	323	323	3	224	3

*All dimensions in inches.

Specification: The end of the dry return line shall be provided with a Webster Vent Trap. The discharge of the vent trap shall be connected through a Webster 45° Check Valve to a Webster Boiler Return Trap. The boiler return trap discharge shall connect into the boiler return header through a Webster 45° Check Valve. The size of this equipment shall be that called for on the plans. Installation shall be made according to the standard practice of the manufacturer who will provide contractor with service details showing approved methods of connection.

Webster Damper Regulator

Used for controlling dampers on boilers. Used with Webster Vacuum and Type "R" Systems of Steam Heating where very low steam pressure is normally maintained to insure circulation. Controls and maintains pressure of only a few ounces.

The well, diaphragm casing and plates are made of cast iron, the lever of steel, and the diaphragm of rubber. An asbestos disc between the lower casing and the well prevents the transfer of heat to the diaphragm chamber from the steam in the upper part of the well.

Pressure — Will operate at boiler pressures from 2 oz. to 2 lb. May be temporarily subjected to higher pressures, but this will shorten life of diaphragm.

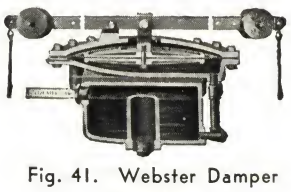


Fig. 41. Webster Damper Regulator

Specification: Each heating boiler operating at pressures from 2 oz. to 2 lbs. shall be provided with a Webster Damper Regulator. Installation shall be made in accordance with the standard practice of the manufacturer, who will provide the contractor with service details showing approved methods of connection.

Webster Boiler Protector

Provided to prevent breakage in low pressure cast iron boilers when the water level becomes inadequate. Automatically supplies raw water to boiler when water level reaches set position. It is primarily a protective device, but may be used as a boiler feeder.

Body is made of cast iron with three principal parts bolted together. Interior parts of copper, brass or monel metal to withstand corrosion. Seamless float of standard type actuating cone valve on sharp-edged seat. Water valve with standard Jenkins composition disc actuated by difference in water pressure between exterior and interior of Sylphon Bellows to which it is attached.

Adapted to almost all types of low pressure heating boilers where maximum pressure will not exceed 15 lb. per sq. in. Maximum cold water main pressure is 150 lb. per sq. in.; minimum is 25 lb. per sq. in.

Made in two sizes, 0030 and 030, both with ¾-in. connections.

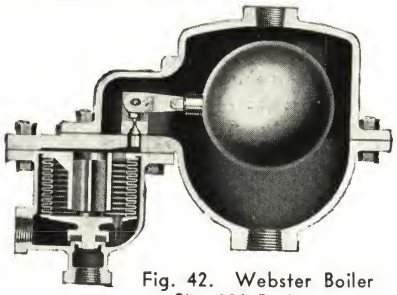


Fig. 42. Webster Boiler Size 030 Projector

Table IX. Capacity of Webster Boiler Protectors

Boiler pressure, lb.	Water main pressure, lb.	Pressure difference, lb.	Capacity—gallons per min.	
			Size, 030	Size, 0030
5	25	20	12.0	5.3
5	35	30	15.6	6.6
5	55	50	20.0	8.6
5	75	70	23.4	10.1
5	105	100	27.2	11.9

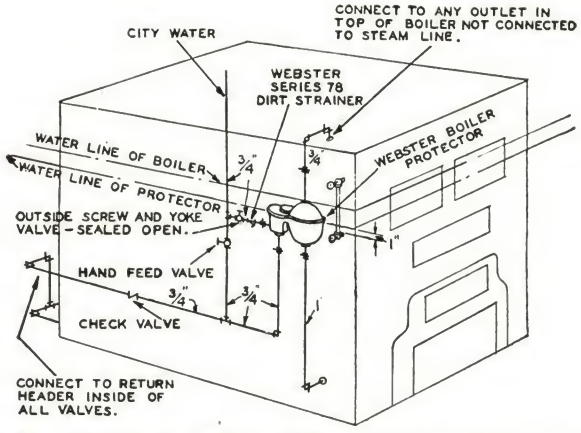


Fig. 43. Method of Installing Webster Boiler Protector, on Low Pressure Cast Iron Boiler

Specification: Each low pressure heating boiler shall be equipped with one (1) Webster Boiler Protector of the size called for on the plans. Installation shall be made in accordance with the standard practice of the manufacturer, who will provide contractor with service details showing approved methods of connection.

Webster Lift Fittings

The improved design of Webster Lift Fittings makes possible quicker starting of the lift and retains all the advantages of the earlier design.

For use where condensation is to be lifted to a higher level. More efficient than "lifting pockets" made of standard fittings; require less time, and costs less to install.

Sizes ¾ to 6 in.

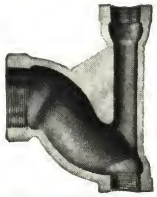


Fig. 44. Webster Lift Fitting

Specification: Where lifts occur on the vacuum return lines they shall be provided with Webster Lift Fittings of the sizes called for on the plans. Installation shall be made according to the standard practice of the manufacturer, who will provide contractor with service details showing approved methods of connection.

Webster Expansion Joints

Webster Expansion joints are constructed with cast iron bodies and brass slip sleeves, and in both single and double slip types. The bodies of Webster Expansion Joints are provided with anchors integral with the body castings. Service connections are provided for convenience in tapping the steam main for branch piping. Drip outlets are also provided.

Made in three classes: (1) For working pressure of 15 lb. per sq. in.; (2) for 125 lb. per sq. in.; (3) for 150 lb. per sq. in.

Sizes range from 1½ to 20 in., according to class. Write for complete information.

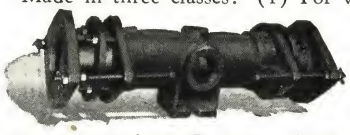


Fig. 45. Webster Expansion Joint

Specification: Webster Expansion Joints shall be provided at all expansion points as called for on the plans. Installation shall be made according to the standard practice of the manufacturer, who will provide contractor with service details showing approved methods of connection.

Webster Series "78" Traps for "Process Steam" Pressures (10 to 125 lb. per sq. in.)

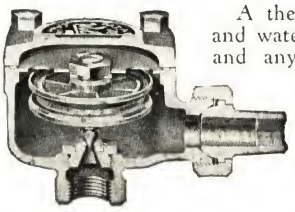


Fig. 46. Webster Series "78" Trap

A thermostatic trap used to discharge air and water of condensation from heating coils and any apparatus using steam at process pressures, i. e., 10 to 125 lb. per sq. in. Built in four sizes: ⅜, ½, ¾ and 1 in. There are two classes: Class 2 for pressures of 10 to 60 lb. and Class 3 for pressures of 60 to 125 lb.

Applications: Webster Series "78" Traps may be used to advantage in hundreds of different applications. Most of these fall into three groups:

(1) To discharge both air and water condensation from single pieces of apparatus within its capacity.

(2) For installation on each unit of a battery—as for example a battery of jacketed kettles, instead of the old-fashioned method of trying to handle the entire battery through one "master" trap.

(3) For venting air only from apparatus formerly provided with a handcock or similar inadequate means, and where a large volume of condensation is handled by a bucket type trap.

Where Used—Webster Series "78" Traps are used in heating systems, in sterilizers, in cooking and laundry apparatus, and, in the process industries on melting tanks, jacketed mixers, digesters, reaction kettles, extraction vats, pressure cookers, presses, vulcanizers, steam heated roller mills, tanks, stills, coil heaters, evaporators and dryers.

Design and Construction—Webster Series "78" Traps have been developed especially for operation at the specified pressures. Unusual construction features include automobile type copper-asbestos gasket, heavy gage monel metal diaphragm, renewable stainless steel valve piece and seat, expanded opening for quiet operation, cast steam brass body and hot forged brass cap bolted on with monel metal tap bolts.

Table X. Ratings of Webster Series "78" Traps*

Size of trap	Pressure differential, lb. per sq. in.										
	1	5	10	20	30	40	50	60	80	100	125
	Lb. water per hour										
Class 2—Working pressures up to 60 lb. per sq. in.											
⅜"—780	6	20	33	53	70	88	100	120	145	170	200
½"—782	14	40	64	100	130	158	180	205	245	283	330
¾"—783	31	90	142	225	290	350	400	460	550	640	740
1" —784	70	200	315	490	640	770	900	1000	1204	1400	1620
Class 3—Working pressures up to 125 lb. per sq. in.											
⅜"—780	4	13	22	36	48	60	70	80	99	115	135
½"—782	11	32	51	80	105	128	148	165	200	230	270
¾"—783	25	72	112	178	230	280	325	360	440	500	580
1" —784	56	162	255	402	530	640	730	830	1000	1170	1350

*Pressure differentials given in this table refer to pressure at inlet of trap and in return line. Select trap to handle maximum condition. For normal working pressures up to 60 lb. per sq. in., use Class 2 Traps even though occasional pressures may go above 60 lb. For normal pressures between 60 lb. and 125 lb., use Class 3 Traps. In this table ratings are given *above* 60 lb. for Class 2 Traps and *below* 60 lb. for Class 3 Traps merely to show performance at these special pressures.

Specification: The return end of (insert name of unit) shall be provided with a Webster Series "78" Trap and Webster Series "78" Dirt Strainer. The size and class of the trap shall be as called for on the plans. The connections shall be made according to service details furnished the contractor by the manufacturer.

SPECIAL NOTICE

To protect ourselves in our constant endeavor to make Webster Systems of Steam Heating and Webster System equipment ever better, we reserve the right to change specifications and prices without notice.

BASIC SPECIFICATIONS FOR WEBSTER SYSTEMS OF STEAM HEATING

FOREWORD

The specification data given below has been divided into four main groups for purposes of easy identification, under the headings: "Introduction," "The System," "Control Equipment" and "Conclusion."

The first and last groups are intended more as a guide than as a mandatory set of requirements to be copied word for word as printed. As most architects have their own forms of specifications for these items carefully worked out from past experience, the subjects under these headings therefore should be considered only as reminders.

Under the headings of "The System" and "Control Equipment" Webster Engineers have prepared separate specifications for each type of Webster System and Webster Controls for use with these systems. Each of these specifications is complete in every detail with the exception of certain type numbers or dimensions which should be filled in by the architect to meet the conditions of the particular installation. It should be understood that the specifications are only intended to describe basic heating (or steam circulation) systems. Heating requirements vary widely, making necessary certain changes in specifications of the individual installation.

In preparing heating specifications involving the use of any of the Webster Systems we suggest that the Architect read over the introductory and concluding groups given below for possible points which should be covered in his own specification. Under normal conditions he will probably find it easier to use his own form for these subjects, inserting at the proper point the specifications for the selected System. These latter specifications can be copied word for word after making the necessary selection of sizes, types, etc.

The services of our Engineers are available absolutely without obligation to Architects or Specification Writers encountering any difficulty in using these basic specifications and may be secured by telephoning any of the local offices listed in the forepart of this catalogue. Complete specifications, of standard or special form, may be secured from Webster Engineers for any Webster System.

INTRODUCTION

General Conditions

The "General Conditions of the Contract" (Latest Edition) of the American Institute of Architects (as well as any "Supplementary Conditions"), are hereby made a part of this specification and the contractor shall be responsible for any instructions therein pertaining to his work.

Work of Related Trades

Note: *Under this heading the architect should describe or list related work which will be done by others. These items include pipe trenches, ash handling equipment, cleanout doors, stack, hot water heater and/or storage tank(s) (if not included in this specification), electrical equipment and control apparatus (except as specified herein), etc. The Heating Contractor should be required to become familiar with such other specifications.*

Scope of the Work

It is the intent of these specifications and the accompanying drawings to provide for the furnishing of all materials, labor, permits, etc., necessary for the complete installation of the system described below, excepting such materials, labor or equipment as are specified or noted as being furnished by others.

However, it is not intended that the drawings shall show every pipe, fitting and appliance, and it is understood that, while the drawings must be followed as closely as circumstances will permit, the Heating Contractor will be held responsible for the proper installation of the system according to the true intent and meaning of the plans and specifications.

The Heating Contractor will be required to furnish, without extra charge to the Owner, all such appliances as may be necessary to complete the system in accordance with the best practice and to the satisfaction of the Owner or his representative.

Should it be found that any piping cannot be installed as shown on plans, the Heating Contractor must consult with the (Architect, Heating Engineer) before running pipe or making any changes in the piping.

Measurements

The Heating Contractor shall verify all measurements at the building before proceeding with the work and shall be responsible for same.

Right of Inspection

The Architect, Heating Engineer, or representative of the manufacturer of any of the equipment shall be permitted at any time on the job for the purpose of inspection and the Heating Contractor shall render any assistance necessary to facilitate the work. Any instructions given by these parties must be confirmed in writing by the Architect or Supervisor and shall then be considered part of these Specifications.

Cutting and Patching

Where walls, floors, etc., are already constructed the Heating Contractor shall do all cutting of walls, floors, etc., necessary to accommodate his heating work, and he shall refinish same to meet the approval of the Architect.

The General Contractor shall provide openings necessary for heating work in new walls, floors, etc., to be constructed from the drawings furnished by the Heating Contractor and as directed by him. Should the Heating Contractor fail to furnish the General Contractor with drawings, the Heating Contractor will provide the openings necessary for his heating work. The Heating Contractor shall also be required to furnish information to any other Contractors whose work in any way affects the heating contract.

THE SYSTEM

General

These specifications and the accompanying plans are intended to describe the installation of a complete Improved Webster Type "R" (Vacuum) System of Steam Heating in .....
.....

The System is so designed and shall be installed in such a manner that all radiators get steam at the same time and in substantially the same proportion. This balanced steam distribution will be accomplished by Webster Metering Orifices installed in radiator supply valves (and by intermediate metering orifices installed in branch mains and riser laterals) as specified hereinafter.

Boiler

Furnish and erect on foundation provided under this contract one cast iron (steel) boiler No. ....., as manufactured by the .....
Water line shall not exceed ..... in.

The boiler shall be provided with a Webster Damper Regulator (include only with coal burning installations and boilers having throttling type oil burner) and a Webster Modulation Gauge instead of that commonly furnished, a pop safety valve set to blow off at 5 lbs., a water column water gauge, gauge cocks and fusible plug, the necessary firing tools and all accessories and connections required under the State Laws. Damper Regulator shall be rigidly supported and connected by chains and pulleys to the check damper and check draft door and to the steam space of boiler by a ½ in. pipe fitted with a globe valve.

Smoke Pipe

Connect boiler to chimney with ..... gauge black iron smoke pipe closely fitted. The pipe shall be provided with a damper and cleanout door with fastening device. Stack (to be provided by .....) will be .....
x ..... in. x ..... ft. high with cleanout door at base.

Boiler Protector

Heating Contractor shall furnish and install in cold water line to the boiler a No. ..... Webster Boiler Protector in strict accordance with manufacturer's drawings, specifications and installation instructions.

Hot Water Heater

Furnish and install below water line of boiler one ..... in. water heater capable of heating not less than ..... gallons of water 100 degrees F. in 3 hours. This heater shall be so installed

that top connection is approximately 1½ in. below water line of boiler. A gate valve shall be installed in bottom connection from heater to return header on boiler. The water heater shall be connected as per sketch on plans and as recommended by the manufacturer.

Pipe

All pipe shall be of new material and made of full weight spellerized steel (wrought iron) as manufactured by .....
.....

All pipe must be reamed and cleaned before it is assembled. It must be installed in such a manner that due provision shall be made for expansion and contraction.

Fittings

All fittings shall be of the best quality heavy gray cast iron as manufactured by .....
Provide for disconnection of pipe by use of flanges and unions, unions to be ground joint type, as manufactured by .....
..... Use a stiff mixture of oil and graphite on male threads only for screw joints. Eccentric reducing fittings or eccentric reducing couplings shall be used at all points where steam supply pipes are reduced in the horizontal run.

Piping

From the supply tappings of the boiler, lines provided with flanged unions shall be run and connected into a header from which the steam mains shall be taken. A drip line shall also be run from the steam header to the wet return header. Should a header-type boiler be used, no additional header will be required. The ends of mains and other low points in the steam mains shall be provided with Webster Dirt Pockets, or Dirt Strainers and Webster Traps as shown or called for on plans.

The base of all downfeed risers shall be dripped through a Webster Drip Trap as shown on the plans.

Risers shall be run where shown on plans. The laterals from risers to radiators shall be run in the floor construction or as approved by the Architect.

Connecting with the return risers, radiators and air lines, dry return mains shall be run overhead in basement or as noted on plans. Where the return mains start they shall be kept as high as possible.

The supply and dry return mains shall grade 1 in. in 20 ft. in the direction indicated by arrows on plans, while the laterals to risers and radiators shall be taken from the top and grade 3 in. in 10 ft. toward the mains.

A ..... in. galvanized iron cold water pipe fitted with a brass cock shall be run from the cold water main to boiler and a ..... in. drain line, also provided with a brass cock, shall be run from the lowest point of boiler.

Sleeves and Plates

Suitable sleeves, floor and ceiling plates of type approved by the architect shall be provided where pipes pass through walls, floors, etc.

Supports

The Heating Contractor shall provide substantial expansion pipe hangers to support all pipe. No perforated strip hangers will be permitted. Hangers should be spaced according to the weight and size of pipe they support to prevent it from sagging from line of grade.

Pressure Reducing Valve and Gauge

Heating Contractor shall furnish and install complete for heating system ....., ... Pressure Reducing Valve with extra large diaphragm to reduce the pressure from ..... lbs. (not over 10 lbs.) to two ounces. (If initial pressure is more than 10 lbs. specify two valves, one to reduce from high pressure to about 5 lbs., and other from 5 lbs. to 2 ounces.) This valve is to be installed in the supply main with by-pass as shown or called for on plans and service details of the manufacturer. Each pressure reducing valve shall be provided with a strainer. A globe valve shall be installed on the high pressure side and in the bypass and a gate valve on the low pressure side of reducing valve. The by pass shall be ..... in. pipe size. From the proper outlet on the reducing valve for low pressure work, Heating Contractor shall run a ½ in. control pipe and connect into a Webster Water Accumulator at a distance of not less than 5 ft. from pressure reducing valve. The control valve is to be sealed and provided with a globe valve laid horizontally.

Furnish and install a 5½-in. Webster Combination Gauge on the low pressure side of the water accumulator.

At a distance of 10 ft. beyond pressure reducing valve install a ¾-in. pop safety valve set to blow at 10 lbs.

Key Room Thermostatic Control

The Pressure Reducing Valve previously specified herein shall be furnished with Webster Key-Room Thermostatic Control consisting of torque motor designed for current available at the building, motor bracket, Thermostat with (without) clock, and an electric snap switch. Manufacturer is to furnish torque motor and bracket assembled to Pressure Reducing Valve. Thermostat and Snap Switch are to be installed where noted on plans. All electrical work required for motor, thermostat and switch shall be done by Heating Contractor (from outlets left within 5 ft. of the apparatus by the electrical contractor).

Radiator Supply Valves

All radiators (heat cabinets, concealed heat units, etc.) shall be provided on the supply end with Webster Type ..... Supply Valves.

Radiator Metering Orifices

All radiators and concealed heat units, other than those excepted on the plans or by the next paragraph below, shall be provided with Webster Nipple-Type Metering Orifices in the supply valve, union elbow or brass pipe nipple as shown on the plans. The orifices are to be sized by the manufacturer for the amount of radiation, the distance (equivalent pipe length) of the radiator from the source of steam supply, the basis on which the piping system has been sized and when necessary, for altitude; and to provide fully heated radiators during period of maximum heat requirements with a pressure of ..... lbs. at the source of steam supply. The Heating Contractor shall install the proper size orifice for each radiator according to the plans and to the instructions furnished by the manufacturer.

Radiators and concealed heating units fitted with Webster "Three-Point" Valves as called for above or indicated on plans shall be provided with Webster Sleeve-Type metering orifices sized and installed as provided above for nipple-type metering orifices.

Intermediate Metering Orifices

Webster Intermediate Metering Orifices shall be provided in branch mains to assist in primary distribution. The sizing of these intermediate orifices shall be done by the Manufacturer and shall be installed by the Heating Contractor at the locations designated on the plans.

Intermediate orifices shall be of brass plate $\frac{3}{16}$ in.in thickness and shall be provided with two copper-asbestos gaskets spot welded to the plate. Suitable lugs for mounting in pipe lines shall be included.

RADIATION

Cast Iron

Furnish and install radiation as shown on plans. The Radiators are to be as manufactured by .....
.....

Radiators are to be of the tube and wall pattern, hot water type, having the supply tappings at the top and the return tappings at the bottom opposite supply end. The return ends shall be provided with eccentric bushings. All air valve tappings shall be omitted or the tappings plugged. Radiators must be given one coat of primer at the factory.

Radiators shall not be ordered until the contractor has verified the heights of the window sills by actual measurement at the building. Should it be found that any radiator or heights shown on plans would project above the sill or does not suit space conditions, the contractor shall furnish a radiator having approximately the same amount of surface and of height and width to suit the space limitations without extra charge. Legless and wall radiators are to be supported on approved adjustable hangers.

Concealed Heat Units

Furnish and install where noted on plans concealed heat units as manufactured by .....
..... They shall be of size and capacity as shown on plans and must fit snug to sides of casing so that all air shall pass up through units.

The heat unit shall not be larger than grille or opening in baseboard and piping so arranged that unit can be removed by disconnecting piping and taking unit out through opening in baseboard. Should units be used where traps cannot be installed in back of grilles or openings, then heating contractor must run separate risers for each unit and return traps placed in basement where they are accessible.

Concealed unit manufacturer must furnish unit complete with galvanized iron casing. The casing must be made air tight and fit snug to sides of units.

The recess in back and sides of galvanized iron duct shall be lined with ½ in. asbestos air cell board or celotex by the heating contractor. The radiation noted on plans for concealed units is understood to mean the equivalent of cast iron radiation.

Recesses for Heat Units

All recesses and removable baseboards for heat units are to be furnished by the general contractor.

Heating Contractor, however, must furnish general contractor with drawings showing sizes and location of all recesses for heat units.

Grilles

Grilles or openings shall be installed in baseboard for all concealed units and grilles above heat units.

Grilles to be furnished by manufacturers furnishing units of type and design approved and are to be installed by Heating Contractor.

Unit Heaters

Furnish and install where noted on plans .... Unit Heaters provided with adjustable deflectors. Units shall be as manufactured by .... Each shall be capable of delivering .....B.t.u. per hour with entering air at ..... deg. F. and steam in the unit at ..... lbs. per inch pressure when running at ..... r.p.m.

Motors shall be wound for current available at the building.

Each unit heater shall be provided with a three-speed control.

Heating Contractor shall furnish and install where noted on plans or as directed by the Unit Manufacturer, thermostatic control for each unit heater. In addition to the thermostatic control there shall be provided a cut-out switch so that the unit heater may be operated independent of the thermostat.

All electrical work required for the unit heaters and switches shall be done by the Heating Contractor from outlets left within 5 ft. of the apparatus by the electrical contractor. The Heating Contractor must also furnish and install all necessary starting and safety devices.

All switches are to be located where directed by the ....

Traps

All radiators (heat cabinets, concealed heat units, etc.) shall be provided with Webster ..... Traps of size as designated on the plans. All unit heaters shall be provided on the return end with a Webster Drip Trap and Webster Dirt Pocket or Dirt Strainer as indicated.

BASEMENT RETURN EQUIPMENT

Vent Trap and Boiler Return Trap (Use for Webster Type "R" System)

Furnish and install at the end of the dry return a Webster Vent Trap to vent the air from the system. Connect the vent trap discharge through a Webster 45 degree Check Valve to a Webster Boiler Return Trap to return the water of condensation to the boiler. The boiler return trap discharge shall connect into the boiler return header through a Webster 45 degree Check Valve. These traps shall be installed in accordance with details on plans and as recommended by the manufacturer.

Vent Trap (Use with "street" steam)

Furnish and install at the end of the dry return a Webster Vent Trap to vent air from the system. This Trap shall be installed in accordance with details on plans and as recommended by the manufacturer.

Condensate Pump and Receiver

Furnish and install complete on concrete foundation in accordance with manufacturer's details and instructions a No. ..... Condensation Pump and Receiver to return the water of condensation to the boiler. Pump shall have a rated capacity of ..... sq. ft. of radiation and shall be as manufactured by ....

It shall be provided with a G. E. Capacitator to eliminate radio interference.

Motor for pump shall be designed for current available at the building.

Pump shall be capable of discharging against a pressure of ..... lbs.

The discharge from pump shall be provided with a check valve and a gate valve.

All electrical work in connection with wiring of motors shall be done by Heating Contractor from outlet left by electrical contractor.

Vacuum Pump

(Use for Webster Vacuum System)

Furnish and erect complete on a concrete foundation in accordance with manufacturer's drawings, one size ..... duplex unit Vacuum Pump as manufactured by..... .....

Each pump shall be designed for automatic operation and shall have separate cut-out switch for vacuum control and also provided with a G. E. Capacitator to eliminate radio interference.

The motor shall be wound to suit current characteristics available at the building.

Each pump shall have a rated capacity of ..... sq. ft. of radiation and shall be capable of maintaining a vacuum of 10 in. of mercury at the pump when the system is in operation and discharging water of condensation against a pressure of ..... lbs. gauge.

The suction line to the pump is to be provided with a gate valve and a suction strainer. Before the gate valve provide a bypass to drain. In the discharge line from each pump place a check valve and a gate valve.

All electrical work in connection with wiring motors to be done by this Contractor from an outlet left by electrical contractor.

CONTROL EQUIPMENT (Optional)

THE HYLO VACUUM VARIATOR

General

These specifications and accompanying plans are intended to describe the installation of a Webster Hylo Vacuum Variator to provide central manual throttling control of steam delivery to all radiators in the Improved Webster Vacuum System previously specified herein under "The System."

The steam supply to the heating system will be maintained at a relatively constant pressure by a Pressure Reducing Valve as previously specified. The steam delivery to radiators shall be controlled by varying the pressure difference between the supply and return piping through varying the return pressure by means of a Webster Hylo Vacuum Variator as hereinafter specified.

The Heating Contractor shall furnish and install the following material in accordance with these specifications and accompanying plans:

(a) Webster Hylo Vacuum Variator
(b) Webster Hylo Trap
(c) Webster Dirt Strainer

HYLO Vacuum Variator

Furnish and install a size ..... Webster Hylo Vaccum Variator in the air bypass around the heavy duty trap in the return main, as shown in service details of the manufacturer or as called for on the plans.

The Hylo Vacuum Variator shall be provided with a lever arm having clearly worded scales on which movable weights are placed. The amount of steam supplied to the entire heating system or such parts as called for on the plans will be controlled manually by the setting of the weights on the calibrated scales. The range of the scale is to be from 140 per cent of full load for quick heating-up to 33⅓ per cent of full load for mild weather.

Heavy Duty Trap and Dirt Strainer

Furnish and install a ..... in. Webster Hylo Trap for heavy duty service and a ..... in. Webster Series 18 Dirt Strainer in the return main ahead of the vacuum pump according to service details of the manufacturer or as called for on the plans. A bypass, full size of the return main and with gate valves shall be provided around the Heavy Duty Trap and Dirt Strainer.

WEBSTER MODERATOR CONTROL

General

These specifications and accompanying plans are intended to describe the installation of Webster Moderator Control to provide central automatic throttling or gradual acting control of steam delivery in the Improved Webster System previously specified herein under "The System."

The steam supply to the heating system will be automatically controlled and delivery to each radiator apportioned in accordance with requirements determined by outdoor temperature. This automatic control will be supplemented by a centralized manual control to vary the supply of steam to the entire system from 50 per cent to 200 per cent of the normal requirements of this system.

The Heating Contractor shall furnish and install the following material in accordance with these specifications and accompanying plans:

(a) Webster No. ..... Control Panel
(b) Webster Roof Thermostat
(c) Webster Air Compressor and Oil Pump Unit
(d) Webster Main Steam Control Valve

Air Compressor and Oil Pump Unit

Furnish and install a Webster Type "B" Air Compressor and Oil Pump Unit at a point indicated on the plans and on a foundation in accordance with service details of the manufacturer. The Heating Contractor must also furnish and install all necessary starting and safety devices called for on the plans.

Roof Thermostat

Furnish and install outdoors a Webster Type "B" Roof Thermostat at a point indicated on the plans and in accordance with service details of the manufacturer. All necessary material such as copper flashing, grouting, nuts and bolts and paint must be furnished by the Heating Contractor.

Control Panel

Furnish and install a Webster No. ..... Control Panel at a point indicated on the plans and in accordance with service details of the manufacturer.

Main Steam Control Valve

Furnish and install a ..... in. Webster Main Steam Control Valve in the main steam line at a point indicated on the plans and in accordance with service details of the manufacturer. All material, special valves and fittings needed for installation of the bypass, called for on service details of the manufacturer, must be furnished by the Heating Contractor.

Branch Control Valves (Optional)

Furnish and install ....., ... in. Webster manually operated Branch Control Valves at points in the branch mains as indicated on the plans and in accordance with service details of the manufacturer.

Branch Control Valves, Thermostatically-Controlled (Optional)

Furnish and install ....., ... in. motorized branch control valves at points in the branch mains as indicated on the plans. Each control valve is to be automatically operated by a thermostat with (without) clock and manually operated by a snap switch located in the .....

Around each branch control valve install a bypass provided with a lockshield valve. The lockshield valve shall be set so as to permit enough steam to pass to keep the mains and risers warm when the branch control valve is closed.

Piping for MODERATOR Control Equipment

Provide and run a steam line from the steam main to the control panel; a steam line from the nearest supply riser to the roof thermostat. Provide and run an air line from the Air Compressor to the roof thermostat; an air line from the roof thermostat to the control panel. Provide and run an oil line from the oil pump to the control panel; an oil line from the control panel to the main steam control valve. Also suitable overflow oil lines from the control panel and main steam control valve to the oil tank on the pump unit. Provide and run a return line from the control panel to a heating system return carrying both air and water; also a return line from roof thermostat to nearest return riser of the heating system. The size and location of these lines shall be as called for on the plans and in accordance with service details of the manufacturer.

Piping

These paragraphs must be added to Piping Clause under "The System" if Moderator Control equipment is specified.

Where steam is used to generate hot water the supply connection to the hot water generator must be taken off ahead of the main steam control valve.

Where steam is used for indirect heating surfaces (unit heaters, hot blast stacks, etc.), the supply main to this indirect radiation must be taken off ahead of the main steam control valve.

All lifts in vacuum return mains must be avoided and returns so arranged that condensation will flow by gravity to the pump room. Where needed a lift may be installed at the pump.

(The following paragraphs should also be included if intermediate orifices are specified.)

All branch mains shall be provided with flanges where connection is taken from the main so that intermediate orifice plates may be installed in a manner to be accessible.

A flanged union is to be installed on each lateral from steam main to riser to provide for accessible installation of intermediate orifice plates.

(*Include for up-feed risers*)

The connections from mains to risers are to be graded in direction of flow and the base of each riser must be dripped through a Webster Trap of size and type shown on the plans and as called for by service details of the manufacturer.

CONCLUSION

Painting

Note: *Here specify that portion of the installation to be painted by the Heating Contractor. Under certain conditions it may also be advisable to list or describe here items to be painted by the Painting Contractor.*

Covering

Note: *If other than a jacketed boiler is used then specify here covering for the boiler and also covering for pipes, tanks, traps, breeching, etc., as may be required.*

Test and Cleaning Boiler and System

When the work embodied in these specifications has been completed but before covering is applied the entire system shall be tested at a pressure of ten pounds per sq. in. and condensation wasted to drain for first two days to rid system of dirt, grease, oil, etc. Cold water is to be fed into boiler to prevent breakage while condensation is being wasted.

After the system has been made tight at this pressure, the boiler shall be cleaned in the following manner:

The safety valve shall be removed and a quantity of washing soda placed inside of boiler and the safety valve replaced. Run temporary valved overflow line to waste from main header drop and from drips at ends of supply mains. Start a moderate fire so that the foaming of the boiler will cause flow of oil and grease to waste through these drip lines, at the same time feeding the boiler with water to prevent injury to same. The washing out process should be continued until the water line in boiler remains steady. After the boiler has been cleaned the drips to waste can be removed and the system put into regular operation. If more oil from the mains washes back to the boiler at a future date, the cleaning out process should be repeated.

All fuel for making test and cleaning out system shall be furnished by the Heating Contractor.

Guarantee

The Heating Contractor shall guarantee all apparatus and equipment, in addition to the guarantee of the manufacturer, for a period of one (1) year from date of acceptance and shall make good any defect of material or workmanship occurring during that period, without expense to the owner.

WARREN WEBSTER & COMPANY
Camden New Jersey

THERMOLIER

A GRINNELL DEVELOPMENT IN UNIT HEATERS

FOUNDED 1850

GRINNELL COMPANY
INC.

GRINNELL COMPANY, INC.

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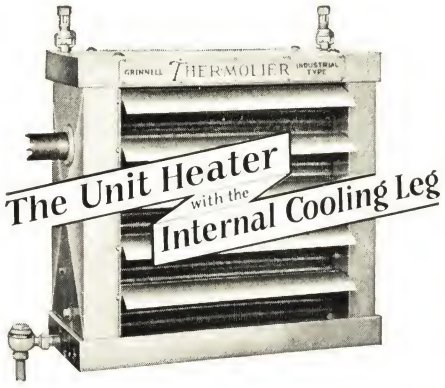
THERMOLIER

A development based upon 50 years' experience in heating. Thermolier has fourteen outstanding features, dictated by practical engineering knowledge.

● Underlying Principles

The old method of heating industrial and commercial buildings by pipe coils and cast iron radiation fails to secure ideal, uniform comfort on cold days and mild days, with just the heat you want, when and where you want it. The new method of unit heating meets these desired ends in a revolutionary manner and at much less cost than automatic controls on steam systems or careful central control on hot water systems.



Unit heating produces a large amount of heat in a small amount of space and distributes this heat by rapid air circulation. Steam or hot water is always in the radiating elements, so the amount of heat diffused depends entirely on whether or not the fan is running. It further provides almost instantaneous heat.

● Economy

The principle of unit heating is so revolutionary that it successfully meets all five basic elements which go to make up heating cost.

These determining factors in the choice of all heating equipments are:

1. Minimum Initial Investment
2. Minimum Expense of Operation
3. Minimum Maintenance
4. Minimum Depreciation
5. Maximum Adaptability

● Installation

As compared with direct steam a unit heater system requires only one-eighth the number of valves, traps and accessories.

Requires only one-eighth the number of elbows, tees, unions and other fittings.

Requires only one-fifth the amount of pipe for supply and return lines.

Requires only one-fifteenth of the weight in radiating elements.

● A More Efficient and Rugged Unit

In the Thermolier, GRINNELL COMPANY, INC., believes it is offering a development of unit heaters so ruggedly built and so conservatively engineered as to make this revolutionary heater principle more effective, and of wider practical application.

A unit weighing approximately 200 lbs. does the work of more than 5000 lbs. of cast iron radiation and occupies a space of less than 8 cu. ft. Being hung from ceilings, columns or beams, it adds to the comfort of operators, and uses no space needed for machinery and equipment.

● Types and Models

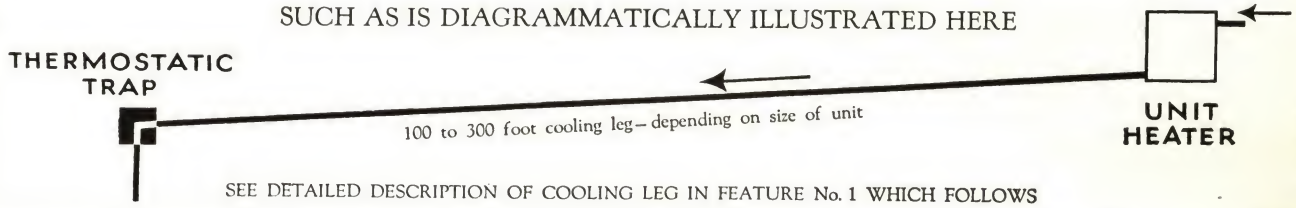
Thermolier is made in 16 models (or capacities). The Industrial Type is encased in a polished copper housing. The Factory Type is encased in a housing of steel and is finished in gray duco.

Thermoliers are made in regular and "A" models (the latter being a unit of less heating surface and lower final temperature).

THE INTERNAL COOLING LEG DISTINGUISHES THERMOLIER FROM ALL OTHER UNIT HEATERS

The importance of this feature can not be over-emphasized. It takes the place of from 100 to 300 feet of external cooling leg piping, according to size of Thermolier, and thus allows the use of a Thermostatic trap attached to the unit. No other unit heater has this patented Grinnell feature.

THE THERMOLIER INTERNAL COOLING LEG ACCOMPLISHES A RESULT SUCH AS IS DIAGRAMMATICALLY ILLUSTRATED HERE



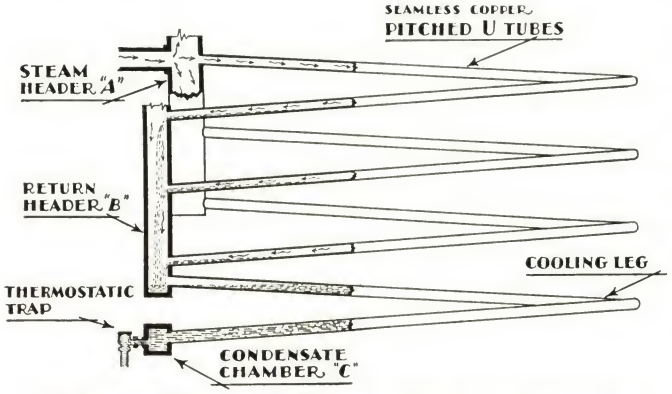
SEE DETAILED DESCRIPTION OF COOLING LEG IN FEATURE No. 1 WHICH FOLLOWS

THE "14" FEATURES WHICH 50 YEARS' HEATING EXPERIENCE BUILT INTO THERMOLIER

1 *A Cooling Leg feature so simple, practical, and valuable that engineers and contractors alike realize its importance.*

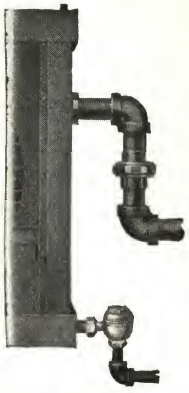
Unique Header Construction

Steam is delivered into chamber "A" of the header and circulates from there through the pitched U tubes, carrying its condensation with it into chamber "B." By partitioning off the lower tubes at the bottom of the steam supply chamber "A," these tubes carry all condensation from chamber "B" into drain chamber "C." In passage of this condensation through these tubes, the air from the fan is rapidly carrying off heat just as it does in the rest of the unit. The result is that these lower tubes form an efficient internal cooling leg, integral with the unit. The actual cooling effect of this construction is equal to a run of more than 100 ft. of the ordinary, exterior cooling leg piping.



This Drawing Illustrates the Function of the Internal Cooling Leg

2 Due to the efficient functioning of the internal cooling leg, it is practical with the Grinnell Thermolier to make an exceedingly close connection of the return trap, namely, to attach a thermostatic trap directly to the return outlet of the Unit, as indicated in the accompanying illustration.



Simple Piping Connections

The condensation coming from the unit is cool enough so that a thermostatic trap can be used, which operates continuously even when the unit is working at maximum capacity for long periods.

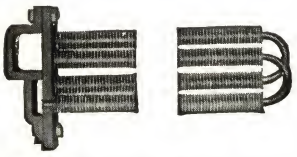
This feature, combined with the fact that the steam supply connection is at the same end of the unit, makes for compactness and neatness in the piping connections and effects important economies both in labor and materials.

3 These "Adjustable Swivel Couplings," here illustrated, were developed for hanging Grinnell Thermoliers and are an integral part of each unit. The swivel is loose in the socket, which allows vibration from building or machinery to be taken up in the hanger and not transmitted to the unit.

Easily Adjustable Swivel Socket Hangers

THE "14" THERMOLIER FEATURES

4 This shows cut-through section emphasizing two other practical engineering features. At left is shown gasket bearing surface into which is heavily bolted a gasket of the very materials used in steam piping work for the highest pressures and temperatures.

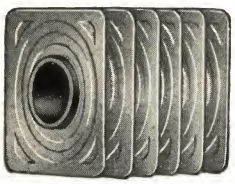


Perfect Expansion Bends Take Up All Strains

At right are shown the perfect expansion bends—a part of every tube.

These bends absorb contraction and expansion strains.

5 The steam container is made of ⅜-in. seamless copper tubing, which under actual bursting tests has withstood an internal pressure of 9500 lbs. Stamped fins ⅞-in. square, slightly corrugated for stiffness, are attached uniformly to this tubing.



⅜-in. Seamless Copper Tubing—Brass Fins

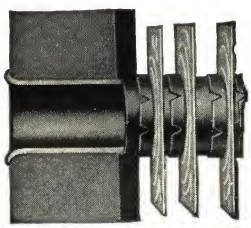
Square brass fins provide 24% more area than round fins occupying the same space.

This accounts for the large amount of heat obtained from the small frontal area of Thermolier.

6 No solder whatever is used for strength in Thermolier assembly. The deep, tight fitting collars on the fins provide ample support and large metal contacts for rapid heat transfer from tubes to fins. (See cut under No. 8.)

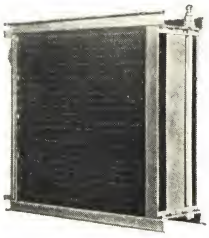
7 Of the total heating surface, 89% is provided in *vertical* fins, which will not catch or hold dirt. The remaining 11% of the heating surface consists of the round, horizontal tubes. Only a small area at the top of the tubes could conceivably catch dirt. There is absolutely no flat horizontal surface in the unit.

8 Each tube in the Grinnell Thermolier is expanded into a cast iron tube sheet ½-in. thick, the finished job being practically a rolled joint. Obviously with this construction the steam pressures which the heating element of Thermolier will withstand is limited only by the weight of the cast iron header. The standard unit is built for 125 lbs. working steam pressure.



Tubes Expanded Into Cast Iron Tube Sheet

9 The pitch of each tube is not less than $\frac{3}{16}$ in. per ft., which provides perfect and rapid drainage of condensation, thus increasing heating efficiency and doing away with the possibility of noisy and destructive water hammer on account of accumulated condensation.



Frame with Hanger

10 Thermolier is constructed with great ruggedness. In addition to the rugged framework, two heavy hanger rods extend through and become an integral part of the completed frame.

11 Thermoliers may be hung by more than a dozen methods through the use of Grinnell Adjustable Hangers in connection with the Adjustable Swivel Couplings used on Thermolier. Grinnell shows in its Hanger Catalogue the full line of adjustable hangers.

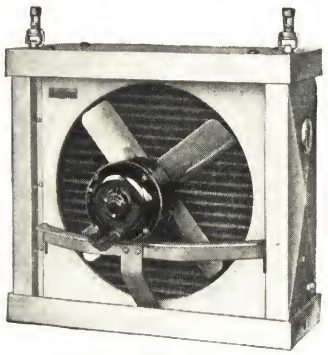
12 The louvers are made of heavy pure copper for Industrial Type, or heavy steel finished in gray duco for Factory Type. Each louver may be adjusted independently of the other, and may be set permanently into place, simply by tightening the brass nuts.

Independently Adjustable Louvers

13 Thermolier has a motor fully enclosed to keep out dirt and moisture. It is equipped with ball bearings to reduce maintenance and upkeep. Motor is especially wound to provide high efficiency and a high power factor.

The direct-connected fan has a heavy hub and aluminum blades. The mounting for motor and fan is a heavy angle iron frame, reinforced by a sturdy, supporting leg. (See cut under No. 14.)

14 Rear view of Industrial Type Unit showing how the copper housing covers the whole unit, protecting the heavy steel framework from moisture. Factory Type Unit has a steel housing of neat appearance finished in gray duco.



Copper Housing

The fourteen features illustrated and briefly described are vital and important only when built into a working unit by a company of unquestioned integrity and responsibility. Of greater significance even than these features is the fact that Thermolier is sponsored by Grinnell Company, with its half century of heating experience and its reputation as one of the country's leading manufacturers and distributors of cast iron fittings, adjustable pipe hangers, fabricated piping, and general piping supplies.

TYPES, MODELS AND DIMENSIONS

Industrial Type

Sixteen Models (See Dimension Table).

Available with polished copper or chrome plated housing. Velocity nozzles have same finish. Suitable for use in mercantile buildings, manufacturing buildings, factory offices, stores, etc., where the best in appearance is desired.

Thermolier without Housing is available in all model numbers as listed below. Usually used to build into special housing, duct or wall.

Thermolier—Industrial Type

LIST PRICES

Model No.	100 200	100A 200A	300 400	300A 400A
Copper housing	$100	$ 90	$150	$135
Chrome plated	110	100	160	145

Model No.	600 800	600A 800A	1200 1600	1200A 1600A
Copper housing	$200	$180	$385	$345
Chrome plated	215	195	405	365

Portable Type

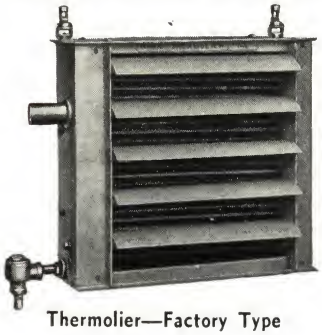
Portable Type in steel cage on swivel rollers is available in Model 800 only.

List price, $260.00; approximate net weight, 360 lb.; shipping weight, 485 lb.

Factory Type

Sixteen Models (See List Price Table).

Available with steel housing, gray Duco finish. Slightly less expensive than copper housing unit and for use where appearance is not of paramount importance. Velocity nozzles have same finish. All essential dimensions are same as listed for Industrial Type in table below.



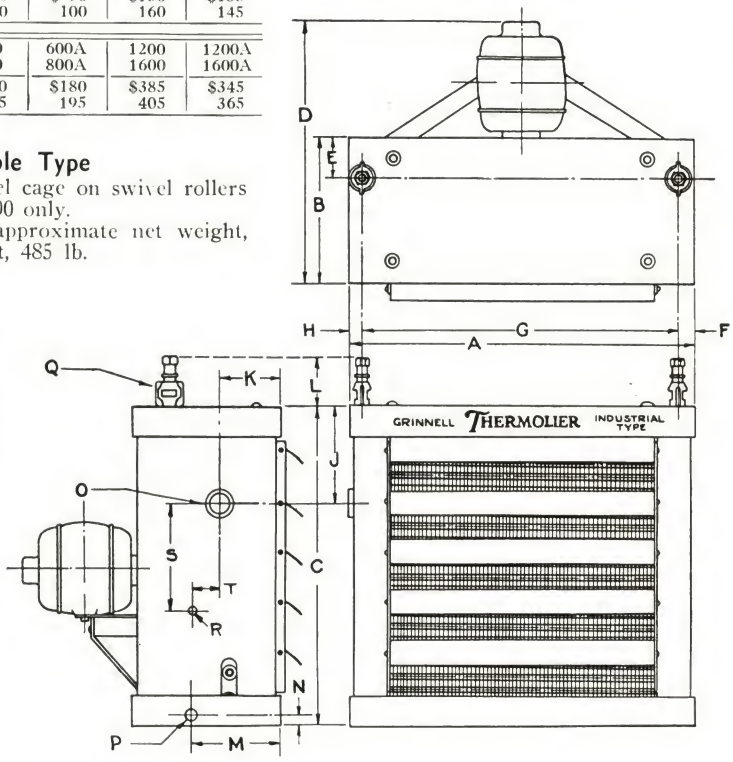
Thermolier—Factory Type

LIST PRICES*

Model No.	Price
100 —200	$ 94
100A—200A	84
300 —400	142
300A—400A	127
600 —800	190
600A—800A	170
1200 —1600	365
1200A—1600A	325

*Steel housing.

125 Lbs. Maximum Working Steam Pressure



DIMENSIONS AND WEIGHTS OF INDUSTRIAL TYPE

Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	O Supply	P Return	Q	R	S	T	No. of Louvers	Weight, lb. Net	Weight, lb. Ship.
100, 100A, 200, 200A	14 1/4	8 1/2	11 3/4	*15	2 3/16	15/16	12 5/8	11/16	2 3/4	3 1/4	2 5/8	5 11/16	13/16	1 1/4	1/2	†3/8	3/8	4 1/2	2 1/16	4	55	70
300, 300A, 400, 400A	21 1/8	10 7/16	18 7/16	*17	2 15/16	1	19 1/8	1	3 3/4	4 1/16	3 1/8	6 5/8	13/16	1 1/2	3/4	†1/2	3/8	7 3/16	2 3/8	4	105	130
600, 600A, 800, 800A	27 3/4	11 7/8	25 1/2	*21	3 7/8	1 11/16	24 7/8	1 3/16	7 5/8	4 7/8	4	6 7/8	1 1/16	2	‡1	†5/8	3/8	10 7/8	2	5	190	250
1200, 1200A 1600, 1600A	36 1/2	12 3/4	32 5/8	*25	4 1/4	1 1/2	33 11/16	1 1/4	9 7/16	5 3/16	5 7/16	6 7/8	1 1/4	2 1/2	‡1 1/4	†7/8	3/8	12 5/8	1 3/4	6	400	550

All dimensions given in inches. Air vent "R" is tapped 3/8 in., but can be bushed as required. *This dimension varies slightly with different motors. †Adjustable swivel coupling (furnished with Thermolier) tapped standard bolt thread. ‡Outlets bushed to pipe size next smaller than indicated in table.

CONTROLLING THERMOLIER UNITS

● Manual Control

D-C. up to 440 Volts or Single Phase A-C. up to 220 Volts. Three Phase A-C. up to 550 Volts.

It is usually preferable to have special circuits controlling the Units only.

As many Thermoliers as desired may be connected into one manually controlled circuit. It is, however, recommended that at least each room or section be on a separate circuit.

● Automatic Control

The number of units to be controlled by a single Thermostat, either directly or with Automatic Starter or Magnetic Switch, should be governed by conditions in the area to be heated.

Typical Wiring Diagrams with explanatory notes are included in the Thermolier Data Book, copy of which will be mailed on request.

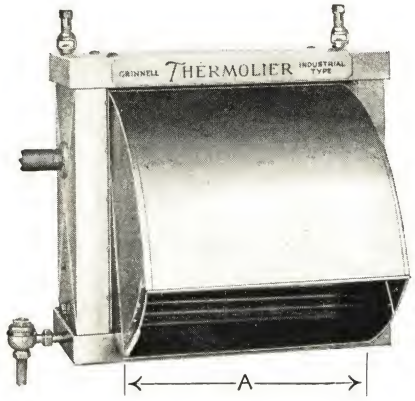
● Duotherm Control

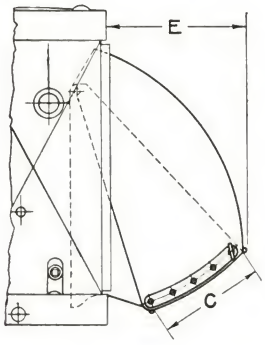
The Grinnell Duotherm Control is a device for regulating room temperatures where unit heating systems are installed. A high temperature is automatically maintained when required, and a low temperature during idle hours such as at night and on holidays. This wide range of high and low temperatures cannot be secured by the ordinary single thermostat control. Bulletin No. A-3 giving a detailed analysis of the economies to be had by its use, will be mailed upon request.

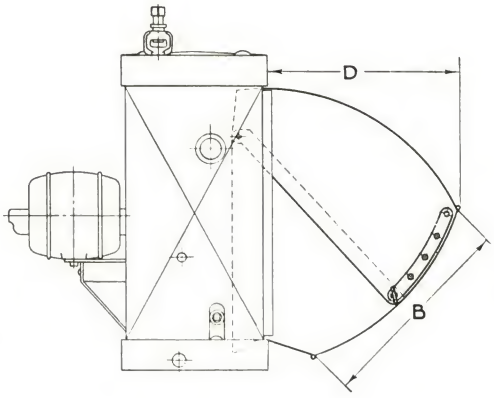
● Remote Control

The most important economies to be gained by its use are in the remote control of temperatures throughout large plants. When so used, the temperatures throughout the whole plant are under the control of one responsible individual in the boiler room or any other convenient place.

APPLICATION OF VELOCITY NOZZLE TO THERMOLIER







LIST PRICES AND DIMENSIONS

Thermolier Model No.	100—100A 200—200A	300—300A 400—400A	600—600A 800—800A	1200—1200A 1600—1600A
*List price—velocity nozzle only—Copper	$12.00	$12.00	$15.00	$25.00
—Chrome plated	15.00	15.00	20.00	32.00
—Steel duco finish	8.00	8.00	10.00	15.00
*Note.—List prices shown include adjustment for omission of louvers.				
A Length of discharge opening	9¼ in.	14¾ in.	20¾ in.	28 in.
B Maximum width of discharge opening	8⅜ in.	12¾ in.	16 15/16 in.	23 in.
C Minimum width of discharge opening	3⅞ in.	6¾ in.	8 7/16 in.	10½ in.
D Maximum overhang	7 in.	11 in.	15¼ in.	22½ in.
E Minimum overhang	5½ in.	8 in.	10¾ in.	14½ in.

VELOCITY NOZZLE EFFECT PERCENTAGES

	Normal capacities without velocity nozzle—5 Lb. steam—60° air			Capacities with velocity nozzles											
				Percentage of normal B. T. U. delivery with different openings of nozzle						Percentage of normal discharge velocity with different openings of nozzle					
Model	B. T. U. per hr.	Discharge opening	Discharge velocity	Smallest	2nd	3rd	4th	5th	Largest	Smallest	2nd	3rd	4th	5th	Largest
200	32,900	.58 Sq. Ft.	655 F.P.M.	82%	93%	96%	98%	.....	.....	188%	160%	136%	122%	.....	.....
400	110,800	1.53 Sq. Ft.	949 F.P.M.	76%	86%	92%	96%	.....	.....	180%	146%	124%	112%	.....	.....
800	199,100	2.95 Sq. Ft.	773 F.P.M.	85%	92%	96%	98%	99%	.....	202%	168%	142%	127%	114%	.....
1600	388,000	5.25 Sq. Ft.	923 F.P.M.	85%	90%	93%	96%	97%	99%	186%	166%	146%	128%	118%	109%

FURTHER DATA AND INFORMATION

Capacity Tables

Complete in the Thermolier Data Book which will be sent on request, or by telephoning our nearest branch office.

Electric Wiring Diagrams

Manual, Automatic and Duotherm Control, with descriptions and list prices, are in our Thermolier Data Book.

Motor Specifications

Send for Thermolier Data Book for Ratings, Brake H.P., Speed and Prices of Stock Motors (constant speed). Also for characteristics and models of multi-speed motors for special orders.

Piping Materials

Typical connections (see page 10)

For Schedules of Materials write or telephone nearest Grinnell office for Thermolier Data Book.

Adjustable Hangers

Detailed schedules for ordering are given in the Thermolier Data Book. See also Grinnell Pipe Hanger Catalogue in this edition of SWEET'S ARCHITECTURAL CATALOGUES for Figs. No. 225, 226, 154, 155, 281, 202.

CAPACITY TABLES FOR MODELS 100-100A-200-200A

*See Note below

Model 100

C.F.M. (70° Vol.) 221 at 60° F. Entering Air Temperature

Motor: R.P.M., 1150 Brake H.P., .01

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	39,700	119	41	41,000	125	43	47,400	148	51	59,300	190	67
0	35,100	129	36	36,400	134	38	42,800	158	46	54,200	200	62
20	30,800	139	32	32,100	144	34	38,400	167	42	49,400	210	56
40	26,900	148	28	28,200	153	29	34,200	177	37	44,900	220	51
60	23,200	157	24	24,500	162	26	30,300	186	33	40,700	230	46
70	21,400	161	22	22,700	166	24	28,400	191	31	38,700	234	44
80	19,700	165	20	21,000	171	22	26,600	195	29	36,700	239	42
100	16,500	174	17	17,700	179	18	23,100	204	25	33,000	248	37
120	13,300	182	14	14,500	187	15	19,700	212	21	29,400	257	33
	†Air delivery, 257. ‡Air velocity, 437.			†Air delivery, 260. ‡Air velocity, 441.			†Air delivery, 269. ‡Air velocity, 458.			†Air delivery, 288. ‡Air velocity, 488.		

Model 100A

C.F.M. (70° Vol.) 261 at 60° F. Entering Air Temperature

Motor: R.P.M., 1150 Brake H.P., .01

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	28,900	67	30	29,900	74	31	34,500	84	37	43,000	109	49
0	25,600	80	26	26,600	83	28	31,200	98	34	39,800	124	45
20	22,400	94	23	23,500	97	25	28,100	112	30	36,400	139	41
40	19,900	107	20	20,700	110	22	25,000	125	27	33,200	153	38
60	17,200	121	18	18,000	124	19	22,200	139	24	30,100	167	34
70	15,900	127	16	16,700	130	17	20,900	146	23	28,700	173	32
80	14,600	133	15	15,400	137	16	19,600	152	21	27,200	180	31
100	12,200	146	13	13,000	149	14	17,100	165	19	24,600	193	28
120	9,800	159	10	10,700	162	11	14,700	178	16	22,000	207	25
	†Air delivery, 286. ‡Air velocity, 485.			†Air delivery, 288. ‡Air velocity, 488.			†Air delivery, 295. ‡Air velocity, 500.			†Air delivery, 309. ‡Air velocity, 524.		

Model 200

C.F.M. (70° Vol.) 335 at 60° F. Entering Air Temperature

Motor: R.P.M., 1750 Brake H.P., .03

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	52,200	105	55	54,300	107	57	63,100	128	68	78,700	164	90
0	46,700	114	48	49,600	118	51	57,100	139	62	72,300	176	82
20	41,300	125	43	43,100	129	45	51,300	150	56	66,100	187	75
40	36,100	136	37	37,900	140	39	45,900	161	50	60,200	199	69
60	31,200	146	32	32,900	150	34	40,700	172	44	54,700	211	62
70	28,900	152	30	30,500	156	32	38,300	177	41	52,100	216	59
80	26,600	156	28	28,200	161	29	36,000	182	39	49,500	222	58
100	22,200	166	23	23,700	171	25	31,300	192	34	44,500	232	51
120	18,000	175	19	19,400	180	20	26,900	202	29	39,800	242	45
	†Air delivery, 383. ‡Air velocity, 650.			†Air delivery, 386. ‡Air velocity, 655.			†Air delivery, 400. ‡Air velocity, 678.			†Air delivery, 424. ‡Air velocity, 720.		

Model 200A

C.F.M. (70° Vol.) 408 at 60° F. Entering Air Temperature

Motor: R.P.M., 1750 Brake H.P., .03

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	37,600	52	39	39,000	55	40	44,300	66	49	57,700	86	63
0	33,600	67	35	34,900	70	36	40,900	82	44	51,500	103	59
20	29,800	82	31	31,000	85	32	37,900	97	40	47,500	119	54
40	26,200	97	27	27,400	100	29	33,300	112	36	43,600	135	50
60	22,700	111	23	24,000	114	25	29,600	127	32	39,900	150	45
70	21,100	119	22	22,300	121	23	28,000	134	30	38,000	158	43
80	19,400	126	20	20,600	129	22	26,200	142	28	36,200	165	41
100	16,300	140	17	17,500	143	18	22,800	156	25	32,500	179	37
120	13,200	153	14	14,400	156	15	19,500	170	21	29,200	194	33
	†Air delivery, 440. ‡Air velocity, 746.			†Air delivery, 442. ‡Air velocity, 749.			†Air delivery, 452. ‡Air velocity, 766.			†Air delivery, 469. ‡Air velocity, 796.		

*Data sheets covering all working pressures are available upon request.
The Grinnell Thermolier is tested and rated in accordance with rules of the Industrial Unit Heater Manufacturers Association adopted Jan. 1930.
†Air delivery in cu. ft. per min. based on 60° F. entering air temperature.
‡Air velocity at exit in linear ft. per min. based on 60° F. entering air temperature and taken with louvers in wide open position; with louvers in 45° position, velocity increases approximately 18%.
Maximum working steam pressure, 125 lb.

CAPACITY TABLES FOR MODELS 300-300A-400-400A

*See Note Below

Model 300

C.F.M. (70° Vol.) 817 at 60° F. Entering Air Temperature

Motor: R.P.M., 1150 Brake H.P., .04

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	132,000	107	149	136,900	112	142	158,200	133	172	208,200	170	226
0	117,800	118	122	122,500	122	128	143,600	144	156	182,000	181	207
20	103,600	128	108	108,100	133	113	129,000	154	140	165,800	193	189
40	90,100	138	94	95,000	143	99	115,000	164	125	150,800	204	172
60	77,700	148	81	82,300	153	86	101,900	175	110	136,500	215	155
70	71,900	153	74	76,100	158	80	95,500	180	103	130,000	220	147
80	66,000	158	68	70,400	163	74	89,400	185	97	123,200	225	140
100	55,500	167	57	59,000	172	62	77,900	194	84	110,500	234	126
120	44,400	176	46	48,600	181	51	66,500	204	72	98,700	244	112
	†Air delivery, 938. ‡Air velocity, 620.			†Air delivery, 945. ‡Air velocity, 625.			†Air delivery, 978. ‡Air velocity, 647.			†Air delivery, 1039. ‡Air velocity, 687.		

Model 300A

C.F.M. (70° Vol.) 954 at 60° F. Entering Air Temperature

Motor: R.P.M., 1150 Brake H.P., .04

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	90,500	54	93	93,600	57	98	108,000	69	117	136,000	92	155
0	80,500	69	83	84,000	72	87	98,500	84	106	125,000	107	142
20	70,500	83	74	74,500	86	78	88,500	99	96	114,200	122	130
40	61,500	98	65	65,400	101	68	79,000	114	86	104,000	137	118
60	53,300	112	56	56,900	115	59	70,000	128	76	94,600	151	107
70	49,200	119	52	52,900	122	55	66,000	135	72	90,000	159	102
80	45,500	126	47	48,800	129	51	61,500	142	67	85,500	166	97
100	38,100	140	40	41,200	143	43	54,000	157	58	76,800	180	88
120	31,000	154	32	34,000	153	35	46,500	170	50	68,800	194	78
	†Air delivery, 1030. ‡Air velocity, 682.			†Air delivery, 1035. ‡Air velocity, 685.			†Air delivery, 1057. ‡Air velocity, 701.			†Air delivery, 1100. ‡Air velocity, 728.		

Model 400

C.F.M. (70° Vol.) 1267 at 60° F. Entering Air Temperature

Motor: R.P.M., 1750 Brake H.P., .16

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	171,800	86	177	177,900	90	185	207,000	108	225	258,000	141	293
0	154,500	99	160	160,600	103	167	189,000	121	204	239,000	154	272
20	137,200	112	142	143,300	116	149	171,000	135	185	220,000	168	250
40	120,600	124	125	127,000	129	132	153,000	147	166	201,400	181	229
60	104,800	137	108	110,800	141	115	136,500	160	148	183,600	194	209
70	97,400	142	100	103,000	147	107	128,600	166	139	175,100	200	199
80	89,600	148	93	95,100	152	99	120,900	172	131	167,000	206	190
100	75,000	159	78	80,100	164	84	106,500	183	115	150,600	218	171
120	60,000	170	63	66,100	174	69	92,300	194	99	135,000	230	153
	†Air delivery, 1424. ‡Air velocity, 942.			†Air delivery, 1436. ‡Air velocity, 949.			†Air delivery, 1481. ‡Air velocity, 980.			†Air delivery, 1563. ‡Air velocity, 1033.		

Model 400A

C.F.M. (70° Vol.) 1475 at 60° F. Entering Air Temperature

Motor: R.P.M., 1750 Brake H.P., .16

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	113,600	41	118	117,000	43	122	136,500	52	148	170,500	71	193
0	102,000	56	106	106,100	59	111	124,700	69	135	158,000	87	179
20	90,700	72	94	94,700	75	99	113,000	85	122	145,500	104	165
40	79,700	88	83	83,700	91	88	101,700	101	110	133,600	120	152
60	69,400	104	72	73,400	106	77	91,000	117	98	122,100	136	139
70	64,500	111	67	68,400	114	72	85,700	125	93	116,500	145	133
80	59,600	119	62	63,500	121	66	80,500	132	87	111,000	152	126
100	50,000	134	52	53,900	136	56	70,600	148	77	100,500	168	115
120	41,000	148	42	44,700	151	46	61,000	162	66	90,500	183	103
	†Air delivery, 1566. ‡Air velocity, 1039.			†Air delivery, 1574. ‡Air velocity, 1043.			†Air delivery, 1606. ‡Air velocity, 1064.			† Air delivery, 1661. ‡Air velocity, 1099.		

*Data sheets covering all working pressures are available upon request.
The Grinnell Thermolier is tested and rated in accordance with rules of the Industrial Unit Heater Manufacturers Association adopted Jan. 1930.
†Air delivery in cu. ft. per min. based on 60° F. entering air temperature.
‡Air velocity at exit in linear ft. per min. based on 60° F. entering air temperature and taken with louvers in wide open position; with louvers in 45° position, velocity increases approximately 35%.
Maximum working steam pressure, 125 lb.

CAPACITY TABLES FOR MODELS 600-600A-800-800A

*See Note below

Model 600

C.F.M. (70° Vol.) 1475 at 60° F. Entering Air Temperature

Motor: R.P.M., 850 Brake H.P., .09

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	248,000	112	256	257,000	117	267	297,500	139	323	372,000	178	424
0	223,000	122	231	231,400	127	240	270,000	149	293	342,000	189	389
20	197,300	132	204	205,800	138	215	242,500	160	263	312,000	200	355
40	174,100	142	180	182,400	147	190	216,000	170	234	284,000	211	323
60	151,600	152	156	159,500	157	166	191,000	180	207	257,000	221	292
70	138,900	156	144	147,100	161	154	179,000	184	194	244,000	226	278
80	126,500	161	132	134,800	166	140	167,500	189	182	232,000	231	264
100	104,500	170	109	112,600	175	117	146,000	198	158	208,000	240	237
120	84,000	179	88	91,500	184	96	125,000	207	136	186,000	250	212
	†Air delivery, 1702. ‡Air velocity, 569.			†Air delivery, 1717. ‡Air velocity, 574.			†Air delivery, 1780. ‡Air velocity, 595.			†Air delivery, 1895. ‡Air velocity, 633.		

Model 600A

C.F.M. (70° Vol.) 1722 at 60° F. Entering Air Temperature

Motor: R.P.M., 850 Brake H.P., .09

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	163,500	55	169	169,500	57	176	197,000	70	214	245,000	92	278
0	147,000	70	152	153,000	72	159	180,000	85	195	227,000	108	258
20	130,500	85	136	136,500	87	142	163,000	100	176	209,000	123	238
40	115,000	99	120	121,000	102	126	146,000	115	158	191,500	139	219
60	100,000	113	104	105,000	116	110	130,500	130	141	175,000	154	200
70	92,500	121	96	98,000	123	103	123,000	137	133	167,000	161	191
80	85,500	128	89	90,500	131	95	115,500	144	125	159,500	169	182
100	72,000	142	75	77,000	144	81	101,500	158	110	145,000	183	165
120	59,000	156	61	63,000	158	67	88,500	173	95	131,000	198	149
	†Air delivery, 1860. ‡Air velocity, 623.			†Air delivery, 1872. ‡Air velocity, 626.			†Air delivery, 1917. ‡Air velocity, 641.			†Air delivery, 1995. ‡Air velocity, 667.		

Model 800

C.F.M. (70° Vol.) 2016 at 60° F. Entering Air Temperature

Motor: R.P.M., 1150 Brake H.P., .22

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	306,500	100	315	317,000	104	330	368,500	124	399	460,500	159	523
0	276,100	111	285	282,200	115	299	335,000	136	363	424,500	172	482
20	245,900	122	255	257,000	127	267	301,500	147	326	388,500	184	441
40	216,200	133	224	227,100	138	237	269,000	158	292	354,000	196	402
60	189,200	144	196	199,100	148	207	238,500	169	259	321,000	207	365
70	173,500	149	180	183,800	154	192	224,000	175	243	306,000	212	347
80	158,800	154	164	168,600	159	176	210,000	180	228	290,500	218	330
100	130,700	164	135	141,200	169	147	183,000	190	198	261,000	229	297
120	104,500	174	109	114,500	178	119	157,000	200	170	233,000	239	265
	†Air delivery, 2298. ‡Air velocity, 768.			†Air delivery, 2315. ‡Air velocity, 773.			†Air delivery, 2393. ‡Air velocity, 800.			†Air delivery, 2535. ‡Air velocity, 847.		

Model 800A

C.F.M. (70° Vol.) 2312 at 60° F. Entering Air Temperature

Motor: R.P.M., 1150 Brake H.P., .22

Temp. of entering air, °F.	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
—20	194,000	46	201	201,500	48	210	233,500	60	254	293,000	79	332
0	174,000	61	180	181,000	64	189	212,500	75	231	270,000	95	306
20	154,000	77	160	160,500	79	167	191,500	91	208	247,000	111	281
40	135,000	92	140	141,500	95	147	172,000	106	186	225,500	127	257
60	117,000	107	121	123,000	110	129	153,000	121	166	205,000	142	234
70	108,500	114	112	115,000	117	120	144,000	129	156	196,000	150	223
80	100,000	122	104	106,500	124	111	135,000	136	146	187,000	158	212
100	83,500	136	87	90,000	139	94	118,000	151	128	168,500	173	191
120	68,000	151	71	74,500	153	78	102,000	165	111	152,000	188	172
	†Air delivery, 2472. ‡Air velocity, 827.			†Air delivery, 2484. ‡Air velocity, 831.			†Air delivery, 2534. ‡Air velocity, 848.			†Air delivery, 2628. ‡Air velocity, 879.		

*Data sheets covering all working pressures available upon request.
The Grinnell Thermolier is tested and rated in accordance with rules of the Industrial Unit Heater Manufacturers Association adopted Jan. 1930.
†Air delivery in cu. ft. per min. based on 60° F. entering air temperature.
‡Air velocity at exit in linear ft. per min. based on 60° F. entering air temperature and taken with louvers in wide open position; with louvers in 45° position, velocity increases approximately 35%.
Maximum working steam pressure, 125 lb.

CAPACITY TABLES FOR MODELS 1200-1200A-1600-1600A

*See Note below

Model 1200

C.F.M. (70° Vol.) 3075 at 60° F. Entering Air Temperature

Motor: R.P.M., 850 Brake H.P., .27

Temp. of entering air, °F.	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
—20	500,000	107	517	517,000	112	540	601,000	133	651	753,000	171	854
0	445,000	118	461	463,000	123	483	544,000	144	589	690,000	182	783
20	390,000	129	405	409,000	133	426	487,000	155	527	627,000	193	712
40	340,000	139	352	358,000	143	373	433,000	165	470	569,000	205	647
60	294,000	148	304	311,000	153	324	384,000	175	416	516,000	215	586
70	272,000	153	281	289,000	158	301	360,000	180	390	491,000	220	558
80	251,000	158	258	267,000	163	278	338,000	185	365	466,000	225	530
100	208,000	168	216	224,000	172	234	294,000	195	317	418,000	235	476
120	169,000	177	175	183,000	182	192	252,000	204	273	374,000	245	426
	†Air delivery, 3528. ‡Air velocity, 676.			†Air delivery, 3558. ‡Air velocity, 681.			†Air delivery, 3680. ‡Air velocity, 704.			†Air delivery, 3917. ‡Air velocity, 748.		

Model 1200A

C.F.M. (70° Vol.) 3747 at 60° F. Entering Air Temperature

Motor: R.P.M., 850 Brake H.P., .27

Temp. of entering air, °F.	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
—20	324,000	49	335	338,000	51	351	393,000	62	423	488,000	82	553
0	291,000	64	301	304,000	66	316	357,000	77	385	451,000	98	512
20	258,000	79	267	270,000	81	281	321,000	93	347	414,000	114	471
40	226,000	94	235	237,000	96	247	288,000	108	311	378,000	129	430
60	196,000	108	203	207,000	111	215	256,000	123	277	344,000	145	391
70	182,000	116	189	192,000	118	200	241,000	131	261	328,000	152	373
80	167,000	123	174	178,000	126	185	227,000	138	244	313,000	160	354
100	139,000	137	145	150,000	140	156	198,000	152	215	281,000	175	320
120	114,000	151	118	124,000	154	130	170,000	166	184	252,000	189	287
	†Air delivery, 4010. ‡Air velocity, 769.			†Air delivery, 4038. ‡Air velocity, 773.			†Air delivery, 4125. ‡Air velocity, 788.			†Air delivery, 4272. ‡Air velocity, 819.		

Model 1600

C.F.M. (70° Vol.) 4236 at 60° F. Entering Air Temperature

Motor: R.P.M., 1150 Brake H.P., .65

Temp. of entering air, °F.	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
—20	617,000	93	639	633,000	97	661	725,000	117	799	910,000	150	1046
0	552,000	106	570	570,000	110	594	669,000	129	726	843,000	163	965
20	487,000	117	501	507,000	122	527	603,000	141	653	776,000	176	884
40	425,000	129	439	446,000	134	464	540,000	153	584	711,000	189	806
60	368,000	140	379	388,000	145	404	480,000	165	520	646,000	201	732
70	340,000	146	352	360,000	150	376	452,000	170	489	615,000	206	700
80	314,000	151	324	334,000	156	349	423,000	176	459	585,000	212	666
100	263,000	161	272	283,000	166	294	368,000	186	400	526,000	224	600
120	213,000	172	221	232,000	177	242	317,000	197	344	471,000	235	537
	†Air delivery, 4800. ‡Air velocity, 916.			†Air delivery, 4830. ‡Air velocity, 923.			†Air delivery, 4995. ‡Air velocity, 955.			†Air delivery, 5280. ‡Air velocity, 1010.		

Model 1600A

C.F.M. (70° Vol.) 5091 at 60° F. Entering Air Temperature

Motor: R.P.M., 1150 Brake H.P., .65

Temp. of entering air, °F.	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour	Total heat delivered, B.t.u. per hour	Exit air temp., °F.	Condensation, lb. per hour
	Steam Press. 2 Lb. per Sq. In. Gage (219° F.)			Steam Press. 5 Lb. per Sq. In. Gage (228° F.)			Steam Press. 25 Lb. per Sq. In. Gage (267° F.)			Steam Press. 100 Lb. per Sq. In. Gage (338° F.)		
—20	384,000	39	396	395,500	41	411	461,000	51	498	573,000	68	651
0	345,000	55	357	357,500	57	372	421,000	67	455	532,000	85	604
20	306,000	71	318	319,500	73	333	381,000	83	412	491,000	102	557
40	269,000	87	280	281,500	89	294	342,000	99	371	450,000	118	510
60	234,000	103	243	246,000	105	257	305,000	115	331	411,000	134	466
70	216,000	110	225	229,500	113	239	287,000	123	312	392,000	142	445
80	200,000	118	208	213,000	120	221	270,000	131	292	373,000	150	424
100	168,000	133	175	180,000	136	187	237,000	146	256	338,000	166	384
120	137,000	148	142	149,000	150	155	205,000	161	221	303,000	181	345
	†Air delivery, 5400. ‡Air velocity, 1034.			†Air delivery, 5428. ‡Air velocity, 1039.			†Air delivery, 5530. ‡Air velocity, 1058.			†Air delivery, 5705. ‡Air velocity, 1092.		

*Data sheets covering all working pressures are available upon request.
The Grinnell Thermolier is tested and rated in accordance with rules of the Industrial Unit Heater Manufacturers Association adopted Jan. 1930.
†Air delivery in cu. ft. per min. based on 60° F. entering air temperature.
‡Air velocity at exit in linear ft. per min. based on 60° F. entering air temperature and taken with louvers in wide open position; with louvers in 45° position, velocity increases approximately 45%.
Maximum working steam pressure, 125 lb.

TYPICAL CONNECTIONS FOR THERMOLIER

FOR Vacuum or Vented Return Gravity Systems

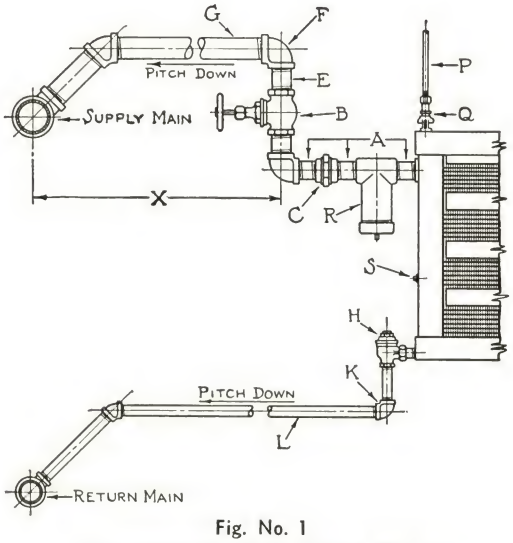


Fig. No. 1
For equipments where distance "X" is *less* than 10 feet

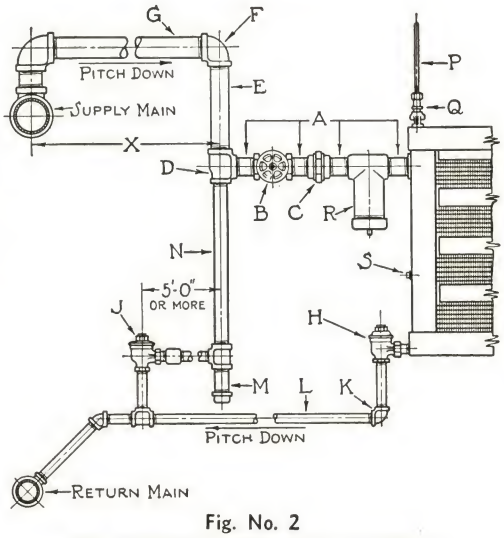


Fig. No. 2
For equipments where distance "X" is *more* than 10 feet

FOR Closed Return Gravity Systems

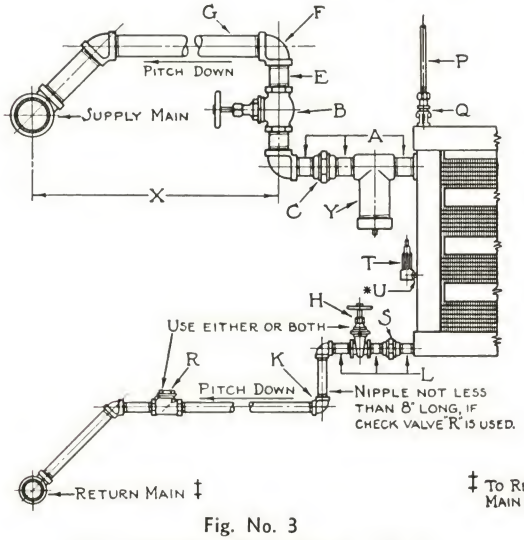


Fig. No. 3
For equipments where distance "X" is *less* than 10 feet

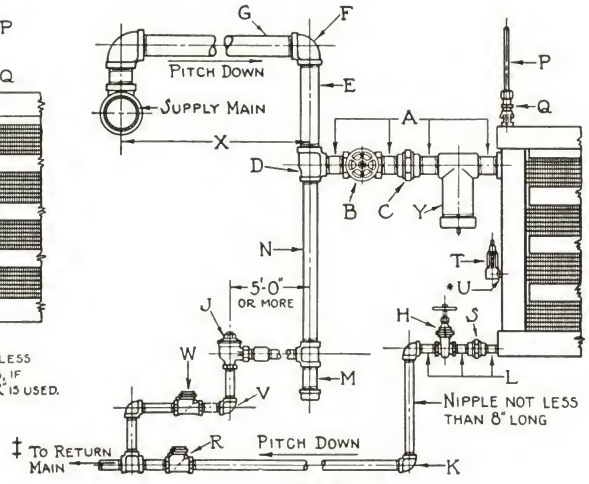
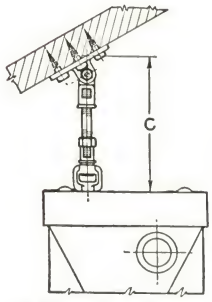


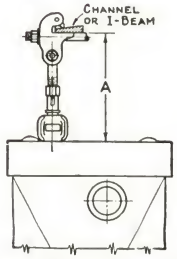
Fig. No. 4
For equipments where distance "X" is *more* than 10 feet

‡*Note:* Return mains or risers must be vented preferably at point where lines drop below water line of boiler.

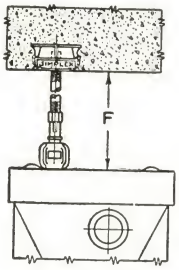
APPLICATION OF GRINNELL ADJUSTABLE HANGERS TO THERMOLIER



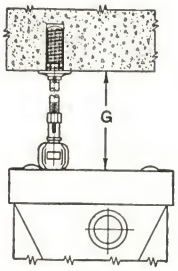
Adjustable Swinging Hanger Flange
*Fig. No. 155



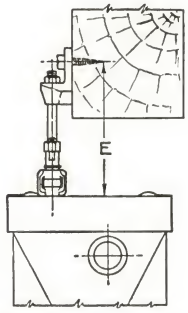
Universal Side I-Beam Clamp
*Fig. No. 225 with extension eye bolt Fig. No. 220



Simplex Insert
*Fig. No. 281



Expansion Case
*Fig. No. 117



Side Beam Bracket
*Fig. No. 202

Catalogue showing complete line of Grinnell Adjustable Hangers, with mechanical drawings and dimensions, sent upon request.

**Figure Numbers here as used in Grinnell Hanger Catalogue*

HERMAN NELSON

HEATING AND VENTILATING EQUIPMENT

THE HERMAN NELSON CORPORATION

Service

The practice of heating and ventilating is an applied science. Each case is an individual engineering problem involving the selection and adaptation of some definite scheme of treatment. Herman Nelson products have always been designed, built and sold as essential elements in a system of heating or ventilating and not as mere equipment. In conformity with this idea, it has been the policy of THE HERMAN NELSON CORPORATION to impress upon purchasers of equipment the advantages of professional service and to co-operate with the architect and engineer in rendering this service.

In line with this policy, we have endeavored to provide the architect and engineer with sufficient information and data to properly adapt the system selected to the project at hand. In this catalogue we have tried to present each Herman Nelson product in such a manner as to enable him to readily grasp its intent, purpose and limitation, and to supply information and data that will enable him to adapt the product to his individual problem in such a manner as to insure best results.

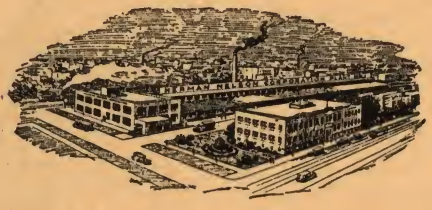
Since heating and ventilating is a profession, it is obviously impossible to cover every phase of the subject. For this reason, we are represented throughout the country by practical trained Engineers who will gladly co-operate in the solution of heating and ventilating problems.

Guarantee

THE HERMAN NELSON CORPORATION products described in this catalogue, which have as their heating element the Herman Nelson Wedge Core Radiator, are guaranteed without reservation against defects in material or construction.

If it is demonstrated that these products will not perform in every way as claimed in this catalogue, the manufacturers will accept their return, pay all transportation charges, and refund every dollar received for them.

THE HERMAN NELSON CORPORATION

Moline  **Illinois**

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The Herman Nelson
WEDGE CORE RADIATOR

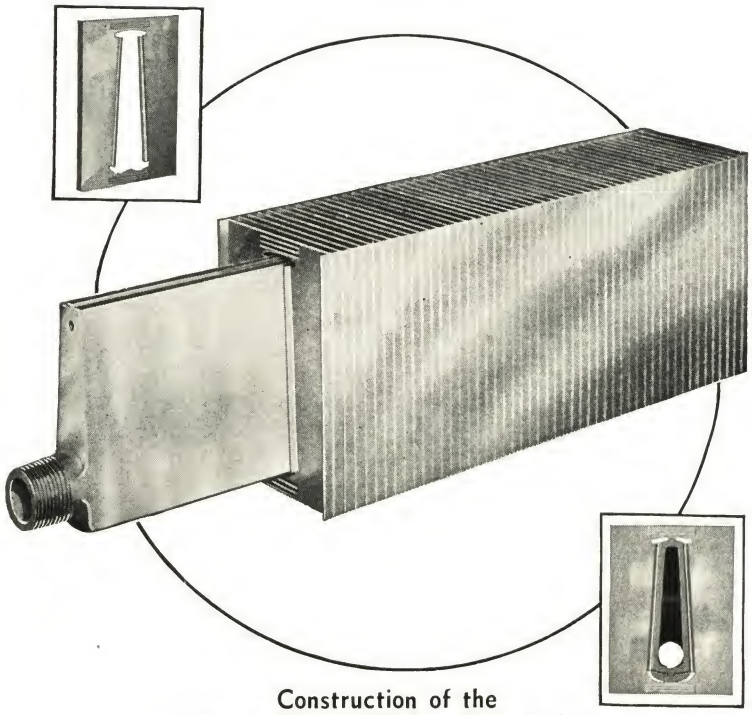
(Patented)

Its Development

The Wedge Core Radiator is the heart of the Herman Nelson heating and ventilating products described in the following pages, and an outstanding achievement in the art of heating and ventilating.

When THE HERMAN NELSON CORPORATION engineers set out to build smaller, lighter and better heating equipment, the radiator constituted the greater problem. Cast iron was almost universally used for this purpose but its bulk demanded too much space, its rough surfaces fouled easily and despite its apparent ruggedness, cast iron is brittle and easily damaged by frost—a serious weakness in many applications. Sheet steel radiators had proved to be unsuitable for the purpose.

The automotive industry suggested the use of non-ferrous metals but the design and construction employed was not practical *for use in the heating of buildings where the life of the heating equipment must be as long as that of the building.* Investigation led to the conclusion that soldered joints would not withstand the heat of steam and continuous expansion and contraction strains—to say nothing of freezing. The congested waterways and multiplicity of passages characteristic of automotive radiators were liable to stoppage and would not permit proper venting which eventually caused leaks.



Construction of the Herman Nelson Wedge Core Radiator

Careful study, with a background of many years' experience in the art of heating buildings, indicated that the proper solution lay in a non-ferrous radiator *especially designed for this service—not an adaptation from some other art.* This resulted in the HERMAN NELSON WEDGE CORE RADIATOR involving a unique design and method of construction. It has many distinctive features and renders practical the use of an ideal material.

Construction

The HERMAN NELSON WEDGE CORE RADIATOR consists of a wedge shape fluid container or "core" on which a series of heat conductor plates are securely mounted. It is built entirely of aluminum which makes a light, practically non-corroding, compact and effective radiator. The core is a straight one-piece die casting of an aluminum alloy which is unusually strong, dense and ductile and has a high heat absorbing capacity. The conductor plates are of pure sheet aluminum which has a higher heat transmission value per unit of weight than even cast aluminum or any other metal.

Because of its light weight and high conductivity pure aluminum will transmit about twice as much heat per unit of weight than either copper or silver, six times as much as brass and twelve times as much as cast iron.

Unique in Design—Correct in Principle Effective in Practice

The exclusive design employed in the Herman Nelson Wedge Core Radiator renders aluminum practical for radiators. It is ideal for the purpose but is not suitable for the types of construction used in other nonferrous radiators because it cannot be commercially soldered, brazed or welded nor reliably cast except in simple forms and by special processes.

The "core" is provided with male threads at each end, for pipe connections. The outer surfaces are accurately machined. The plates are die stamped with interlocking flanged apertures which fit the core and afford a contacting area many times greater than the conducting area. Aluminum possesses the characteristic of seizing other metals in contact with it and when the plates are pressed onto the core under heavy pressure and locked and interlocked in position, a permanent efficient contact is obtained. The plates are also provided with interlocking outer flanges which act as separators, strengthen the plates and give the radiator a very neat appearance.

Air Vent for Hot Water Systems

Low Temperature Heating Surface

In the operation of the Wedge Core Radiator, heat is absorbed from the steam or hot water, transmitted through the plates and delivered to the air. This arrangement affords a very large amount of comparatively low temperature surface which is much better, for heating purposes, than the high temperature prime surface commonly used since it does not overheat or scorch the dust particles contained in the air.

Free Air Passage

It is unnecessary for the air passing through this heating element to continuously change its direction because the passages are straight and smooth. The air is quickly and uniformly heated by being split up into fine streams.

Clean and Sanitary

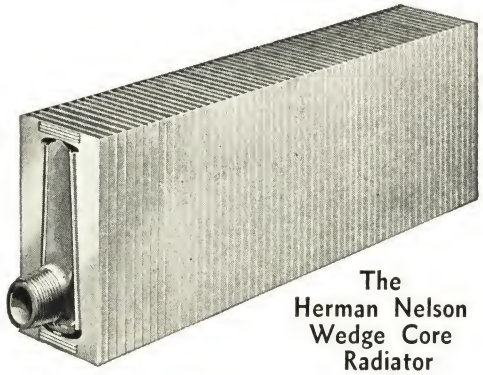
There is no place for dust or dirt to accumulate on the perfectly smooth, straight plates. From the standpoint of sanitation this is a very desirable feature.

Great Strength

The heating element is so substantially built that it has frequently withstood pressures as high as 500 pounds per square inch after the plates had been applied. All cores are regularly tested at 300 pounds hydrostatic pressure before assembly. The method of mounting the plates adds strength to the core and provides a very large factor of safety even when operated at a pressure of 150 pounds per square inch.

Proved Record of Durability

The Wedge Core Radiator was first regularly employed in the Univent, under conditions where outdoor air as low as 40° below zero is blown through the heating elements. Under these conditions it has served unfailingly for years withstanding expansion, contraction and water hammer strains. Often, through neglect, it has been frozen but never damaged.



The Herman Nelson Wedge Core Radiator

HISTORY OF VENTILATION

Ventilation an Early Puzzle

The harmful effects of bad air were recognized by men centuries ago and they resorted to a simple antidote—diluting it with fresh air. Thus originated the art of ventilation. As the art developed, however, problems arose which demanded an analysis of causes and effects. This proved difficult and has been a matter of more or less speculation ever since. The need for good ventilation is obvious and the fact that the admission of fresh air secures it has been adequately demonstrated. Nevertheless, the amount of fresh air required and other important details are moot questions which have puzzled students for many years.

To clear these questions it is first necessary to determine just why and when we need ventilation and just how fresh air affords relief. The only physiological need of air recognized by early students of the subject was for breathing purposes, and it was natural for them to suppose that the bad air conditions in congested quarters were due to respiration. It was also probably natural that they first sought a chemical explanation.

Oxygen Deficiency Seldom a Problem

Air essentially consists of a mixture of oxygen and nitrogen. Scientists knew this two hundred years ago. They also knew that oxygen is its life-sustaining constituent and it is reasonable that they should have first ascribed the trouble in crowded rooms to a deficiency of oxygen. Indeed there are people today who have this erroneous notion. Nevertheless, within the extant history of ventilation, shortage of oxygen has never been regarded by scientific men as a factor in the ordinary ventilating problem. Evidence is abundant that the amount of oxygen in the air may drop more than four points below normal without harmful physiological results, whereas it is rarely off more than one point in the most poorly ventilated spaces.

Carbon Dioxide Theory Disproved

The first theory of consequence was proposed toward the end of the eighteenth century by a French scientist named Lavoisier, who stated that the cause of distress in poorly ventilated rooms was due to excessive carbon dioxide. This gas is a product of combustion and is given off in respiration. It is quite uniformly distributed in the outdoor atmosphere, in small amounts, but is increased in occupied enclosures. For many years carbon dioxide was accepted as the scientific basis for ventilation. At first, it was commonly regarded as more or less poisonous, but after this had been definitely disproved, it was still deemed harmful in what was considered excess amounts.

About the middle of the nineteenth century, Max von Pettenkofer, a German scientist, demonstrated by careful and conclusive experiments that carbon dioxide, of itself, is no more responsible for the bad air conditions of poorly ventilated rooms than is a slight shortage of oxygen. We now know that the presence of this gas in amounts of 3%, which is twelve or fifteen times that in the most poorly ventilated school, is not harmful. Nevertheless, von Pettenkofer did not discredit carbon dioxide as a basis for ventilation practice. He contended that while chemical changes in the air were not accountable for its harmful effects in poorly ventilated rooms, excess carbon dioxide showed the extent to which the air has been used for breathing and was, therefore, an index of its purity. He retained the belief, without reason, that air was vitiated through respiration.

Organisms in Atmosphere Declared Harmless

This doctrine was a misfortune because it took for granted a danger that never existed and imbued the public with superstitious fear. With the growth of the miasmatic theory of disease, organic matter was suggested as the specific reason for ventilation. This premise was almost immediately challenged by scientists, at large, but it appealed to the popular fancy and has held its own, to some extent, to the present day. It is true that living organisms, in varying numbers, are present in the atmosphere—indoors and out, and, that products of organic decomposition are given off from the bodies and clothing of people, but investigation indicates that they are all harmless. Repeated tests have demonstrated that the organisms found in the atmosphere of crowded rooms are nonpathogenic and modern science assures us that there are no air-borne diseases.

Present Ventilating Laws and Ordinances Subject to Criticism

In spite of all failures to rationalize the carbon dioxide or respiratory basis for ventilation, it was relied upon for 150 years and has been recognized while formulating standards in ventilation practice up to this time. There are in effect in the United States many laws and ordinances, regulating the ventilation of schools and other public gathering spaces, which are based on this theory and which are now the subject of severe criticism by competent hygienists and others who have made a careful study of the subject.

The standards founded on the carbon dioxide theory were necessarily empirical. The amount of carbon dioxide regarded as a proper limit was eventually fixed, by more or less common agreement, at from six to ten parts in 10,000 of air. Ordinary outdoor air contains about four parts in 10,000 and the average man exhales $\frac{6}{10}$ of a cu. ft. of this gas per hour. This data permitted the derivation of a simple rule:

> *To find the cu. ft. of outdoor air required per minute, per occupant, to dilute to acceptable proportions the carbon dioxide of an occupied enclosure, divide 100 by the permitted excess of carbon dioxide, expressed in parts in 10,000.*

Present Ventilating Practices Considered Wasteful

According to this rule from 17 to 50 cu. ft. of fresh air would be required, per occupant, per minute, to maintain what was once regarded as a proper limit of carbon dioxide in occupied areas. In the case of school class rooms and similar closely occupied spaces, it was found impractical to circulate the larger amount, and a compromise of 30 cu. ft. per pupil, per minute, finally became a general standard. In the state of Ohio, the law has required six air changes per hour in school class rooms. This amounts to about 20 cu. ft. per pupil, per minute. These requirements are independent of weather conditions and demand the pre-heating of large amounts of cold air during the winter season. This involves a fuel and operating expense which is now considered unnecessary and constitutes a most important reason why practice should be changed.

Modern science asserts that respiration has little to do with the ventilation problem and that the ill effects of air in improperly ventilated rooms are due to its physical properties—temperature, humidity and activity. As put by the New York State Commission on Ventilation, the most obvious and important influences of the atmosphere upon human health and comfort are related to the heat regulatory system of the body rather than to chemical interchanges which go on in the lungs. "In other words, the problems underlying the physiology of ventilation are physical rather than chemical, cutaneous rather than respiratory."

This "Theory of Ventilation" was advanced by a German writer as early as 1883. It was proved sound by experiments at the Institute of Hygiene at Breslau in 1905, subsequently endorsed by eminent students on both sides of the Atlantic, and it is only a matter of time until it will be universally understood and accepted.

SCIENCE OF VENTILATION

The Human Heating System and Its Regulation of Body Heat

Man is energized through the chemical process of oxidation, which is a form of combustion. The blood absorbs oxygen from the air breathed into the lungs and carries it to the various body tissues where it combines with elements from the food we eat and liberates heat. The precise nature of these oxidations is not clearly understood at this time. They do not occur within the blood, yet the latter transports all the necessary elements. The process appears to be regulated by cellular control within the tissues themselves, and is independent of the amounts of oxygen and food elements present. In other words, the rate of oxidation is not governed by the supply of oxygen, as in the case of the combustion of fuel in a furnace, and is not, therefore, regulated by respiration.

The heat liberated by these oxidations in the tissues is, in turn, absorbed by the blood stream which serves to distribute it uniformly throughout the body. Man is a so-called, "warm-blooded" animal and to maintain life it is necessary to keep the body temperature fairly uniform, notwithstanding the various internal and external conditions which tend to change it. Obviously the heat generated must be dispersed and, in order to maintain a constant body temperature, the loss of heat must be nicely balanced and regulated according to physical requirements and environment. The human body is provided with a heat-

regulatory system which functions to separately control and balance heat production and dispersion, but the functions of this system are limited and we must resort to artificial assistance—shelter, clothing, heating and ventilating. Without these, man would be reduced to a narrower environment and lesser attainments.

In the case of heating and ventilating, we are primarily interested in the regulation of heat dispersion. So far as the body itself is concerned, regulation of heat dispersion is limited to a partial control of blood circulation and perspiration. Some of the heat generated is lost through respiration and excretions but most of it must be dispersed through the skin to the surrounding atmosphere. The blood is circulated through multitudinous blood vessels in the skin and transfers heat to the air in contact with the latter. If the body is active and produces a large amount of heat, or, if the atmosphere is warm and inactive, so that transference is difficult, we "feel warm." In response to this sensation, the blood vessels in the skin dilate, while those in the abdomen constrict, and a larger volume of warm blood is sent to the skin to be cooled. This is supplemented, if necessary, by perspiring which causes evaporation and further cooling.

Heat Stagnation the Cause ot Discomfort

The rate at which heat is transferred from the skin to the air depends upon the physical condition of the latter and it is the province of ventilation to maintain compatible atmospheric conditions for health and comfort. Dr. Leonard Hill, an eminent English hygienist says:

> *"In a crowded room, the air confined between the body and clothes of the people is warmed up to body temperature and saturated with moisture. This leads to sweating, wetness and flushing of the skin and a rise of skin temperature. The blood is sent to the skin and stagnates there instead of passing in ample volume through the brain and viscera, hence arise feelings of discomfort and fatigue. Heat stagnation is therefore the one and only cause of discomfort and all of the symptoms arising in the so-called vitiated atmosphere of crowded rooms are dependent upon heat stagnation. The moisture, stillness and warmth of the atmosphere are responsible for all the effects."*

It is not definitely known just how discomfitures of this kind affect health. Colds and other minor ailments are commonly credited to such conditions and it is not unlikely that they may have a cumulative effect that lowers physical resistance and leads to more serious maladies. They do, unquestionably, lower mental efficiency and capacity for work and this, in itself, is sufficient to demand the best of ventilation in school class rooms and other closely occupied spaces. Educators have recognized this fact for years and, as a result, all modern school buildings and many other spaces are equipped with ventilation systems.

How Body Heat Is Dispersed

It has been shown through physiological studies that the reactions which control the dispersion of heat from the human body are governed by the rate at which heat is removed from the skin. This heat is transferred to the surrounding atmosphere principally through the processes of convection and evaporation. There are radiant heat exchanges, but these are unimportant, if precautions are taken to properly limit them. A person sitting close to an exposed steam radiator may feel too warm, or, one near a cold wall may be chilled in a properly tempered room, but such discomfitures may be avoided if radiators are shielded and exposed walls insulated.

Body Heat Removal by Convection or Evaporation

Convection is the primary and normal method by which heat is dispersed from the body. The rate at which heat is transferred from the skin to the surrounding atmosphere through the process of convection depends upon the temperature and physical activity of the air. Heat, like water, seeks its level and flows from a higher to a lower temperature area. Flow occurs so long as there is a difference in temperature and, the greater the difference, the greater the rate of flow. Air, however, is a very poor conductor of heat. That in immediate contact with a warmer body absorbs heat but it does not pass the heat along. Therefore, it is soon raised to the temperature of the warmer body and transfer ceases unless it is displaced with cooler air. Consequently, the rate of transfer is augmented if the mass of air is in motion—physically active.

Evaporation is the supplementary process by which heat is dispersed from the body. The process of evaporation is that by which water is changed to vapor and taken up by the atmosphere. Air can only absorb a limited amount of moisture. The amount

which it contains, at a given temperature, as compared to the amount it could hold, if saturated, is called its relative humidity. If the temperature of the air is increased, it expands and its saturation limit is increased. Consequently, unless water is added, its relative humidity is lowered. In other words, relative humidity indicates the evaporating capacity of the atmosphere as well as the actual amount of vapor in it. This is why "moist" air becomes "dry" when heated. The amount of moisture is not changed but the capacity of the air to absorb moisture is changed.

The process of evaporation requires heat. In the cooling of the human body by the evaporation of perspiration this heat is requisitioned from the skin. This heat does not affect the temperature of the atmosphere but resides in the vapor in the form of latent energy—commonly referred to as the latent heat of vaporization. The rate at which evaporation of moisture takes place depends upon the relative humidity and physical activity of the atmosphere. The latter is a factor in diffusing vapor through the atmosphere just as it is a factor in diffusing heat in the process of convection.

Sensible Temperature

Therefore, the air conditions which affect the liberation of body heat and become the dominant factors in the applied science of ventilation are temperature, relative humidity and physical activity. The combined effect of these is frequently called, "sensible temperature," but the art of ventilation can scarcely be defined as the proper regulation of sensible temperature because it demands consideration of the component factors individually as well as collectively.

Air Motion

Physical activity in air is not essentially a matter of linear motion. Air has a form of physical activity, turbulence, which, *like boiling water,* lacks direction and cannot be defined in terms of velocity but which is very useful in the interspersion of heat or vapor. It is this form of physical activity which is of value in ventilation, whereas, directional currents are often objectionable. The latter expose various parts of the body to different effects and do not, of themselves, secure a thorough inter-mixture of the air. This character of physical activity in the atmosphere of ventilated spaces may be created through the medium of a high velocity air discharge jet directed toward the ceiling. This causes uniform agitation within the mass of air without forming pronounced directional currents.

The proper degree of activity is a matter of experimentation and has been found to be maintained when the air is circulated at a rate of six or more volumes per hour, depending upon the room characteristics.

Humidity

Of the three factors entering into the problem of ventilating rooms in which the occupants are engaged in sedentary vocations, relative humidity is probably least important. In normal health there is always more or less moisture given off by the skin. Except in the case of active exercise or too much clothing, this is maintained at a minimum, in a proper environment, and little heat is removed through the process of evaporation. Therefore, within certain limits, relative humidity is not important except as it affects the sensible temperature. If the atmosphere is too dry the occupants will feel cold, even though the air temperature is correct, and some physicians are disposed to feel that a dry atmosphere is deleterious to the membranes of the nose and throat. On the other hand, if the air is too moist, the room occupants will feel too warm, even though the air temperature be correct, and their clothing may become saturated with moisture and cause discomfort when they go out of doors. For these reasons, a close regulation of relative humidity is not considered necessary but provision should be made so that the relative humidity is maintained within proper limits.

Air Temperature

The proper temperature to be maintained in a room, in which the physical activity and relative humidity of the air are kept within proper limits, is about 70°. A variation of approximately 2° is permissible and a proper system of temperature regulation should control the system within this range. In order to maintain a temperature of 70° in a school class room it is necessary to provide artificial heat in severe weather and means for supplying varying amounts of fresh air for cooling, at other times.

The range of load in a single normal winter day, in the average school class room, is considerable. In the morning, prior to occupancy, it is necessary to utilize the full heating capacity of the system to make up the storage heat lost during the night and bring the room up to temperature. As soon as this is accomplished the load is reduced by about half. When the room is fully occupied the demand for artificial heat is still further reduced and, as the outdoor temperature rises to 30° or 35° the occupants themselves produce sufficient heat to maintain thermal balance. Above this point it becomes necessary to admit increasing amounts of outdoor air for the removal of body heat and odors.

Obviously it is not possible to keep the room temperature from rising above 70° when the outdoor temperature approaches this point unless refrigeration is employed. However, in localities where there are very few days, during the school season, when the outdoor temperature reaches this point the cost of refrigeration is not warranted and therefore, the above limitation is not serious.

The Herman Nelson
HER-NEL-CO SYSTEM OF VENTILATION

Old Idea Versus New

The Her-Nel-Co System reduces to practice the newer science of ventilation as applied to school class rooms and similar spaces. The essential difference between the older and newer ideas in ventilation is this: Under the older science, a fixed amount of outdoor air was supplied at all times, whereas, with the Her-Nel-Co System of Ventilation, outdoor air is admitted only when and as required.

Proper Ventilation Economically Maintained

Obviously, in the light of our present knowledge, current practice involves excessive capacity in steam supply and distribution equipment and an unnecessary waste of fuel. In fact, the greater portion of the steam required to operate the types of heating and ventilating systems heretofore employed is used to preheat large volumes of outdoor air under the erroneous impression that this air is needed to maintain a certain degree of chemical purity in the indoor atmosphere. With the Her-Nel-Co System, proper indoor atmospheric conditions are maintained at all times through physical agitation, humidity limitation and temperature control. Such outdoor air as is required for the removal of excess body heat is brought in fresh and is tempered to just the right degree through intermixture with recirculated air, but is not preheated.

Recently there has been more or less discussion concerning the ionization of air used for ventilation. While the causes and effects of ionization are matters of speculation at this time, it is generally believed that air is de-ionized by being passed over radiating surfaces. Since the outdoor air used in the Her-Nel-Co System of Ventilation is not passed over the radiator, de-ionization is avoided.

When 30 cu. ft. of fresh air per minute, per pupil is supplied school class rooms, under the present methods of ventilating, about 84% of the total load in subzero weather, 93% of it in freezing weather, and all of it in mild weather, is used for preheating air. By theoretical estimates and practical comparisons it can be shown that two-thirds of all the fuel consumed by a plant of this kind during a season, serves no other purpose. Where air is supplied on a basis of six room volumes an hour, as in the state of Ohio, about half the fuel is used for preheating outdoor air. Under the newer hygienic principles of ventilation, the fuel used in this manner represents a direct waste, all of which is avoided with the Her-Nel-Co System.

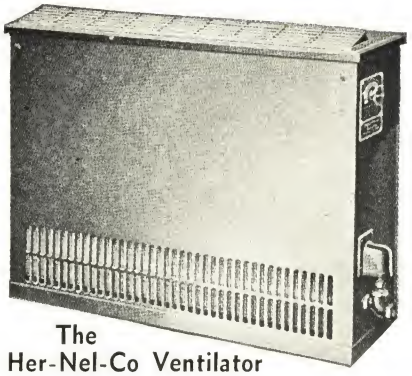
Not only does the preheating of large volumes of outdoor air demand a great waste of fuel, but it also requires excessive capacities in plant equipment. The peak operating load with the Her-Nel-Co System is only about one-sixth that in a system supplying 30 cu. ft. of out of door air per minute, per occupant, or, one-fourth that of a system providing six air changes an hour.

However, with the smaller plant, a larger "pick-up" load factor must be employed for reheating the building after a period of vacancy and, therefore, the rated capacity of the steam generating plant and distributing system should be from one-third to one-half as great. Moreover, the net saving in the initial cost of the boilers, accessory equipment and piping will not be in direct proportion to the capacity. Taking all things into consideration, however, the first cost of the Her-Nel-Co System is from 25 to 50% less than that of a first-class system of the older type.

Equipment Used with the Her-Nel-Co System

The principal equipment used in this system of ventilation is the Her-Nel-Co Ventilator illustrated below. One or more of these machines, together with the required amount of auxiliary direct radiation, is placed in each room to be heated and ventilated. For the average typical school class room, one ventilator is used and the capacity can be adjusted to properly ventilate any such room seating fifty, or less, pupils. For larger rooms, two or more Her-Nel-Co Ventilators, or Her-Nel-Co Magnavents, as illustrated on page 28, should be used.

No vents or so-called "foul-air" flues or outlets are ordinarily employed. The Her-Nel-Co Ventilators and direct radiators are the only apparatus required (aside from the steam generating and distributing system), except where automatic temperature regulation is employed.



The Her-Nel-Co Ventilator

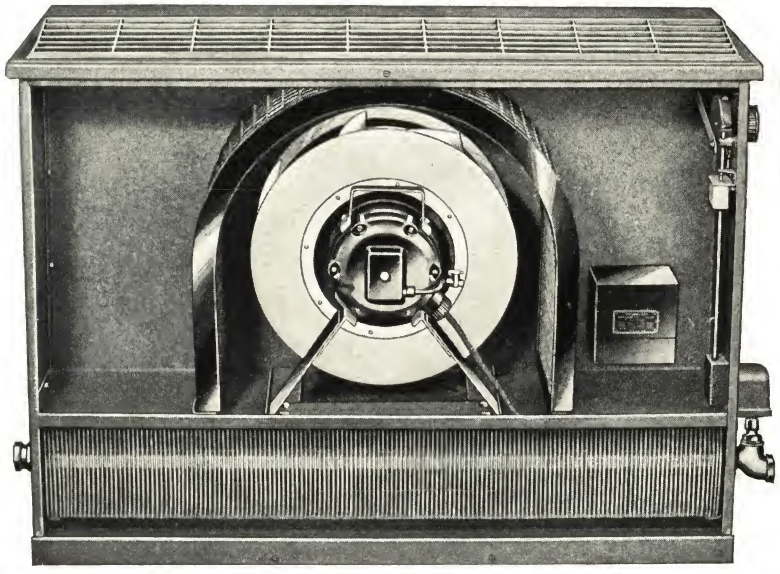
The necessary engineering data for properly designing a complete system of this kind is given in the following pages, and THE HERMAN NELSON CORPORATION maintains a corps of trained engineers who will gladly cooperate with architects and consulting engineers in laying out work of this kind.

THE HER-NEL-CO VENTILATOR

Construction

The Her-Nel-Co Ventilator consists of a high grade furniture steel cabinet designed to be placed against a wall, on the floor, at a central distributing point in the room to be ventilated. The preferred location is at the middle of the longer outside wall. Where structural conditions permit, the Ventilator may be partially recessed. The cabinet is provided with a neatly stamped grille in the lower part of the removable front for the admission of room air. A flanged opening in the back of the cabinet high enough to clear any spandrel beams, provides for the admission of outdoor air. An opening through the wall serves the latter. If it is an outside wall, a weather-proof louver and screen are provided as a part of the equipment and set in the face of the opening.

If the Ventilator is placed on an inner wall or partition, a flue or duct communicating with a source of fresh air supply must be provided. The discharge opening which consists of a cast aluminum, nozzle-formed patented grille is located in the top of the cabinet, near the front, and arranged to direct the air stream at a slight angle toward the ceiling and away from the wall.



The Her-Nel-Co Ventilator with Front Removed

Cabinet

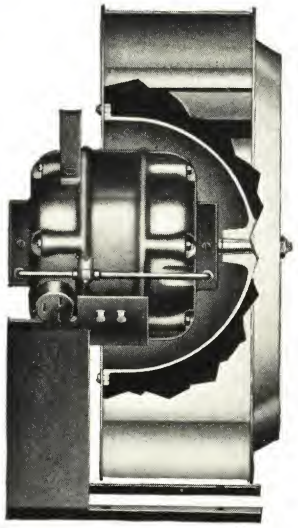
The Her-Nel-Co Ventilator cabinet is about 45 in. long, 33 in. high and 16 in. deep, and is beautifully finished in genuine "Morocco" enamel with plated hardware. It is arranged to be fastened against the wall with a gasket which prevents any air leakage. The entire front is removable, giving free access to all parts. The cabinet contains a radiator for heating the indoor air (only), a fan motor unit for forcing circulation, a filter for removing dust and dirt, a steam jet humidifier and the dampers and mechanism which regulate the admission and intermixture of indoor and out of door air in accordance with U. S. Letters Patent Nos. 1,753,156 and 1,753,157 issued April 1, 1930.

Radiator

The radiator is the well known Herman Nelson Wedge Core Radiator (described in detail on pages 2 and 3), especially designed for this service and used exclusively in Herman Nelson Ventilating Equipment since 1925. It is constructed entirely of aluminum and is light, compact, sanitary, efficient, sturdy and non-leakable. It is located in the forward lower compartment of the Ventilator, which compartment serves as a conduit for recirculated air. In this location the radiator not only heats such indoor air as enters the Ventilator when the damper to this compartment is open, but also any cold air which might leak into the cabinet and settle to the bottom of the same, thereby preventing cold drafts on the floor.

Fan and Motor Unit

The fan and motor unit is also of the exclusive Herman Nelson patented construction which has proved so successful and popular. It is quiet, efficient, sturdy, powerful, sanitary, simple and reliable. It is located in the forward upper compartment of the Her-Nel-Co Ventilator along with the filter and draws air from either indoors or outdoors or both, according to the position of the dampers, and delivers it through the filter and discharge nozzle into the room. It is portable and easily inspected, cleaned, oiled or taken out when the cabinet front is removed. The cone type fan is constructed entirely of aluminum. The motor, which can be furnished to operate with practically any type of electric service, is of the well known Her-Nel-Co design which has heretofore proved so reliable in this service. These motors are highly efficient, noiseless, self-lubricating and electrically self-starting.



Fan and Motor Unit

The Air Filter

Air Filter

The air filter is of a special horseshoe design, arranged to give extra large filtration area. It completely encloses the fan and motor unit so that no air can be delivered into the room without passing through the filter. This filter is so arranged that it can be easily inspected or removed for cleaning when the front of the cabinet is removed. Emphasis is laid on the fact that the filter is located on the discharge side of the fan where it is not subject to low temperatures or weather effects and therefore the oil remains viscous and highly effective. At the same time, since it is not exposed to radiant heat effects, the oil is not evaporated and wasted.

Dampers

The dampers used in the Her-Nel-Co Ventilator are of the balanced type, carefully designed and mounted on weather-proof bearings. A single blade damper, located near the bottom of the rear compartment of the Ventilator on the discharge side of the radiator, is used for controlling the admission of recirculated indoor air. The damper which controls the admission of outdoor air is of the multiblade louver type and is located directly in the outdoor inlet opening. These dampers are mechanically inter-connected so that the outdoor air supply is reduced as the indoor air supply is increased and vice versa.

Steam Jet Humidifier

When required, a steam jet humidifier is furnished and located in the lower radiator compartment and connected to the radiator in such a manner that it operates whenever the radiator operates, thereby providing humidity whenever the air is heated and expanded but not at other times. This forms a method of automatically limiting the humidity. The jets are self-cleansing and noiseless.

Control

The Her-Nel-Co System may be either manually or automatically controlled but in either case, the various elements of control are mechanically co-ordinated in accordance with the patents previously mentioned.

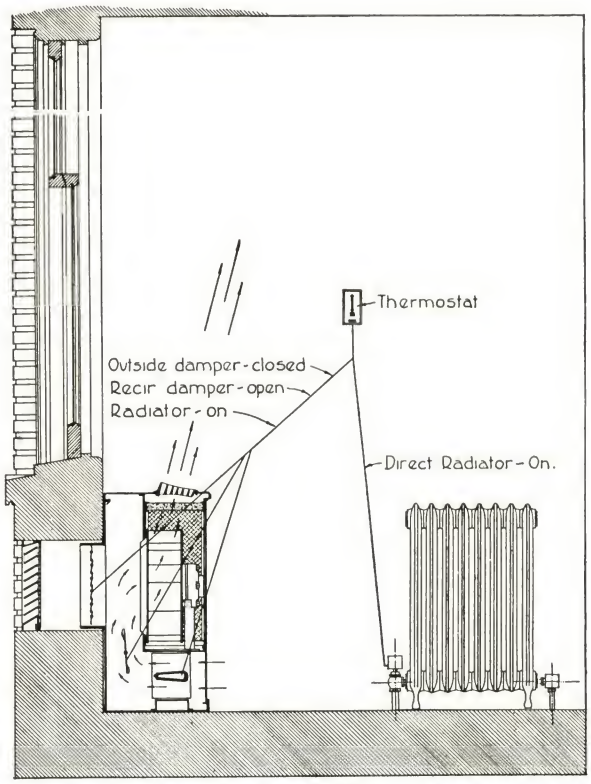
Application of the System to Various Conditions

The illustrations on this and the following page show the successive steps in the Her-Nel-Co System of Ventilation from maximum heating to maximum cooling duty.

These steps are not necessarily continuous nor is the cycle necessarily completed in a single school day in a given instance. Obviously the range and the exact character of the duty depends upon weather conditions, room exposures and occupancy.

In the case of a northerly exposed room, in very cold weather, the system may never get beyond condition "B" or "C," whereas, in a well protected southerly room, in mild weather, the complete cycle may be performed in a few hours.

In the average school class room, on a normal winter day, the cycle, with the possible exception of the last stage, should be completed during the day.



Condition "A"

Room chilled after night period. Her-Nel-Co Ventilator automatically adjusted for full heat delivery. Recirculating room air

Condition "A"

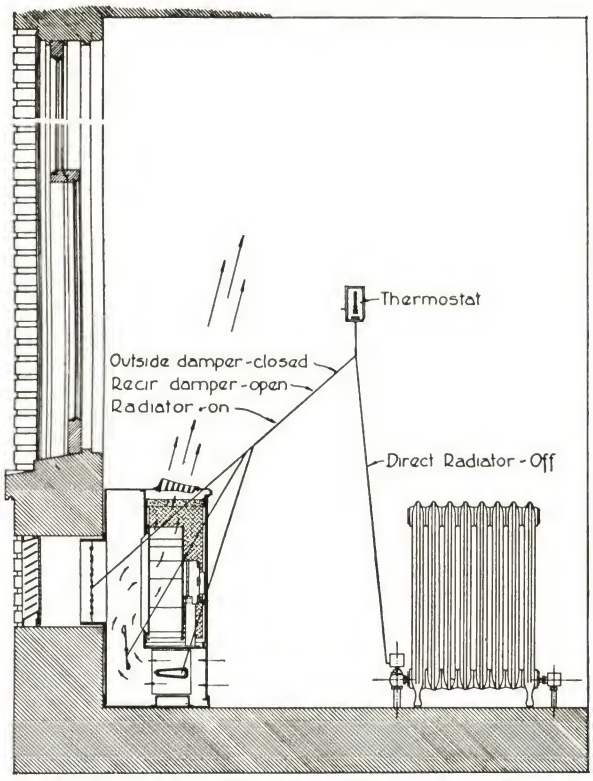
Condition "A" is that in which the system is developing its maximum heat capacity for the purpose of preheating the room in the morning, prior to occupancy. The system will always be in this condition when the room temperature is below normal, and the period of time during which it will remain in this condition will depend upon the weather.

It rarely requires less than one-half hour nor more than one hour to preheat a room after the night period.

Condition "B"

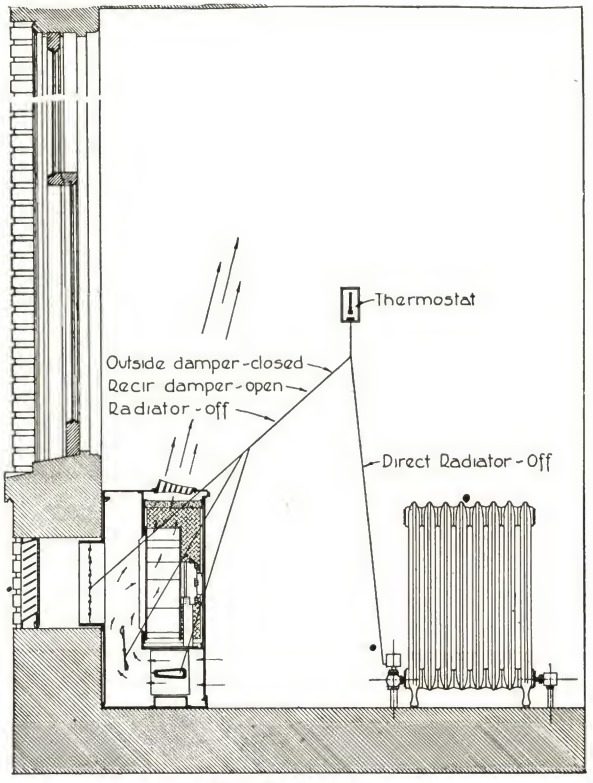
Condition "B" illustrates the first step in restricting heat output—that of cutting off the direct radiator.

This will ordinarily occur shortly after the room has been occupied.



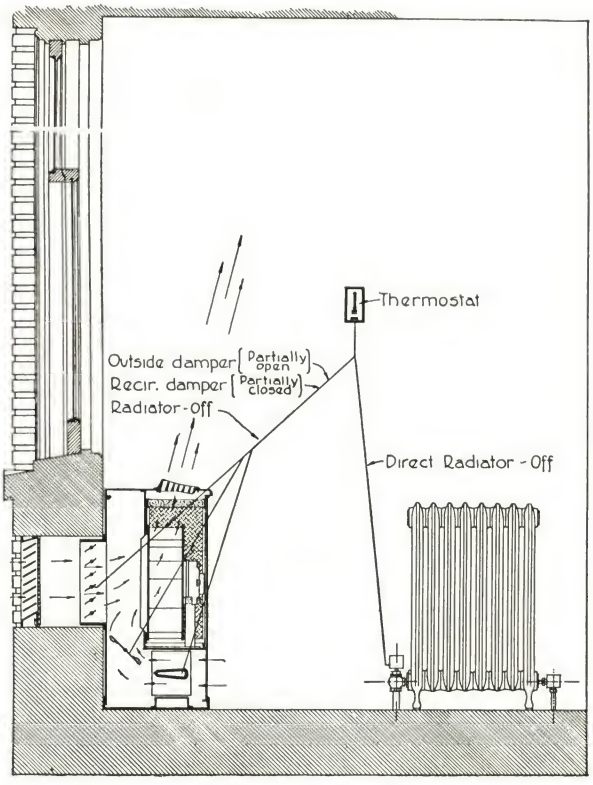
Condition "B"

Room ready for occupancy. Direct radiator shuts off which is the first step in restricting the heat supply to room



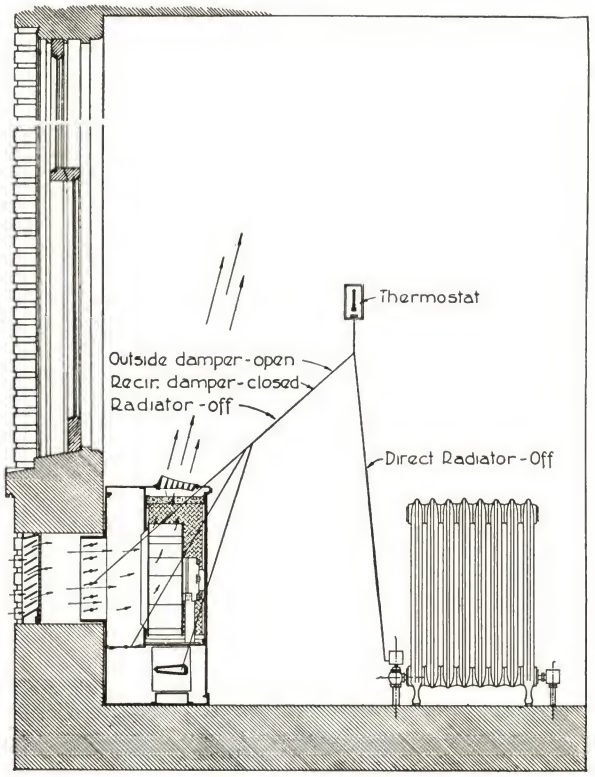
Condition "C"

Due to occupancy, gradual rise in outside temperature, and sun effect, no artificial heat is now required. Her-Nel-Co Ventilator recirculates air without heating for the purpose of air motion and uniform distribution



Condition "D"

Due to continued occupancy, rising outside temperature, and increased sun effect, room now requires outdoor air



Condition "E"

Due to continued occupancy, rising outside temperature, and increased sun effect, room now requires *full volume* of outdoor air

Condition "C"

Condition "C," in which the steam supply is cut off from the heating element in the Her-Nel-Co Ventilator represents a neutral state in the system and a condition of thermal balance in the room. It usually occurs when the outdoor temperature is between 30 and 35° F. depending, however, upon exposure and occupancy. In this stage, the supply of heat is entirely cut off and no outdoor air is admitted for cooling but the system is recirculating and maintaining a proper condition of physical activity in the room atmosphere.

The change from condition "B" to condition "C" is a graduated one during which the steam supply to the heating element in the ventilator is regulated according to requirements. The system may remain in a condition where more or less steam is supplied to the heating element in the ventilator for hours.

Condition "D"

Condition "D" is the first step in cooling. Operating coincidentally, the recirculating damper is gradually closed and the fresh air damper gradually opened. The illustration shows the dampers in an intermediate position. In the average case, the machine will remain in this condition during the afternoon session and the system will deliver more and more outdoor air as required for removing the excess body heat and odors.

Condition "E"

Condition "E" represents the maximum cooling condition of the system in which the recirculating damper is entirely closed and nothing but outside air is delivered by the equipment. In this condition the system will serve to maintain the temperature in the average class room within 10 to 15° of that out-of-doors in addition to activating the air.

Thermal Balance Without Waste of Fuel

It will be noted that the Her-Nel-Co Ventilator operates in such a manner that no outdoor air is ever heated either directly or indirectly through the system, and, therefore, there is never any waste of fuel. At the same time, this system will deliver more or less outdoor air throughout the day, except in extremely severe weather, and will always maintain a proper degree of physical activity in the room atmosphere. The system maintains a thermal balance at all times with direct reference to the room temperature.

Manual or Automatic Control

Manual Control—Where manual control is desired, the entire cycle of operation is covered through the single movement of a dial located on the right hand end of the cabinet, together with an etched instruction plate as illustrated below. Assuming that the machine is completely cut off, the first movement of the dial starts the electric motor and puts the machine in condition "A." Further movement gradually closes the steam valve and restricts the steam supply to the radiator until condition "C" is reached. Further movement gradually closes the indoor air supply and opens the outdoor air supply until condition "E" is reached. A reversal of the dial reverses the cycle of operations. Where manual control is used, it is necessary to control the direct radiators in the room independently but this does not cause a complication for the reason that the operator need only understand that the direct radiators need be on only when reheating in the morning or in extremely cold weather.

Automatic Control—With automatic temperature control all of the elements are operated automatically excepting that the fan and motor unit must be turned on and off through an independent switch.

Hand Control Dial

System Conforms to New Science of Ventilation

A careful study of the five illustrations on pages 10 and 11 will show how the Her-Nel-Co System of Ventilation conforms to the newer science of ventilation.

So long as the fan and motor unit is operating, the air in the room is recirculated or displaced at a rate which insures uniform, positive and continuous physical activity of the air. When it is cold outside and the demand for heat is greater than that created by occupancy, heat is furnished to the room, according to the demands, through the proper regulation of the direct radiators and the radiator in the Her-Nel-Co Ventilator.

When a state of heat balance is reached, the artificial heat supply is cut off and, when the supply of heat from within the room is greater than required, more or less outdoor air is admitted and thoroughly inter-mixed with the room air for cooling purposes. As hereinbefore mentioned, humidity is supplied whenever the air is reheated.

Therefore, the system automatically and continuously maintains a proper degree of air agitation, proper limitations in relative humidity, and accurate temperature regulation at all times in a very simple and effective manner.

Vent Outlets Not Required

As also previously mentioned, it is not ordinarily necessary nor desirable to provide vent outlets from the room. Such outlets interfere with recirculation and are never needed because even when the Her-Nel-Co Ventilator is supplying all outside air it finds an easy egress through crevices around the windows and doors and insures more uniform and better distribution than where separate vent flues are provided. If, in an unusual instance, it should be found that the full volume of outdoor air cannot be supplied without a vent, it is an easy matter to slightly shorten a door leading into a corridor and thus provide means for the exit of this air.

When and Why Direct Radiation Is Necessary

The question has been asked why direct radiators are necessary and why sufficient radiation is not provided in the Ventilator itself so that direct radiators may be eliminated. After a great deal of experimentation, it has been found that most of the difficulties in uniformly heating rooms of this character are due to air stratification created by the use of too high outlet air temperatures. In the interest of proper air diffusion and temperature distribution the outlet temperatures have been limited to 105° F. which obviously fixes the amount of radiation which can be placed in the Ventilator itself. With this limitation, the maximum heating capacity of the Her-Nel-Co Ventilator is equivalent to 120 sq. ft. of direct radiation and where more heating capacity is required it is necessary to use direct radiation. In some cases, particularly in small rooms with little exposure or in mild climates, the direct radiators may be eliminated without in any way affecting the system.

Herman Nelson Invisible Radiators (paneled type) (see pages 79 to 86) are recommended for this class of work because of sanitation, quick responsiveness to regulation, and the absence of radiant heat effects. Cast iron radiators retain a large amount of heat and consequently continue to give off heat for a considerable time after the valve has been closed. This is the cause of a great many complaints of overheating in school class rooms and cannot be corrected with cast radiation. Morever, pupils sitting near cast iron radiators are made uncomfortable through radiant heat effects unless the radiators are shielded, in which event they are generally unsightly and insanitary. Small children are frequently burned by cast iron radiators, whereas this cannot occur where Herman Nelson Invisible Radiators are used. The cost of the installation will be slightly greater with Invisible Radiators but they are well worth the difference and greatly enhance the appearance of the rooms in which they are placed.

When to Ventilate

Ventilation is primarily a matter of comfort, but since few of us are up to par when uncomfortable, it becomes a factor in personal efficiency and—eventually a matter of *health.* Therefore, as an art, ventilation consists of the circulation of air for the removal of excess body heat and odors.

In so far as comfort is concerned, ventilation is required in a room whenever the heat, due to occupancy, exceeds that which is transmitted through the outer walls. Therefore, outdoor conditions are a factor.

When the outdoor temperature is within a few degrees as high as that desired indoors, or higher, perfect comfort cannot be assured in a closely occupied room without resorting to refrigeration, but a reasonable degree of comfort may usually be had by opening windows. However, in crowded spaces, such as school class rooms, the atmosphere becomes uncomfortable under conditions when it is neither safe nor desirable to open windows.

This is the true field of ventilation and it is an important one under the climatic conditions which exist over the greater part of the temperate zone. In all heating and ventilating problems, we are prone to think in terms of hot or cold weather, but, as a matter of fact, what we have to live with most of the time, in the temperate zone, is moderately cool weather.

When to Ventilate (Continued)

In the more densely populated areas of the United States, there are only about four months of the year when it is safe to open windows for ventilation and in only one of these months are schools in session. During the remaining eight months, there are but a few days in most localities when the temperature is less than 20° or more than 60° F. This means that any room, such as a school class room which is well filled with people will be more or less uncomfortable during the greater portion of the year unless it is properly ventilated.

The extent to which a room is crowded, in this respect, is determined by the relation existing between the number of occupants and the amount of cooling surface in the walls. Since the latter also determines the amount of radiation required to heat the room, a simple empirical rule, with figures at hand, for determining when a room requires ventilation, is established by the ratio of the number of occupants (N) and the number of sq. ft. of direct steam radiation (R) required to heat the room from zero to 70° F. Experience indicates that it is not practical to rely upon open windows when the outdoor temperature is much less than 60° F. In other words, it is not safe to depend upon an outer wall cooling effect of more than 10° F. On this basis, a room should be artificially ventilated to insure comfort whenever R divided by N is less than 12.

The importance of comfort will depend upon circumstances. Obviously, no hard and fast rule can be applied in fixing its importance. The purpose for which the room is to be used, together with the duration and frequency of the possible periods of discomfort should be taken into consideration. If a room is to be used merely for rest or recreation, comfort is usually not as important as where the room is employed for work or study. In the first instances, comfort may be regarded as more or less of a luxury, whereas, in the second instance, it is a factor in personal efficiency and health. With reference to the duration and frequency of the periods of possible discomfort, a person can resist the effects for a short time more readily than for a long time and infrequent exposure is less dangerous than repeated exposures.

Cost of installation and maintenance are always to be considered and are frequently deciding factors. Since the Her-Nel-Co System requires no extra plant capacity or fuel to operate, and involves very little incidental installation expense, it may often be employed where ventilation by another method would be impractical or prohibitive in cost. This is particularly true in the case of existing buildings. Moreover, temporary installations are feasible because the character of the equipment is such that the apparatus may readily be changed or moved.

There are cases where ventilation may prove a good investment from a mere comfort standpoint, as in theatres and rest rooms. In the majority of cases, however, ventilation must be regarded from the more serious angle. No better example is afforded of the serious importance of ventilation than in schools which are crowded with pupils engaged in work and study for long periods of time every day.

Aside from the removal of normal body heat and odors, ventilation is frequently necessary for the removal of obnoxious odors, fumes or dust. Where this is the case, exhaust ventilation is usually employed and the subject needs little discussion. Aside from a variety of special industrial problems, the most common example of ventilation of this character is in toilets, kitchens, etc.

Models and Capacities of the Her-Nel-Co Ventilator

The Her-Nel-Co Ventilator is a compact ventilating unit designed to apply the Her-Nel-Co System of Ventilation to school class rooms and similar spaces. It is fully illustrated and described in the first section of the catalogue. The Her-Nel-Co Ventilator is made in but one size designated as the 4500 Series. It can be had in two models, however.

Model "J"

The Model "J", as illustrated on pages 16 and 17, is arranged to take outdoor air through an opening in the wall behind the machine and is the type generally preferred. When the intake opening is through an outer wall, as is usually the case, it should be protected with an air intake as shown on the following page.

Model "K"

The Model "K" is designed with the idea of taking outdoor air through the lower portion of a window opening and is provided with a long narrow intake located at the top of the cabinet and arranged to be built into the window construction as shown on pages 18 and 19. The intake sleeve is so constructed that it may be cut to fit on the job and a heavy wire screen in a steel frame is provided for use in the intake opening.

Construction Details

The Her-Nel-Co Ventilator may be arranged for either manual or automatic temperature control and is adaptable to either vapor, vacuum, gravity steam, or hot water systems. Filters and humidifiers are always recommended but may be omitted at the option of the purchaser.

All motors are of the adjustable speed type to obtain varying air deliveries and may be furnished for all of the more usual current characteristics.

As shown in the accompanying capacity table, both models are rated at three air deliveries and can be equipped with two different radiators, giving two heating capacities for each air delivery. All air deliveries are determined by the A. S. H. & V. E. standard anemometer method with the anemometer held 2 in. above the face of the grille. The air delivery in c.f.m. is determined by multiplying this velocity in feet per minute by the gross area of the discharge grille in sq. ft. (1.58 sq. ft.).

All heating capacities are given in equivalent sq. ft. of standard direct radiation (240 B.t.u.) based on 218° F. steam temperature and 70° F. room temperature. For all practical purposes the heating capacity of the Her-Nel-Co Ventilator, when the motor is not running and the outdoor dampers are closed, is equal to about 20 sq. ft. of direct radiation.

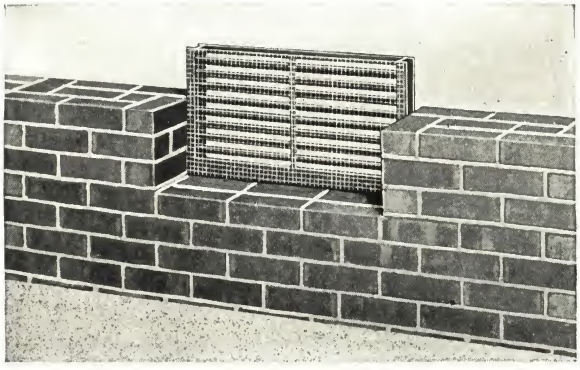
The standard air intake for the Model "J" is made of heavy copper bearing steel with riveted and welded construction throughout. After fabrication each intake is cadmium plated and painted with weather-resisting paint, with the result that the intakes will usually outlast the wall in which they are installed. Intakes are made in both the horizontal and vertical types as shown on page 16.

CAPACITIES OF HER-NEL-CO VENTILATORS MODELS "J" AND "K"

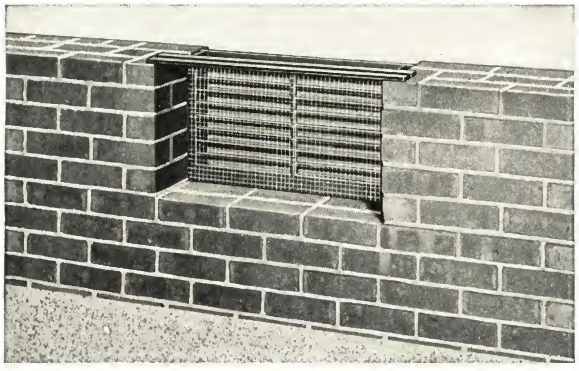
Serial number	Code word	Cu. ft. of air per min.	Heating capacity, sq. ft.
4514	Tabor	700	70
4515	Tacit	700	105
4524	Tales	800	75
4525	Talon	800	115
4534	Tansy	900	80
4535	Tardy	900	120

Heating capacities are given in sq. ft. of equivalent direct radiation and are based on a room temperature of 70° F. and steam temperature of 218° F.

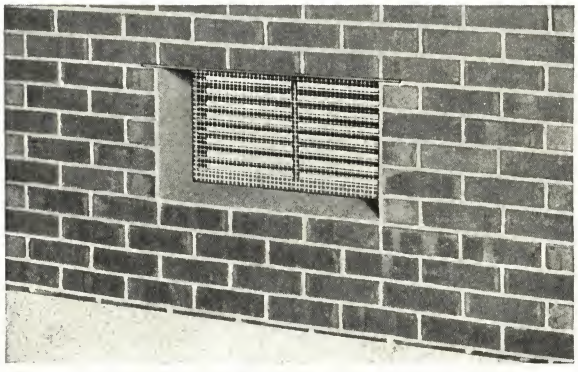
Additional code words—Model J—Jalap. Model K—Kedge.



A. Intake in Place
(From inside of building)



B. Lintels in Place
(From inside of building)



C. Intake Opening Lined with Cement Mortar
(From inside of building)

D. Exterior View of Intake
Note intake is set back from face of wall

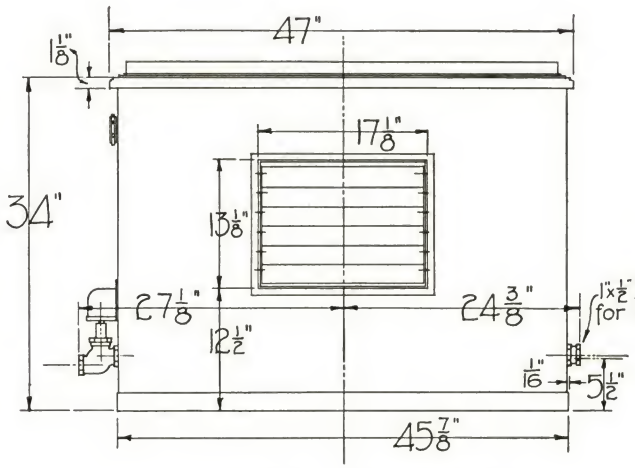
Installation of Intake

MODEL J DIMENSIONS

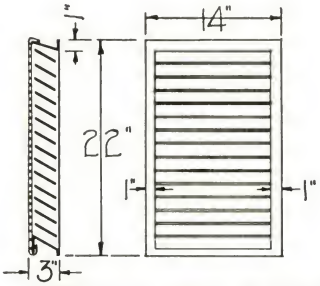
HER-NEL-CO VENTILATOR

WITH HAND CONTROL

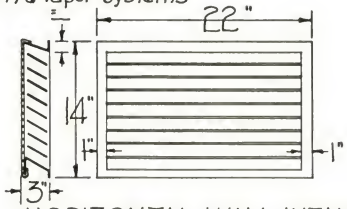
FOR AUTOMATIC CONTROL SEE MODEL K DIMENSION SHEET ••



REAR ELEVATION
Vacuum or Vapor System.

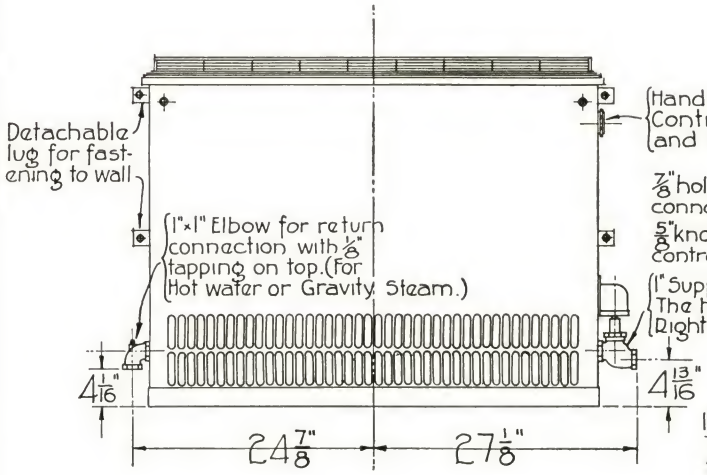


VERTICAL WALL INTAKE

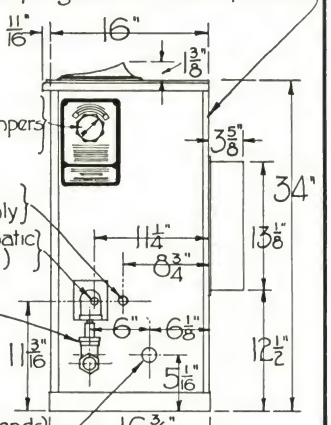


HORIZONTAL WALL INTAKE

Allow 3/8" on all roughing dimensions for gasket on back of cabinet.

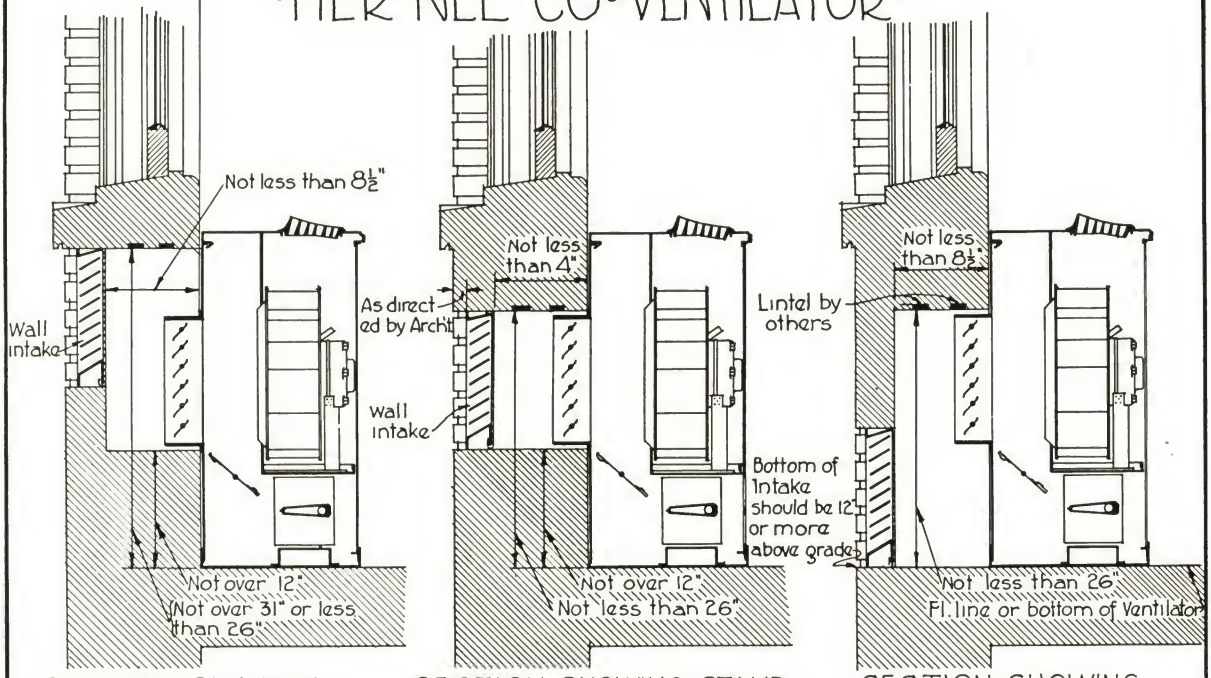


FRONT ELEVATION
Gravity Steam or Hot Water.



END ELEVATION

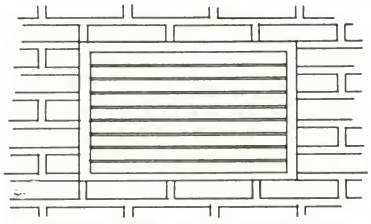
MODEL J APPLICATIONS
HER-NEL-CO VENTILATOR



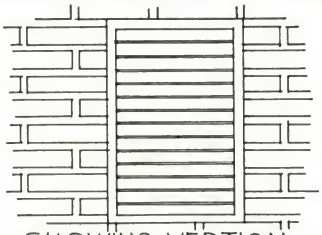
SECTION SHOWING HIGH LOCATION OF INTAKE

SECTION SHOWING STANDARD LOCATION OF INTAKE

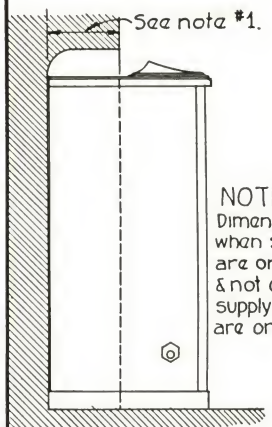
SECTION SHOWING LOW LOCATION OF INTAKE



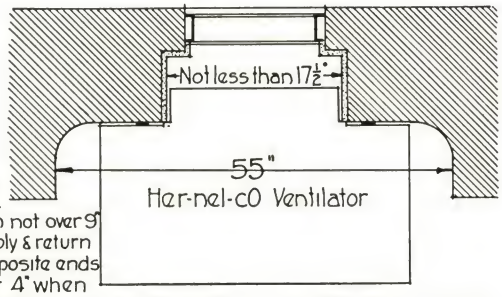
SHOWING HORIZONTAL WALL INTAKE



SHOWING VERTICAL WALL INTAKE



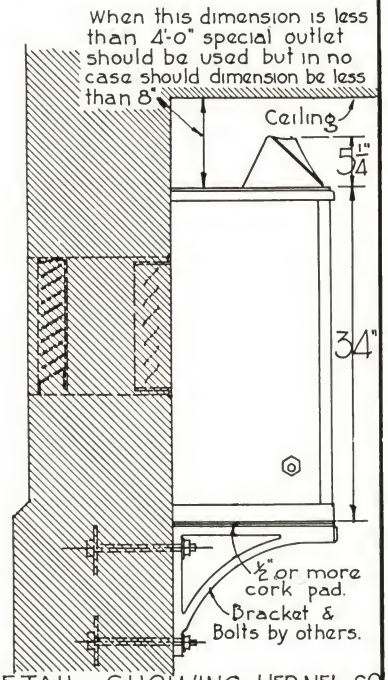
VERTICAL SECTION SHOWING APPROVED METHOD OF RECESSING



NOTE #1
Dimension not over 9" when supply & return are on opposite ends & not over 4" when supply & return are on same end.

HORIZONTAL SECTION THRU WALL INTAKE & SHOWING APPROVED METHOD OF RECESSING

It is advisable to build recess larger than cabinet as shown. If this cannot be done openings should be cased to insure neat fit.



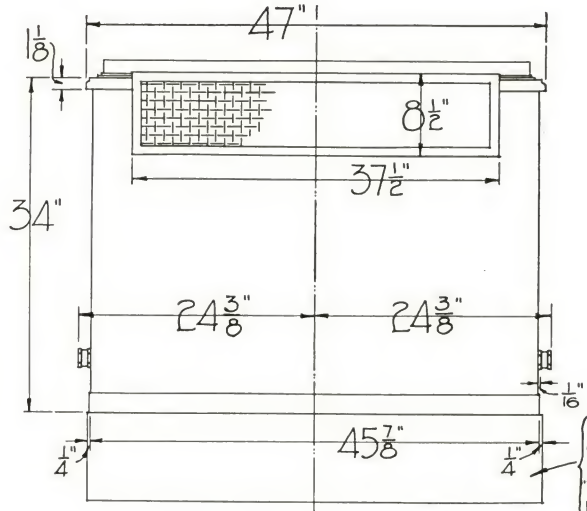
DETAIL SHOWING HER-NEL-CO VENTILATOR NEAR CEILING WITH SUPPORTING BRACKETS AND SPECIAL OUTLET

MODEL K DIMENSIONS

HER-NEL-CO VENTILATOR

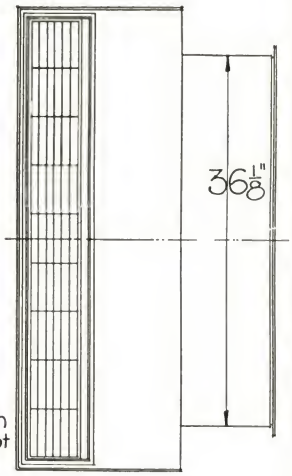
ARRANGED FOR AUTOMATIC CONTROL

FOR HAND CONTROL SEE MODEL J DIMENSION SHEET.

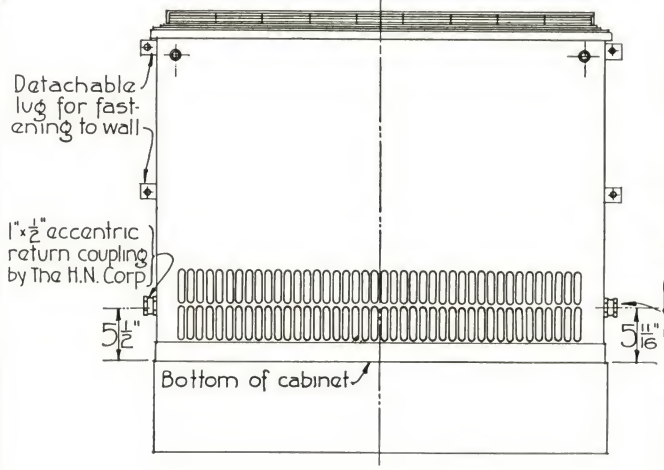


REAR ELEVATION

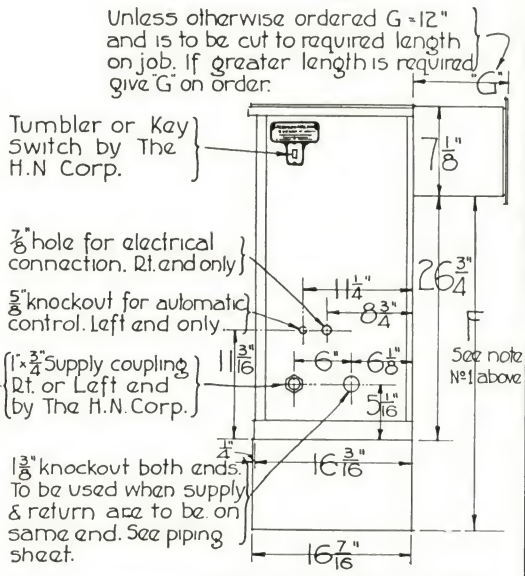
NOTE Nº 1
Sub bases furnished on special order only. Always give dimension "F" on order. F should not be more than 50"



PLAN

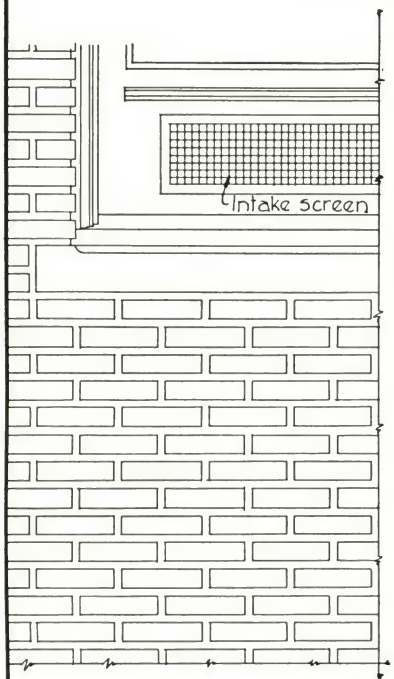


FRONT ELEVATION

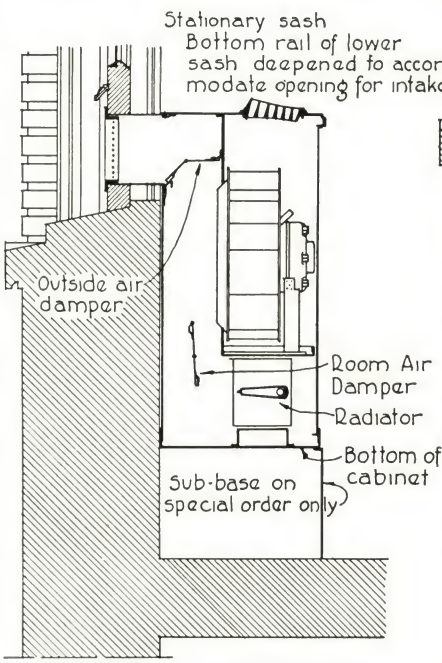


END ELEVATION

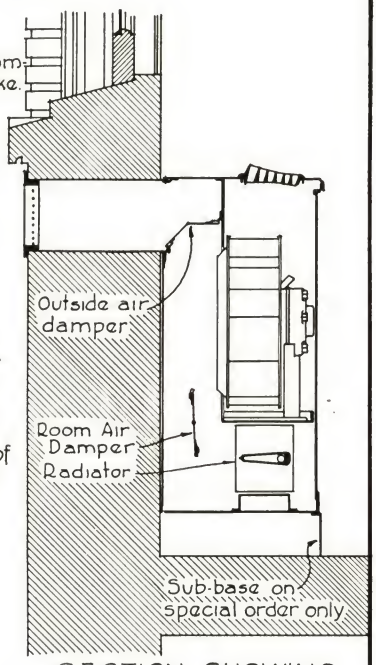
MODEL K APPLICATIONS
HER-NEL-CO VENTILATOR



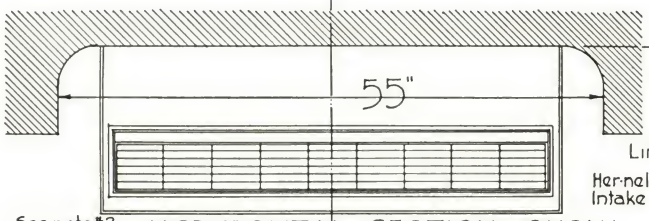
ELEVATION OF EXTERIOR SHOWING HER-NEL-CO VENTILATOR INTAKE



SECTION SHOWING HER-NEL-CO VENTILATOR WITH INTAKE THRU LOWER RAIL OF WINDOW SASH

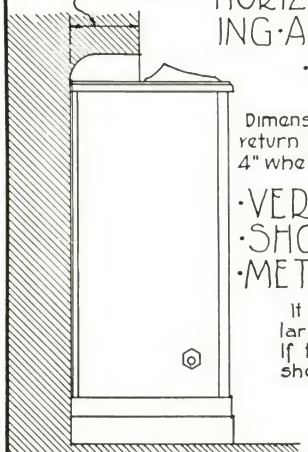


SECTION SHOWING HER-NEL-CO VENTILATOR WITH INTAKE THRU WALL BELOW WINDOW SILL



HORIZONTAL SECTION SHOWING APPROVED METHOD OF RECESSING

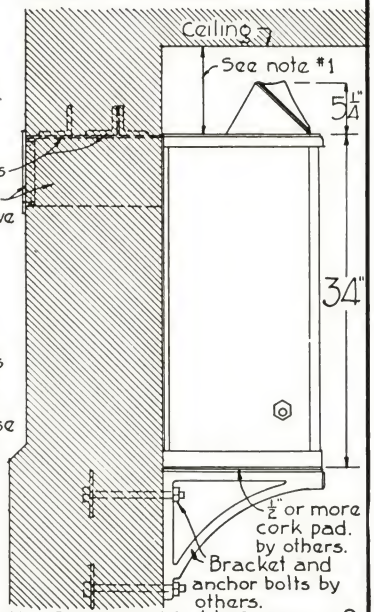
NOTE #2
Dimension not over 9" when supply & return are on opposite ends & not over 4" when supply & return are on same end.



VERTICAL SECTION SHOWING APPROVED METHOD OF RECESSING

It is advisable to build recess larger than cabinet as shown If this cannot be done openings should be cased to insure neat fit

NOTE #1
When the above dimension is less than 4'-0" special outlet should be used, but in no case should dimension be less than 8".



DETAIL SHOWING HER-NEL-CO VENTILATOR NEAR CEILING WITH SUPPORTING BRACKET AND SPECIAL OUTLET

How to Select Her-Nel-Co Ventilators

As outlined in the preceding section of this catalogue, the first requirement of good ventilation is the maintenance of a proper state of atmospheric activity. This can only be insured, in large occupied areas, such as school class rooms, by some well developed means of mechanical agitation. The Her-Nel-Co System of Ventilation employs the high velocity, vertical jet principle of air diffusion which, when properly applied, insures uniform atmospheric activity, without attendant drafts. This is the same method that has proved so successful with the well known Univent System of Ventilation. Experience has shown that the most agreeable and invigorating effect is obtained when the air is circulated at a rate of not less than five nor more than ten room volumes per hour. Therefore, the rule in selecting Her-Nel-Co Ventilators is as follows:

RULE

The rated air delivery capacity of the Her-Nel-Co Ventilator (or Ventilators), in c. f. m. should equal from $\frac{1}{12}$ to $\frac{1}{6}$ of the cubic contents of the room served.

For example, if the cubic contents of a class room is 8400 cu. ft., the Her-Nel-Co Ventilator should have a capacity of not less than 700 c. f. m.

The second requirement of good ventilation demands the introduction of sufficient outdoor air, when required, to remove excess body heat and odors due to occupancy. Obviously a system which depends entirely upon outdoor air for cooling has limitations and it is impossible to maintain a temperature of 70° F. in an occupied room when the outdoor temperture is 70° F. or more. As a matter of fact, it is impractical to do so when the outdoor temperature closely approaches 70° F. Under such conditions, the indoor temperature must be expected to rise unless refrigeration is employed. In the case of schools, which are not generally occupied in hot weather, and, in other cases where partial relief is desirable but the cost of refrigeration is not warranted, this limitation is not important. It is usually satisfactory, in schoolhouse practice, to maintain a temperature of approximately 70° F. so long as the outdoor temperature is below 60° F. In the exceptional cases, when it is higher than this, windows may be safely opened or some overheating may be endured without material discomfort.

Typical class rooms are usually so proportioned that an air change of five (5) to ten (10) room volumes per hour will provide from 17 to 34 c. f. m. of outdoor air per occupant, which insures comfort within practical limits.

The curves on the acompanying chart (see opposite page) show the outdoor temperature for which a room temperature of approximately 70° F. can be maintained in a fully occupied typical class room with various amounts of outdoor air per pupil.

As shown on the chart, 17 c. f. m. per pupil will maintain a room temperature of approximately 70° F. when the outdoor temperature is 59° F. without sun and 55° F. with intense sun. These conditions usually are satisfactory. Therefore, in most instances, the minimum rate of five (5) air changes per hour will satisfactorily fulfill the cooling requirement for good ventilation provided, however, a room is not receiving heat from adjoining boiler rooms or other sources.

When consulting the capacity table on page 15, it will be noted that the Her-Nel-Co Ventilator is listed with two heating capacities for each air delivery rating. The listed heating capacities are enough to take care of the average school class room in mild climates. In more severe climates and in severely exposed rooms in mild climates the use of supplementary direct radiation is assumed. Experience has demonstrated that it is not advisable to provide more heating capacity in the ventilating apparatus than is listed because the necessarily higher outlet temperatures mitigate against proper air diffusion. More heating capacity can easily be provided within the apparatus but the results will not be as satisfactory. In choosing between the two heating capacity ratings, where the total heating load is but slightly in excess of the larger, it is better to use the smaller rating with a larger direct radiator.

It should be kept in mind that no room can be properly ventilated unless it is properly heated. Consequently, care should be exercised to see that the combined heating capacity of the Her-Nel-Co Ventilator and supplementary radiation is sufficient to provide for the heat losses through the exposed surfaces and infiltration and for reheating. It is recommended that the heating load for heat transmission losses and infiltration be calculated in accordance with the rules of the A. S. H. & V. E. The infiltration with the Her-Nel-Co System of Ventilation is substantially the same as with direct radiation. With reference to the extra radiation to be provided for reheating we recommend the following formula:

$R_1 = (70 - t_0)\ C \div 13200.$

In this formula, C = cubic contents of room, t_0 = minimum outdoor temperature for which the system is to be designed, and, R_1 = extra sq. ft. of direct steam radiation (or equivalent) required for reheating. See examples, pages 24, 25 and 26.

The use of vent outlets of any kind in rooms to be ventilated with Her-Nel-Co Ventilators is not recommended. They are not necessary when supplying outdoor air and are a detriment when recirculating. Under no circumstances should an exhaust system be installed in connection with the Her-Nel-Co Ventilators unless it is to be used in warm weather only. If, in very unusual cases it should be found that the full amount of air cannot be delivered by the ventilator without a vent, sufficient relief will be afforded by providing a small opening in, or by slightly shortening a door leading into a corridor.

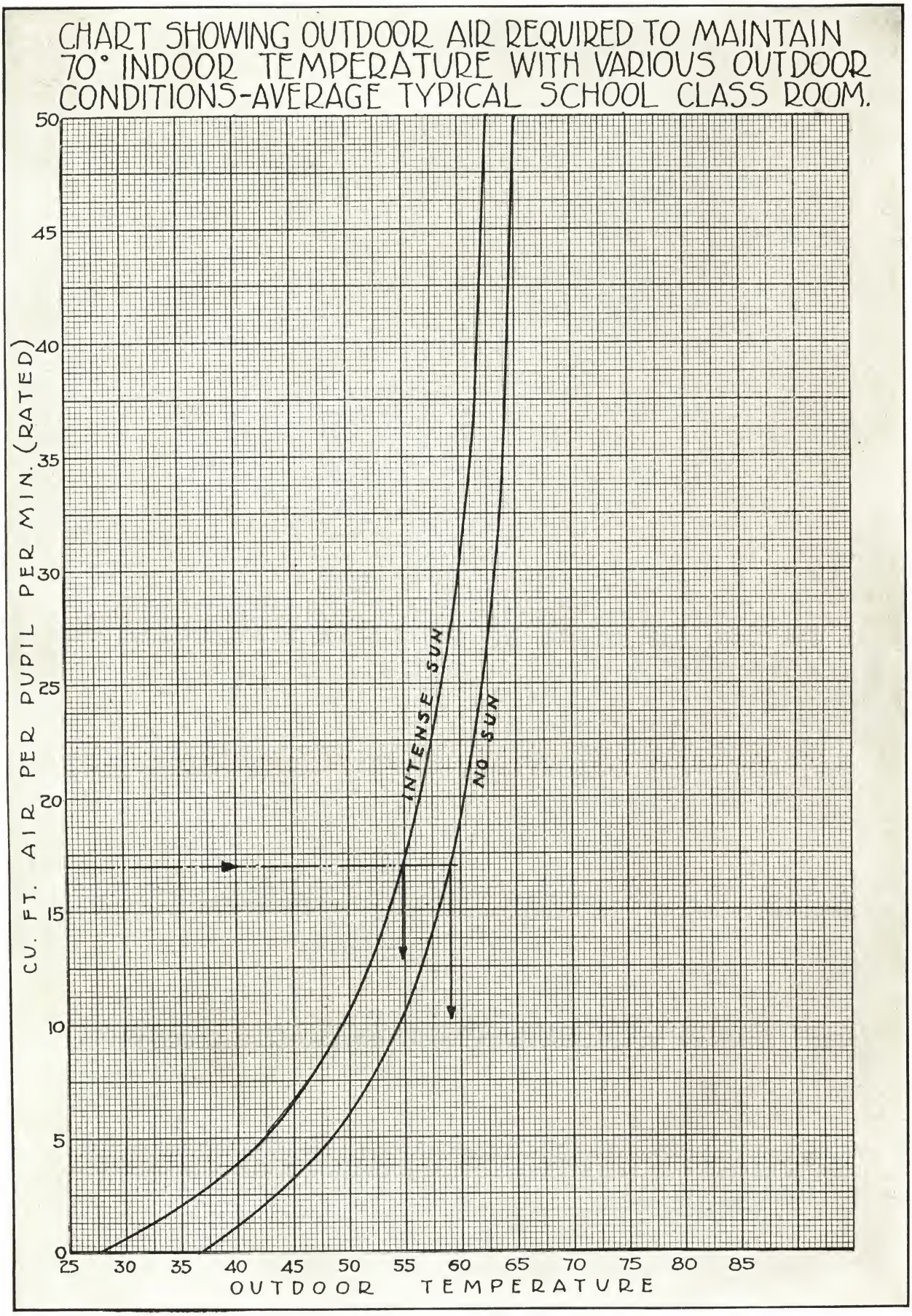


CHART SHOWING OUTDOOR AIR REQUIRED TO MAINTAIN 70° INDOOR TEMPERATURE WITH VARIOUS OUTDOOR CONDITIONS-AVERAGE TYPICAL SCHOOL CLASS ROOM.
CU. FT. AIR PER PUPIL PER MIN. (RATED)
0
5
10
15
20
25
30
35
40
45
50
INTENSE SUN
NO SUN
25 30 35 40 45 50 55 60 65 70 75 80 85
OUTDOOR TEMPERATURE

How to Apply Her-Nel-Co Ventilators

There are several principles underlying the proper application of the Her-Nel-Co System of Ventilation using Her-Nel-Co Ventilators.

First Principle

Use one or more Her-Nel-Co Ventilators for each room to be ventilated.

Each room or space should be provided with its own ventilating system, independent of the systems in all the other rooms or spaces, which provides properly controlled ventilation in keeping with the requirements of each individual space.

The use of one ventilator to serve two or more spaces defeats this principle by substituting group room control for unit room control.

Second Principle

Do not add duct extensions to the Her-Nel-Co Ventilator outlets because they interfere with proper air diffusion.

The air should be thoroughly diffused throughout the room by some properly developed method otherwise the proper degree of atmospheric activity will not be maintained and temperature stratification will lower the efficiency of the system. The vertical jet principle of air diffusion is employed in the Her-Nel-Co System of Ventilation. Anything that interferes with this jet such as an outlet duct will impair the effectiveness of the apparatus.

Third Principle

All Her-Nel-Co Ventilators should be installed in such a manner that they may be easily and quickly inspected and cleaned.

Partial recessing, as illustrated on pages 17 and 19, may be accomplished without jeopardizing the accessibility of the system but full recessing or concealment is not recommended.

It has been our experience that whenever apparatus of this character is fully recessed or concealed it is not given the proper care. Full recesses provide dirt collecting spaces and if the machines are not readily accessible they will not receive proper attention.

Fourth Principle

The location of the Her-Nel-Co Ventilator on an outside wall is preferred.

However, if the supplementary radiators represent at least one-half of the total heating capacity and are located under windows, the Her-Nel-Co Ventilators may be located on inside walls. See page 26.

It is preferred to locate Her-Nel-Co Ventilators on outside walls for the following reasons:

(a) The piping is simplified because the ventilator and supplementary radiation will all be on the same wall.

(b) No flues of any kind are required, resulting in considerable saving in space and building costs.

(c) Outdoor air is drawn directly into the ventilator at outdoor temperature, whereas, air drawn through ducts is subject to a temperaure rise of several degrees before entering the ventilator and will therefore be less effective for cooling purposes.

On the other hand, locating ventilators on inside walls eliminates wall intakes and in a very few instances this may be considered desirable. If located on inside walls, each Her-Nel-Co Ventilator should be supplied with an independent duct extended out-of-doors in the most direct manner. The ducts should be smooth and have not less than 30 sq. in. of net cross sectional area for each 100 c.f.m.

Fifth Principle

Her-Nel-Co Ventilators should be located at good distribution centers and not in a corner of the room.

This principle requires little discussion. It is self-evident that more uniform diffusion can be expected if the ventilators are centrally located.

Sixth Principle

The Her-Nel-Co Ventilator should be located where it will be exposed to view.

Psychology plays a part in ventilation. People appreciate it more if they observe the process of ventilation. For this reason the Her-Nel-Co Ventilator should be located where it will be exposed to view and where its operation will be obvious to the casual observer.

Seventh Principle

Vent outlets are rarely required.

It is true that all the outdoor air pushed into the room by the Her-Nel-Co Ventilator when cooling is required must leave the room in some way or other. However, contrary to common conception it is rarely necessary to provide openings or apertures to serve this purpose.

Experience has demonstrated that vents are seldom required because the excess air easily finds its way out through cracks and crevices around windows and doors. Moreover, it has been shown that the distribution is far better where there are no vents.

Basement or Ground Floor Rooms

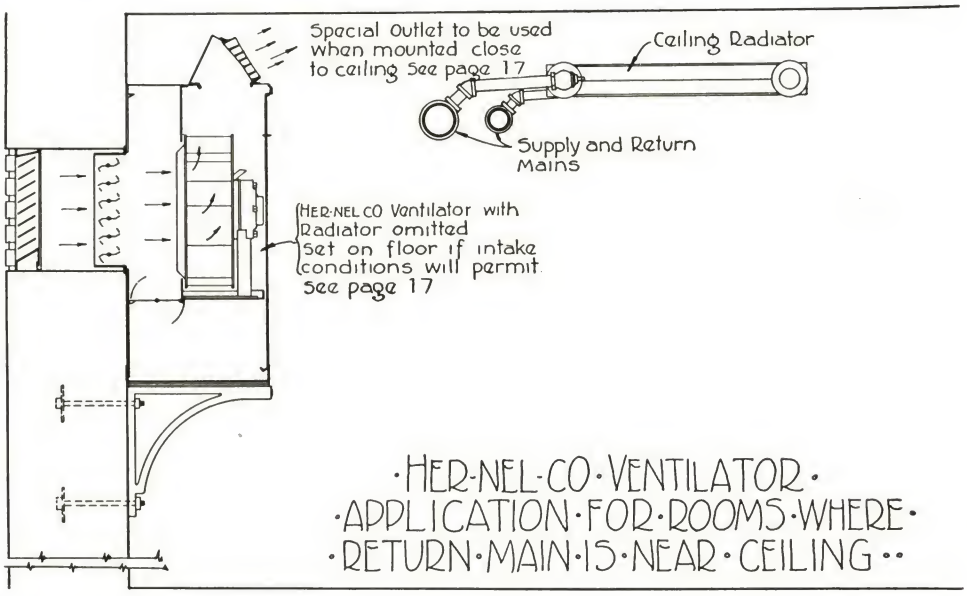
Difficulty may be encountered in applying Her-Nel-Co Ventilators to basement or ground floor rooms. If the grade level outside the building is higher than the basement floor level some special means must be employed to admit air to the Her-Nel-Co Ventilator. The most obvious way of acomplishing this is to locate the ventilator high enough on the wall to permit the use of the Model "J" machine as shown on page 17. Under some conditions it may be preferable to use the Model "K" as shown on page 19 in the same manner.

Where it is not practical to locate the intake within the room it may be necessary to place the Her-Nel-Co Ventilator on an inside wall with a duct extended to a suitable point of intake. This duct should be as smooth and direct as possible and have at least 30 sq. in. of net cross sectional area for each 100 c.f.m.

As a rule, the return piping is low enough to permit the Her-Nel-Co Ventilators in the basement rooms to be piped in the standard manner. However, in instances where the return piping is too high, special arrangements become necessary. A careful study of the principles of the Her-Nel-Co System of Ventilation will disclose the fact that the radiator may be omitted from the ventilator without impairing the effectivness of the system providing sufficient direct radiation is installed in the room to take care of the heating and reheating load. Therefore, when piping difficulties require it, the Her-Nel-Co Ventilator may be installed as shown below with the radiator omitted.

Existing Buildings

There are many existing buildings that are adequately heated but which are not properly ventilated. In many such cases it is an easy matter to apply the Her-Nel-Co System of Ventilation because it does not require any extra capacity in the chimney, or boiler, and the same system of piping which serves the direct radiation can be made to serve the Her-Nel-Co Ventilators.



Notes on School Application

As previously explained, the Her-Nel-Co Ventilator should be selected to have sufficient capacity to circulate the air in any room at the rate of not less than five nor more than ten room volumes per hour.

The room served should be provided with sufficient heating capacity to take care of the transmission losses, infiltration and reheating loads.

Class Rooms

In class rooms that are proportioned to the number of occupants in the usual way, it will be found that an air supply based on a rate of circulation of five room volumes per hour will provide approximately 17 c.f.m. per occupant, which is usually satisfactory, as explained on page 20.

In the average class room in cold climates it will probably be found that supplementary radiation will be required to adequately provide for the heating load because of the limitations placed upon the heating capacity in the ventilators in the interests of good ventilation. In the average class room in milder climates, and in smaller class rooms, in colder climates, supplementary radiation may not be required. Examples of the selection of the Her-Nel-Co Ventilators for two typical class rooms will be found on pages 24 and 25.

Study Rooms, Lecture Rooms, etc.

Study rooms, lecture rooms, etc., should be treated as large class rooms. On page 26 a typical study hall application is illustrated. It should be noticed that in this application the Her-Nel-Co Ventilators are located on the inside walls as discussed on page 22.

Other Large Rooms

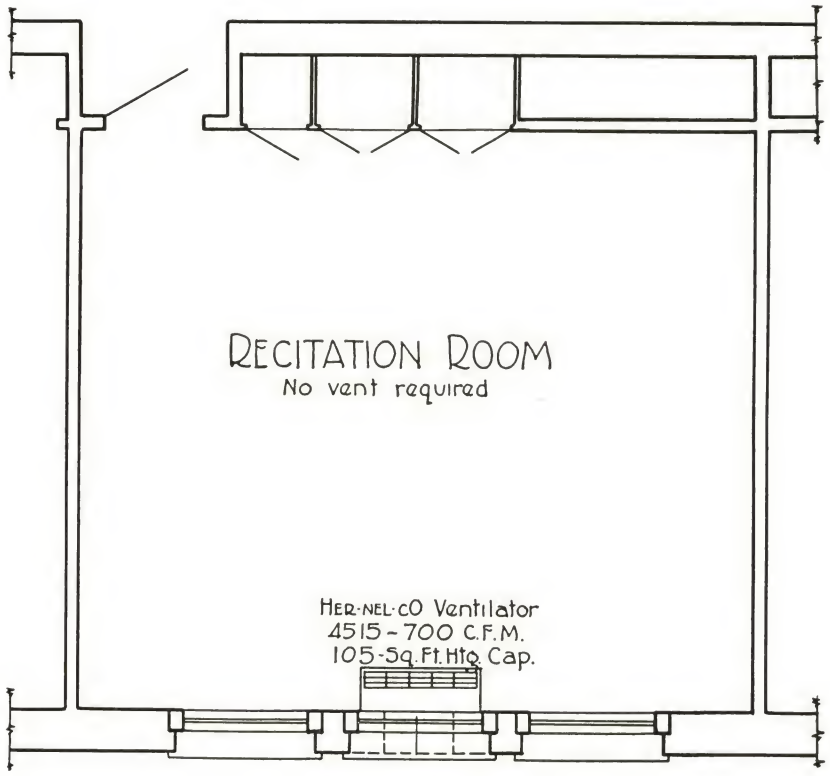
Manual arts rooms, shops, physical laboratories, gymnasiums, auditoriums and other large rooms where no injurious or obnoxious fumes are released should be ventilated in the same manner as class rooms. In this character of space the ratio of cubic contents to occupants is usually high. As a result, the air capacity required to circulate the air in a room at the rate of five volumes will usually provide more than 17 c.f.m. per occupant. In rooms of this kind the duration and frequency of the periods of occupancy by the individual pupil does not, from a health standpoint, render ventilation as important as in class rooms, although, from a pure comfort standpoint, ventilation may be more necessary during the periods of occupancy than in class rooms.

Therefore, while ventilation is not considered as important in an auditorium as in a class room, it is highly desirable.

Selection of Her-Nel-Co Ventilator
SMALL RECITATION ROOM (70° F.)

0° F. Assumed Outdoor Temperature.

Prevailing Winds—Northwest. Room Exposure—East.



Physical Data

One wall exposed—heated space above and below.
Dimensions—21 × 18 × 12 ft. = 4536 cu. ft.
Total window opening = 105 sq. ft.
Windows—double hung, wood sash, weather stripped.
Lineal ft. of weather stripped crack = 81.
Outside wall—13 in. brick furred with metal lath and plaster.
Net exposed wall area = 147 sq. ft.

Selection of the Ventilator

1. DETERMINATION OF AIR DELIVERY REQUIRED.

Minimum air delivery (5 room volumes per hour) $= \frac{4536}{12} = 378$ c.f.m.

Maximum permissible air delivery (10 room volumes per hour) $= \frac{4536}{9} = 756$ c.f.m.

One (1) Her-Nel-Co Ventilator, having the minimum air delivery of 700 cu. ft. of air per minute will be satisfactory because it will circulate the air within the range of five (5) to ten (10) room volumes per hour. A lower air capacity could be used, but 700 c.f.m. is the lowest permissible air delivery of the Her-Nel-Co Ventilator. See page 15.

2. HEATING CAPACITY REQUIRED.

Heat losses based on 0° to 70° F. with 15 mile wind—A. S. H. & V. E. 1930 Guide.

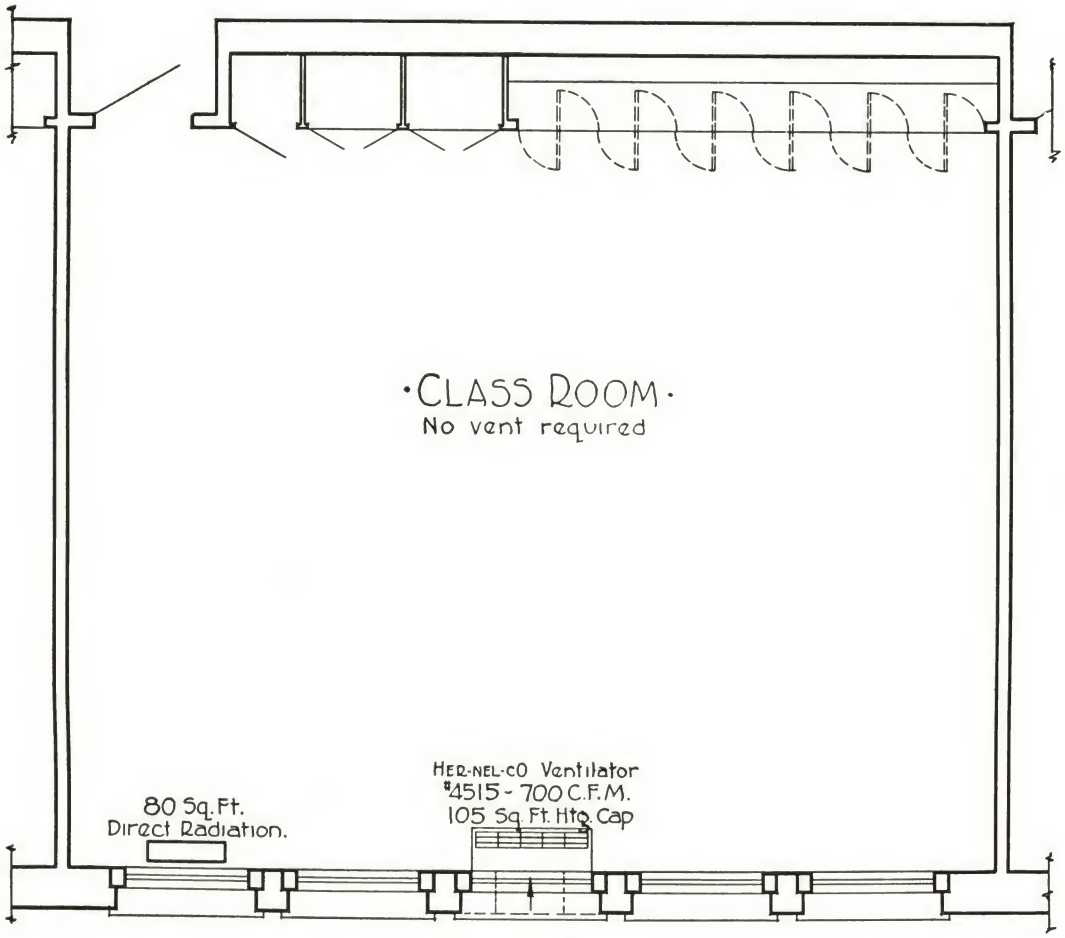
Windows	105 × 1.13 × 70 ÷ 240	= 34.6 sq. ft.	equivalent direct radiation	
Wall	147 × .216 × 70 ÷ 240	= 9.3 sq. ft.	"	"
Infiltration	81 × 29.1 ÷ 240	= 9.8 sq. ft.	"	"
Additional capacity for quick heating	$\frac{4536 \times 70}{13200}$	= 24.1 sq. ft.	"	"
	TOTAL	= 77.8 sq. ft.	equivalent direct radiation	

Heating capacity of No. 4515 Her-Nel-Co Ventilator.... = 105 sq. ft.

No supplementary radiation is required and the surplus capacity in the machine selected is in no way objectionable.

Selection of Her-Nel-Co Ventilator
TYPICAL CLASS ROOM (70° F.)

0° F. Assumed Outdoor Temperature.
Prevailing Winds—Northwest. Room Exposure—West.



Physical Data

One wall exposed—heated space below—exposed ceiling.
Dimensions—23 × 29 × 12 ft. = 8338 cu. ft.
Total window opening = 177 sq. ft.
Windows—double hung, wood sash, weather stripped.
Lineal feet of weather stripped crack = 137.
Outside wall—13 in. brick furred with metal lath and plaster.
Net exposed wall area = 186 sq. ft.
Ceiling—5 in. concrete slab with ½ in. insulation and suspended ceiling.
Net exposed ceiling area = 667 sq. ft.

Selection of the Ventilator

1. DETERMINATION OF AIR DELIVERY REQUIRED.

Minimum air delivery (5 room volumes per hour) $= \frac{8338}{12} = 695$ c.f.m.

Therefore one (1) Her-Nel-Co Ventilator, having an air delivery of 700 cu. ft. or air per minute will be satisfactory.

2. HEATING CAPACITY REQUIRED.

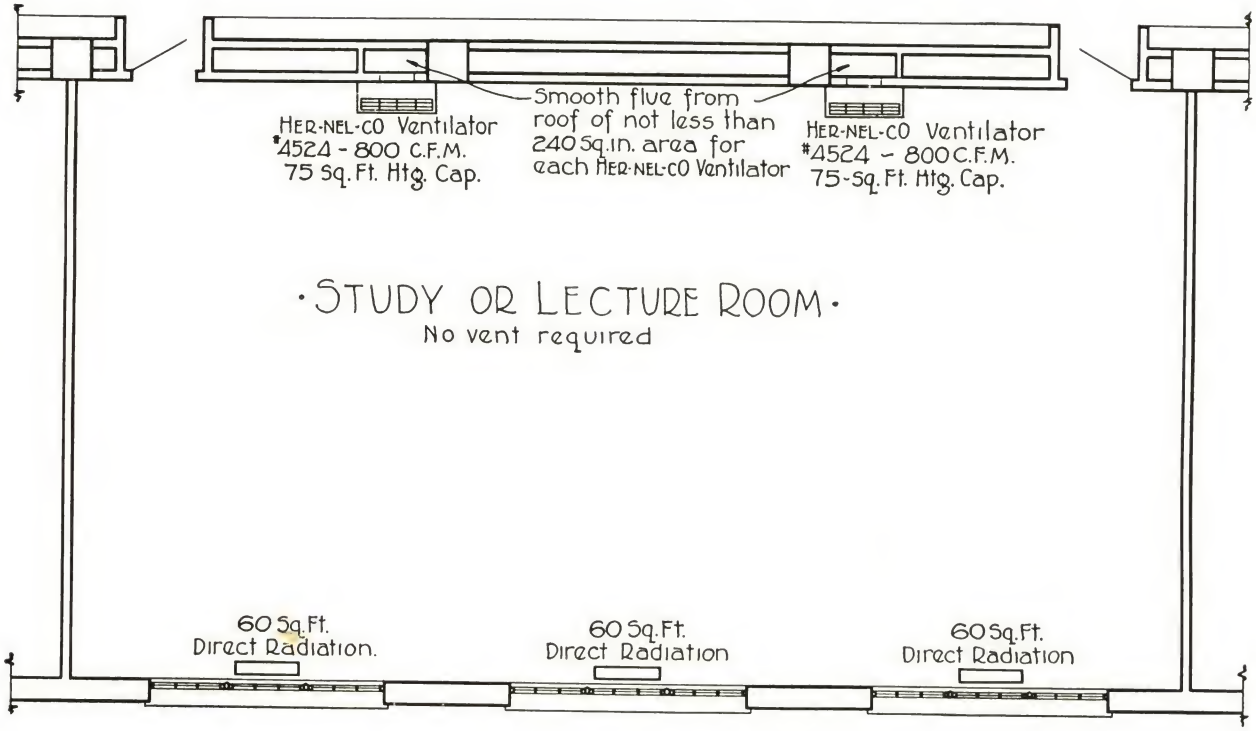
Heat losses based on 0° to 70° F. with 15 mile wind—A. S. H. & V. E. 1930 Guide.

Windows	177 × 1.13 × 70 ÷ 240	= 58.4 sq. ft.	equivalent direct radiation
Wall	186 × .216 × 70 ÷ 240	= 11.7 sq. ft.	" " "
Infiltration	137 × 29.1 ÷ 240	= 16.6 sq. ft.	" "
Total of above		86.7 sq. ft.	equivalent direct radiation
Allowance for windward exposure (15%)		= 13.0 sq. ft.	" " "
Ceiling	667 × .216 × 70 ÷ 240	= 42.0 sq. ft.	" " "
Additional capacity for quick heating	$\frac{8338 \times 70}{13200}$	= 44.2 sq. ft.	" " "
TOTAL		= 185.9 sq. ft.	equivalent direct radiation
Heating capacity of Her-Nel-Co Ventilator No. 4515		= 105.0 sq. ft.	
Supplementary radiation required		= 80.9 sq. ft.	
Supplementary radiation installed		= 80. sq. ft.	

Note. In this case larger sizes of machines could be used if desired, as follows:
No. 4525 with 70 sq. ft. supplementary radiator. No. 4535 with 65 sq. ft. supplementary radiator.

Selection of Her-Nel-Co Ventilator
TYPICAL STUDY OR LECTURE ROOM (70° F.)

0° F. Assumed Outdoor Temperature.
Prevailing Wind—West. Room Exposure—West.



Physical Data

One wall exposed—heated space above and below.
Dimensions—28 × 50 × 12½ ft. = 17500 cu. ft.
Total window opening = 280 sq. ft.
Windows—steel sash, not weather stripped.
Lineal feet of crack = 114.
Outside wall—17 in. brick furred with metal lath and plaster.
Ceiling—6 in. concrete slab with 2 in. cork insulation and suspended ceiling.
Net exposed ceiling area = 1400 sq. ft.
Net exposed wall area = 345 sq. ft.
Assume that it is desired to locate the Her-Nel-Co Ventilators on the inside wall.

Selection of the Ventilator

1. DETERMINATION OF AIR DELIVERY REQUIRED.

Minimum air delivery (5 room volumes per hour) $= \frac{17500}{12} = 1458$ c.f.m.

Therefore two (2) Her-Nel-Co Ventilators having an air delivery of 800 cu. ft. of air per minute each, totaling 1600 c.f.m. will be satisfactory.

2. HEATING CAPACITY REQUIRED.

Heat losses based on 0° to 70° F. with 15 mile wind—A. S. H. & V. E. 1930 Guide.

Windows	280 × 1.13 × 70 ÷ 240 =	92.2 sq. ft.	equivalent direct radiation
Wall	345 × .184 × 70 ÷ 240 =	18.6 sq. ft.	" " "
Infiltration	114 × 111 ÷ 240 =	52.7 sq. ft.	" " "
Total of above	=	163.5 sq. ft.	equivalent direct radiation
Allowance for windward exposure (15%)	=	24.5 sq. ft.	" " "
Ceiling	1400 × .101 × 70 ÷ 240 =	41.3 sq. ft.	" " "
Additional capacity for quick heating	$\frac{17500 \times 70}{13200}$ =	92.8 sq. ft.	" " "
TOTAL	=	322.1 sq. ft.	equivalent direct radiation
Heating capacity of Two Her-Nel-Co Ventilators No. 4524 = 2 × 75	=	150 sq. ft.	
Supplementary radiation required	=	172.1 sq. ft.	equivalent direct radiation
Supplementary radiation installed	3 × 60 =	180 sq. ft.	equivalent direct radiation (should not be less than ½ of total load)

Since the Her-Nel-Co Ventilators are to be located on the inside wall, it is advisable to install one supplementary radiator under each group of windows. Outdoor air should be supplied to each Her-Nel-Co Ventilator by an individual flue, of not less than 240 sq. in. net area, based on 30 sq. in. per 100 c.f.m.

Temperature Regulation

Drafts in cold weather and overheating in mild weather have caused more annoyance and discomfort in school class rooms than all other atmospheric conditions combined. Accurate temperature control is the essence of the science and the crux in the art of ventilation. The manner in which this problem is met in the Her-Nel-Co System of Ventilation is an outstanding achievement and a great improvement over most, if not all, systems, heretofore offered.

Drafts are avoided through the admission of only as much outdoor air as is actually required for the removal of excess heat and odors, the thorough mechanical intermixture of this air with recirculated air prior to delivery and a high velocity, vertical delivery that insures complete and uniform diffusion in the room. In very severe weather, when drafts are most annoying and most liable to occur in conventional practice, little or no outdoor air is required or delivered by this system and no difficulty is involved. In normal weather more outdoor air is admitted but it is completely intermixed with sufficient recirculated air within the fan wheel to insure delivery at a uniform mild temperature without cold spots. In warmer weather when the full supply of fresh air is needed, there is little danger from drafts and by reason of the manner in which the air is delivered in the form of a jet to the ceiling, there are none.

Overheating is minimized because, as soon as weather conditions are such as to permit of overheating, all artificial heating sources are completely shut off and outdoor air, which is at a lower temperature than that indoor, is delivered directly into the upper region of the room for cooling purposes.

Automatic Temperature Regulation Is Recommended

The various operations by which the Her-Nel-Co System of Ventilation affords accurate temperature control of the room atmosphere, under different conditions, is fully illustrated and described in the first section of this catalog (pages 10 and 11). As stated therein, the system may be entirely manually or automatically operated but in either event, the various steps are mechanically co-ordinated and regulation is comparatively simple. The use of a first-class system of automatic temperature regulation is always recommended with any heating and ventilating system for schools. In this manner, all elements of control are taken care of at all times, without personal attention. With the improvements which have been made in automatic temperature regulation equipment and the simple mechanical construction of the Her-Nel-Co Ventilator, the liability for any trouble with automatic temperature control is negligible, while the advantages through its use are pronounced. The Her-Nel-Co System of Ventilation can be properly controlled by any of the well known systems of automatic temperature regulation and requires no special equipment. An intermediate thermostat, valves on the direct radiators and the radiator in the ventilator, together with a single damper control motor are all that are needed in the way of room equipment.

For manual control the entire cycle of operations in the Her-Nel-Co Ventilator is covered through the single movement of a dial located on the right hand end of the cabinet as illustrated on page 12. In this case, however, it is necessary to regulate any direct radiators independently. Since the latter are only used in severe weather and for reheating, this offers no serious complication. There is no hesitation in fully recommending manual control because of any shortcomings in the equipment, but rather because it may be difficult if not impossible for busy teachers to give it proper attention.

In connection with the subject of temperature regulation, it should be pointed out that a first-class vacuum or vapor system of steam circulation is much to be preferred to either gravity steam or hot water. Where accurate control is important, neither of the latter is sufficiently flexible or responsive to afford as dependable regulation as the more modern types of steam systems. However where special vapor or vacuum systems are employed in connection with ventilating equipment, it has been found more satisfactory to carry pressures slightly above atmosphere.

In the case of gravity steam systems, an intermediate action of the valve controlling the supply to the radiator is not practical and, therefore, it is necessary to provide for a lag in operation, which prevents securing the same economy in fuel as is provided where this lag is not necessary. The Her-Nel-Co Ventilator is adaptable to gravity steam systems and can be adjusted to provide for the lag mentioned above but, in view of the greater economy of vacuum and vapor systems and their slight additional cost, the latter are strongly recommended.

As an additional refinement in control, the use of Herman Nelson Invisible Radiators (see pages 79 to 86) or equivalent type is recommended in preference to cast iron radiators wherever supplementary radiators are necessary. The invisible radiators add a little to the cost, but they are more responsive to temperature control and have other advantages which commend them for this class of work.

Finally, it should be realized that comfort cannot be insured in any room if the system of steam circulation is improperly designed or operated, if insufficient heating capacity is provided, or, if the building is very poorly constructed. Therefore, these elements should receive the careful attention of the architect and engineer. On the other hand, uncovered steam pipes, floors over boiler rooms, etc., may render temperature control ineffective. Care should be exercised that no uncontrollable sources of heat shall interfere with proper temperature control.

Wiring Data

Method

The method of wiring recommended for Her-Nel-Co Ventilator motors is the same as that recommended for any standard motor. Due to their special electrical characteristics, Her-Nel-Co single phase motors may be connected to the several phases of a two or three phase service as shown below. Where Her-Nel-Co Ventilators are used it is recommended that circuits, independent of the lighting system, be provided. It is advisable on large jobs to provide a separate circuit for each group.

Electrical wall outlets should be installed at each Her-Nel-Co Ventilator close to the floor and at the right-hand end of the cabinet, as one stands facing it. Connections between such wall outlets and the cabinets should be in rigid, flat, or flexible conduits.

Her-Nel-Co Ventilator motors are furnished for the following current characteristics:

Type of current	Number of phases	Frequency	Voltage	Code word	Approx. amperes per lead
Alternating	1	25	110	Macar	3.10
			220	Macho	1.55
		30	110	Macle	2.00
			220	Maize	1.00
		50	110	Maleo	2.60
			220	Malic	1.30
		60	110	Malva	2.20
			220	Mango	1.10

Note: The above data will be found useful in determining wire, switch and fuse sizes, etc.

Wire Sizes

All Her-Nel-Co Ventilator motors should be wired as shown below. All wires should be so sized that the maximum voltage drop at the last motor on the line does not exceed 3 volts.

Switches

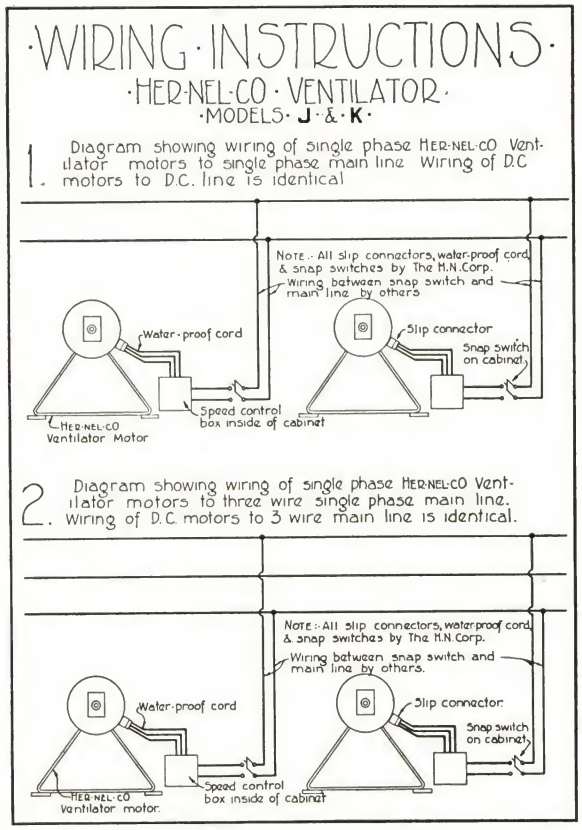
When ordered for hand control, the electrical switch is incorporated in the hand control equipment. When ordered for automatic temperature control, all cabinets are provided with flush type key switches to start and stop the motor as shown on page 18. Tumbler switches are provided on special order.

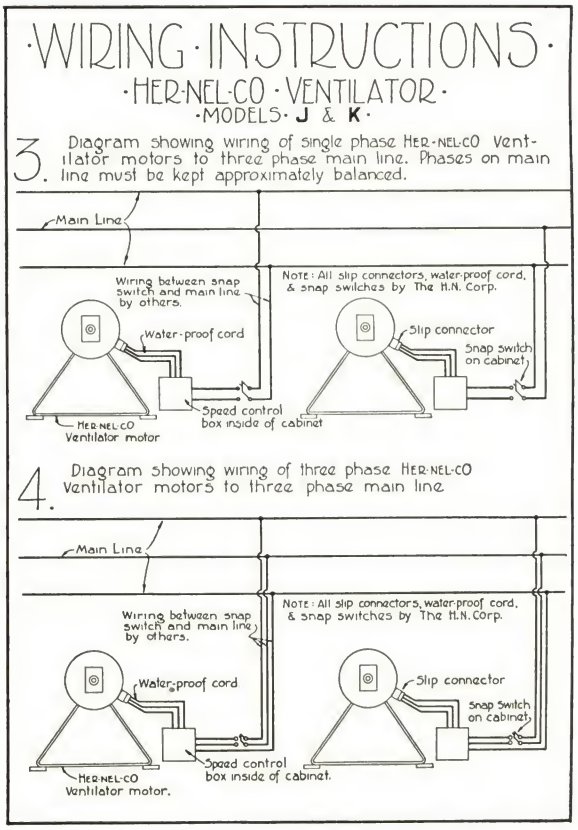
Speed Adjustment

All Her-Nel-Co Ventilator motors are of the adjustable speed type and are shipped from the factory with the approximately correct speed adjustment. Full instructions are furnished with each motor.

Approvals

The Her-Nel-Co Ventilator is approved by the National Board of Fire Underwriters of the United States and the Hydro Electric Power Commission of Ontario, Canada.





Piping Suggestions

In general, Her-Nel-Co Ventilators are piped exactly the same as radiators having the same heating capacity.

Supply Valves and Tappings

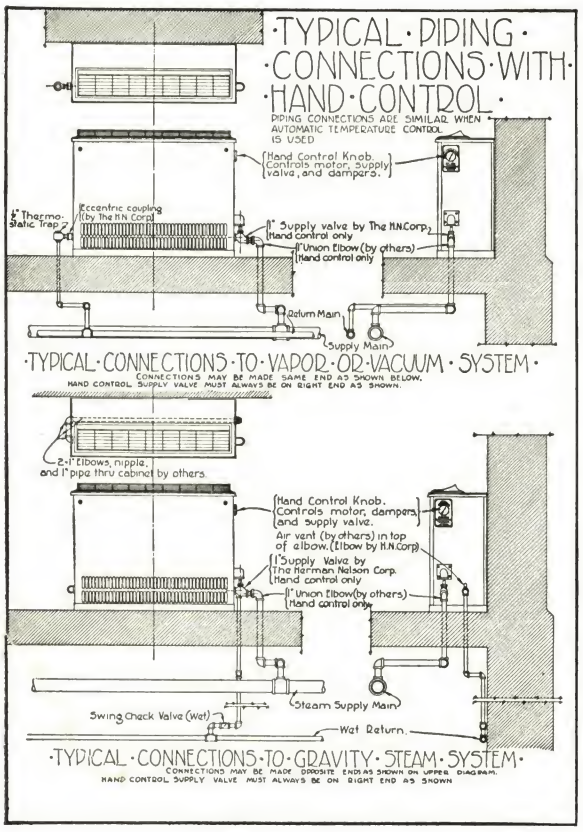
When ordered for hand control, for any type of system, Her-Nel-Co Ventilators are provided with a 1-in. angle valve of the straightway type, with female inlet connection as shown on page 16. The Her-Nel-Co Ventilator is shipped with this valve installed on the radiator ready for pipe connections as shown below.

When ordered for automatic temperature control the above valve is omitted and a coupling is provided with a ¾-in. female thread for vapor or vacuum system. See page 18. A ¾-in. diaphragm valve is recommended in order to make it possible to throttle the steam supply as required.

Return Tappings

When ordered for vapor or vacuum systems a return coupling with a ½-in eccentric female tapping is provided.

When ordered for gravity steam or hot water systems a 1-in. elbow with air vent tapping is provided. In the case of a gravity steam system a ⅛-in. interval vent pipe should be installed to remove the air from a point below the bottom of the Herman Nelson Radiator core. The contractor should install an air vent in this tapping. Vacuum type air vents are recommended.



For hot water systems no internal pipe is required. The contractor should install a hand or automatic air vent in the vent tapping.

Location of Connections

All Her-Nel-Co Ventilators are shipped with the supply connection on the right end and return connection on the left end, as one stands facing them. Knockouts are provided in the cabinet making it possible to have both connections on the right end, with the supply connection in front. This change should be made on the job. When automatic temperature control is used the supply connections can be changed on the job to the left end with the return connection on the right end or both can be on the left end. This change cannot be made with the hand control.

Vapor and Vacuum Systems

For vapor and vacuum systems the traps may be of the thermostatic or combination float and thermostatic type.

Gravity System

When connected to a gravity system all Her-Nel-Co Ventilators should have two pipe connections even though all other radiators on the job have one pipe connection. Care should be taken to provide a tight check valve in each return connection located at the lowest possible point.

Hot Water Systems

Where hot water systems are used with the Her-Nel-Co Ventilator, forced circulation should be employed as gravity systems are not recommended.

Humidifiers

Unless otherwise ordered, all Her-Nel-Co Ventilators are equipped with humidifiers which consist of a nozzle installed behind the Herman Nelson Radiator. This nozzle is connected to a tapping in the Herman Nelson Radiator through a needle valve and check valve. The amount of steam used for humidifying can be regulated by adjusting the needle valve. The check valve prevents air from entering the radiator whenever the steam pressure of the radiator is below atmospheric. When humidifiers are used it is advisable to slightly increase the boiler size and to provide automatic water feeders. It is evident that where humidifiers are used pressures above atmosphere should be carried.

Piping, Valve and Trap Sizes

All piping, valves and traps should be sized on the basis of the heating capacities given on page 15, for the air delivery and radiator selected.

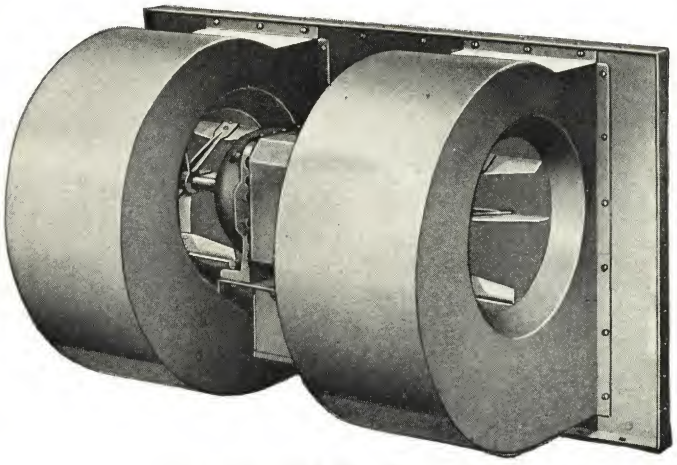
THE HER-NEL-CO MAGNAVENT

The Her-Nel-Co System of Ventilation is not limited in its application to a specific type of equipment. It is *an idea* which broadly covers any means* whereby air from either or both of two sources—one warm and the other cool—is delivered into a room according to the thermal demands of that room. It may be applied to large rooms such as gymnasiums, auditoriums, etc., by using a number of Her-Nel-Co Ventilators—the apparatus hereinbefore described, which is a portable and self-contained machine especially adapted to school class rooms—but frequently the large amount of floor space required makes this solution impractical. The Her-Nel-Co Magnavent equipment has been developed to meet this condition.

*Note: U. S. Letters Patent No. 1,753,156 and No. 1,753,157 issued April 1, 1930.

Use of the Her-Nel-Co Magnavent

The Her-Nel-Co Magnavent is a blower and fan assembly arranged to obtain the maximum capacity, with quiet operation, in a minimum of space. It is used in conjunction with a group of Herman Nelson Wedge Core Heating Elements, or Radiators (described on pages 2 and 3), and mixing dampers, arranged to apply the Her-Nel-Co System of Ventilation to the room to be ventilated, as shown below and on pages 36 and 37.



The Her-Nel-Co Magnavent

The Her-Nel-Co Magnavent is less expensive than an equivalent number of Her-Nel-Co Ventilators, and has certain practical advantages, but it is not quite as effective as an equivalent number of properly distributed units of the other type.

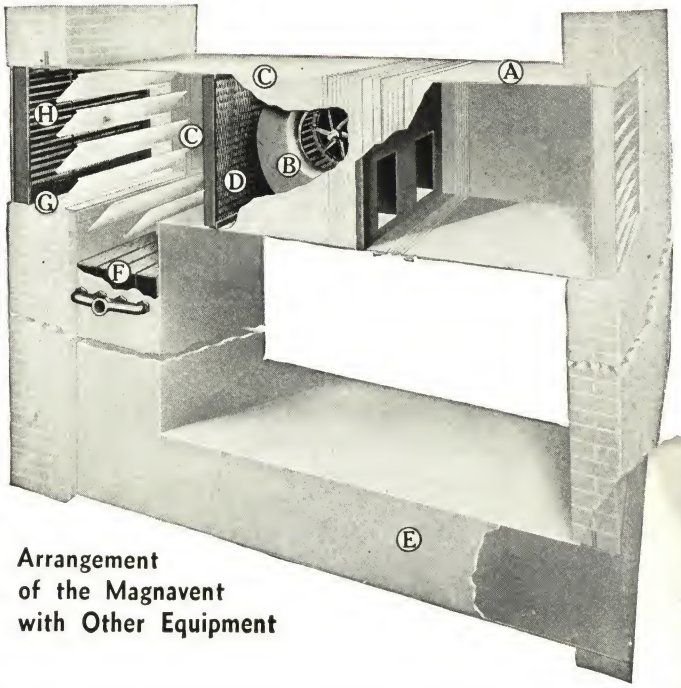
Arrangement

The Her-Nel-Co Magnavent is normally arranged to discharge horizontally but, on special order, may be arranged to discharge up or down as shown on page 36.

The illustration at the right shows the general method by which the Her-Nel-Co Magnavent may be employed. The precise arrangement of the various pieces of equipment and the air chambers and conduits may be varied to meet a number of conditions, providing, however, that certain essentials are observed:

(1) An air discharge conduit (A) of ample size must be extended from the discharge side of the Her-Nel-Co Magnavent (B) to the room served. This conduit may be of sheet metal or other suitable materials and should be long enough to constitute an expansion chamber but not so long and tortuous as to set up unnecessary resistance. This conduit should terminate in an outlet into the room, located well above the breathing line and equipped with a suitable grille or deflector. The latter is illustrated and recommended since it directs the air stream toward the ceiling of the room.

(2) The Her-Nel-Co Magnavent should be properly supported and enclosed in a suitable suction chamber (C). This chamber may be formed of sheet metal or other suitable materials and should be readily accessible. It is desirable to place an air filter (D) in this chamber in such a manner that all the air passing through the equipment will be cleaned.



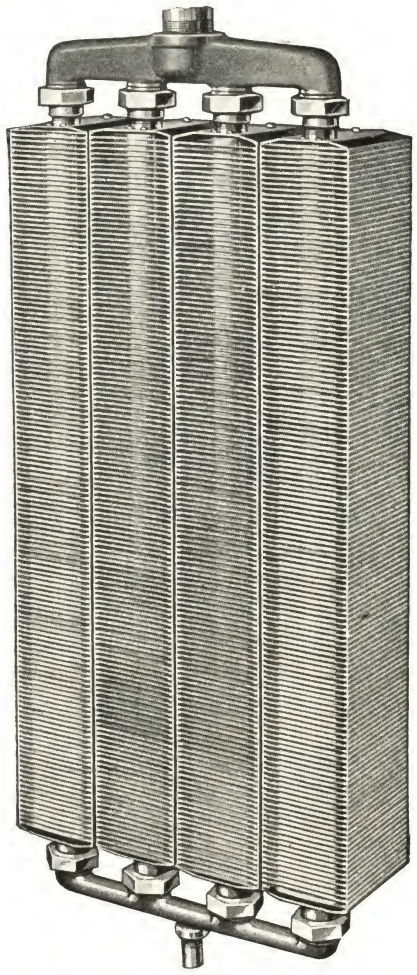
Arrangement of the Magnavent with Other Equipment

3. An indoor air conduit (E) of ample size should be extended from a point at the floor line of the room served and connected to the suction chamber (C). This conduit may be formed of sheet metal or other suitable materials and a grille should be provided at the inlet. A Herman Nelson Wedge Core Radiator (F) of proper capacity and a tight closing, easily operated control damper should be placed in this conduit in convenient locations. It is generally desirable to place the damper at the point where the conduit connects to the suction chamber.

4. An outside air conduit (G) of ample size should be extended from some suitable point and connected to the suction chamber (C). It should be equipped with a weather-proof air intake (H) at the entrance and a tight-closing, easily operated control damper at some suitable point—usually where the conduit connects with the suction chamber.

5. Means should be provided for controlling the steam supply to the radiator and also for operating the control dampers from the two sources of air supply in such a manner that one damper opens as the other damper closes. Automatic temperature regulation is highly desirable for this type of equipment but mechanical means can be arranged so that the dampers may be operated manually.

THE HERMAN NELSON CORPORATION regularly furnishes the Her-Nel-Co Magnavent, the Herman Nelson Wedge Core Radiators, the air intake, and the air filters required for installations of this character, but all other equipment, together with the air conduits and chambers must be provided by the contractor in accordance with specifications of the architect or engineer.

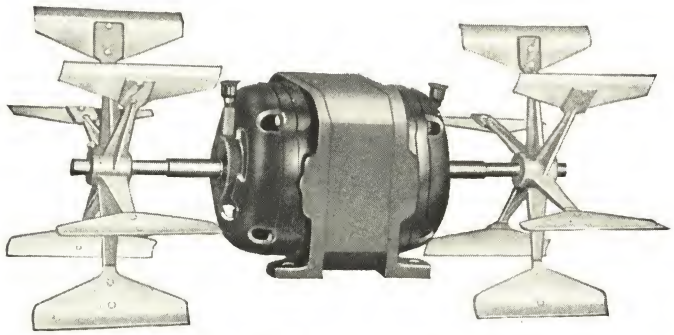


A Group of Herman Nelson Wedge Core Radiators

Made in Two Series

Each Magnavent is made in two series, the 200 series and the 350 series as shown on page 33. Each series is rated at several air deliveries. These variations in air deliveries are obtained by varying the motor speed.

Each Magnavent, regardless of whether it is the 200 or 350 series, should be used in conjunction with one or more groups of No. 0 Herman Nelson Wedge Core Radiators having not less than 5, and not more than 6, linear inches of radiation per 100 c.f.m. For example, a 358 Magnavent having a rating of 5000 c.f.m. should be used with 250 to 300 linear inches of radiation. Likewise a 356 Magnavent having a rating of 4000 c.f.m. should be used with from 200 to 240 linear inches of radiation. Complete data on the Herman Nelson Wedge Core Radiators is given on page 34.



Fan and Motor Assembly

If less radiation is used than recommended on preceding page, the heating capacity and the maximum air delivery will be reduced. On the other hand, if more radiation is used, the outlet temperature becomes too high for good diffusion. For this reason it is essential that the radiation be selected within the above limits. It is also essential that special radiator recommendations be obtained whenever the steam temperature exceeds 227° F.

The exact form in which the radiation is used depends upon the local conditions and the space available for the installation. For this reason extreme care should be taken to carefully specify the exact arrangement desired.

If no particular arrangement is called for, the following will be shipped:

Size of Magnavent	Air Delivery C.f.m.	Number of sections	Length of each section, in.	Total linear inches
205	2000	4	30	120
206	2500	5	30	150
207	3000	6	30	180
355	3500	6	35	210
356	4000	6	40	240
357	4500	6	45	270
358	5000	6	50	300

In all cases the header arrangements will be as shown on page 34.

Control

The Magnavent may be arranged to be controlled by hand or by any of the well known temperature control systems and for use on vapor, vacuum, gravity steam or hot water systems. When controlled by hand, chain markers and instruction plates are furnished by The Herman Nelson Corporation. As will be explained later, all Magnavent equipment is the same regardless of the type of heating system or type of control used.

Motors

All motors are of the adjustable speed type to obtain varying air deliveries and may be furnished for all the more usual current characteristics. Speed variation is obtained by means of the Her-Nel-Co Speed Controller which is mounted in a substantial steel case and has two adjustment knobs, both of which are provided with limit stops and indicators.

Single Phase Her-Nel-Co Speed Controller

Filters

Filters as shown on page 35 are always recommended but may or not be used depending on local conditions. As shown on page 35, 20x25-in. filter units are used. Two units are furnished for the 200 series Magnavent and four units for the 350 series.

Intakes

Magnavent intakes are similar in construction and appearance to the Her-Nel-Co Ventilator. As shown on page 35 two sizes of Magnavent intakes are furnished, one for the 200 series and one for the 350 series. All Magnavent intakes are heavily cadmium plated and finished with brown weather-resisting paint.

Other Equipment

Adjustable deflectors arranged to direct the air toward the ceiling are recommended as shown on pages 38 and 39. These deflectors are not furnished by The Herman Nelson Corporation.

An expansion chamber at least 36 in. long in the case of the 200 series and 48 in. long in the case of the 350 series should be provided between the Magnavent and the air outlets. In cross section this expansion chamber should be the same size as the Magnavent suspension board as shown on page 33.

It should be carefully noted that for each Magnavent installation, The Herman Nelson Corporation furnishes the following appaartus:

The Magnavent
The Herman Nelson Wedge Core Radiators
The Magnavent Wall Intake (Optional)
The Magnavent Filter (Optional)
Chain Markers and Instruction Plates (Hand control only)

All other equipment, including grilles, deflectors, expansion chamber, dampers, duct work, chain controls, etc., is furnished by others.

CAPACITIES OF HER-NEL-CO MAGNAVENT SERIES 200 AND SERIES 350

Number	Code Word	C.f.m. (Varies with fan speed)	Length of H.N. Wedge Core Radiator required in inches	Heating capacity, sq. ft.
205	Vital	2000	100 to 120	205 to 230
206	Vives	2500	125 to 150	255 to 285
207	Vivid	3000	150 to 180	305 to 345
355	Vizor	3500	175 to 210	345 to 380
356	Vocal	4000	200 to 240	395 to 435
357	Voile	4500	225 to 270	440 to 490
358	Volta	5000	250 to 300	490 to 545

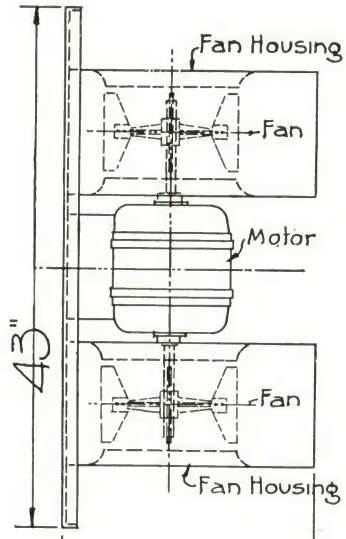
Notes

Each Magnavent should be accompanied by the amount of Herman Nelson Wedge Core Radiator shown in the fourth column. The heating capacities for these minimum and maximum amounts of radiation are given in the fifth column.

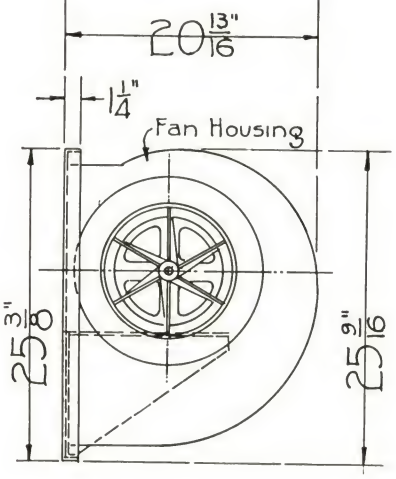
Heating capacities are given in sq. ft. of equivalent direct radiation and are based on a room temperature of 70° F. and steam temperature 218° F.

Where 25 cycle current is used, the 207 and 358 Magnavents cannot be furnished.

MAGNAVENT · DIMENSIONS ·

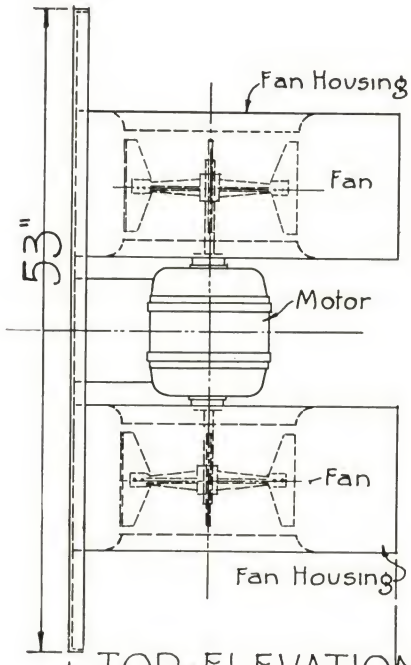


· TOP · ELEVATION ·

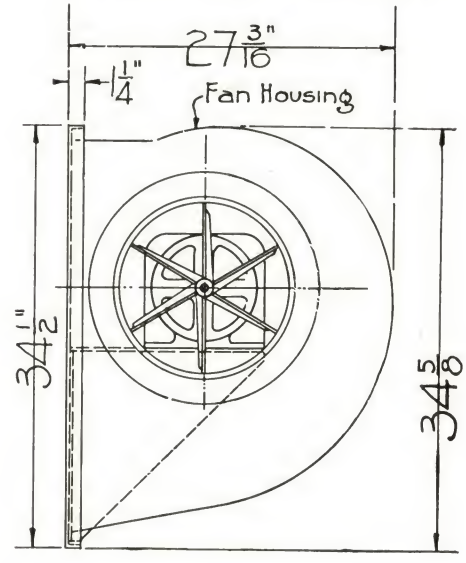


· END · ELEVATION ·

· 200 · SERIES ·



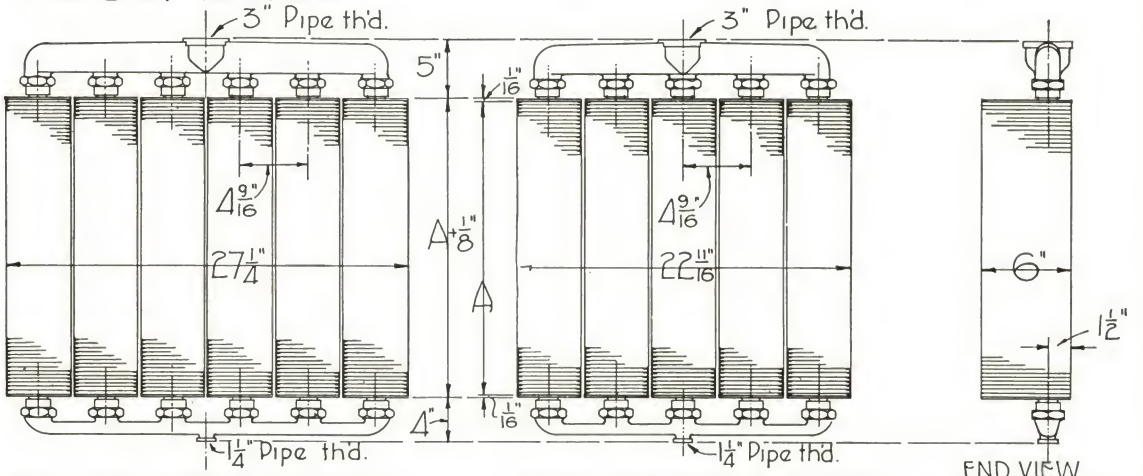
· TOP · ELEVATION ·



· END · ELEVATION ·

· 350 · SERIES ·

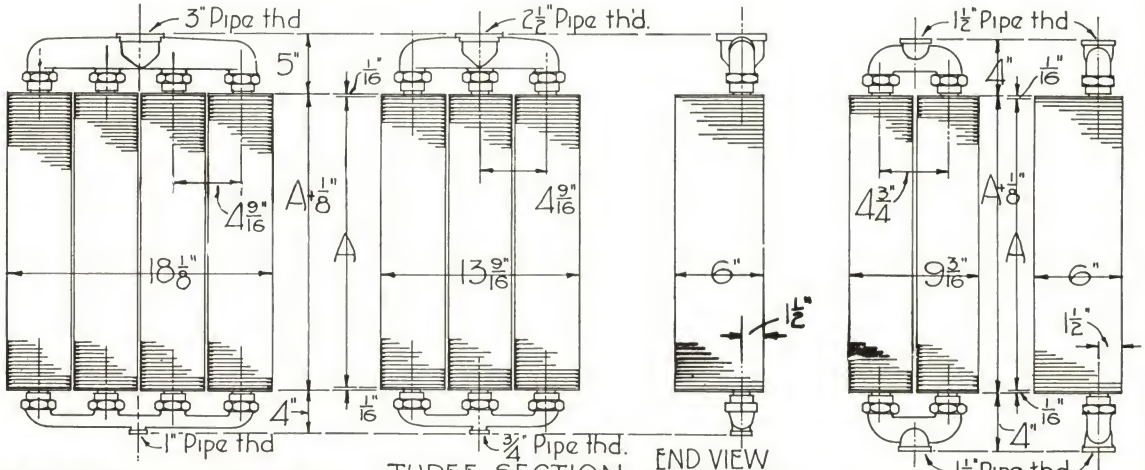
DIMENSIONS OF STANDARD HERMAN NELSON WEDGE CORE RADIATOR ASSEMBLIES



SIX SECTION ASSEMBLY
n = 6

FIVE SECTION ASSEMBLY
n = 5

END VIEW FIVE & SIX SECTION ASSEMBLY



FOUR SECTION ASSEMBLY
n = 4

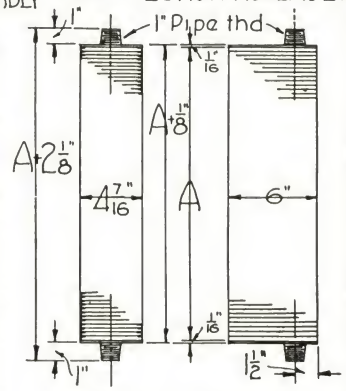
THREE SECTION ASSEMBLY
n = 3

END VIEW THREE & FOUR SECTION ASSEMBLY

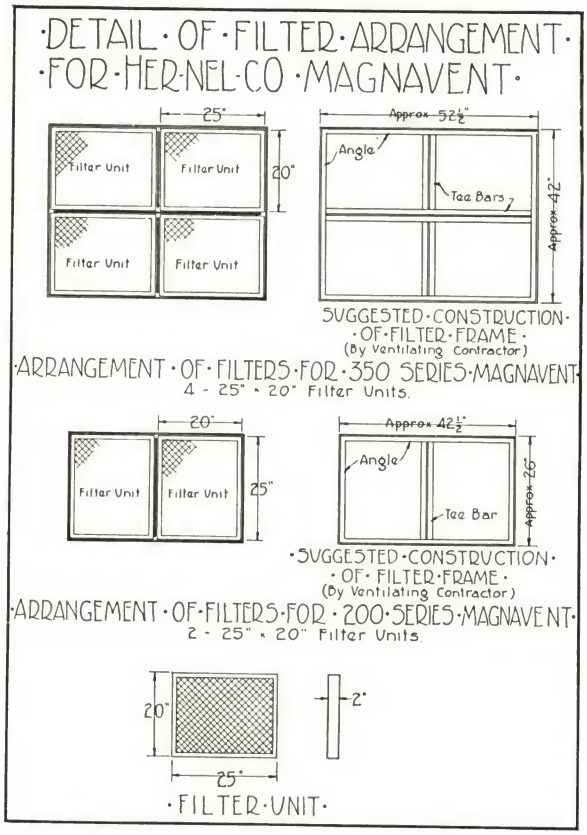
TWO SECTION ASSEMBLY

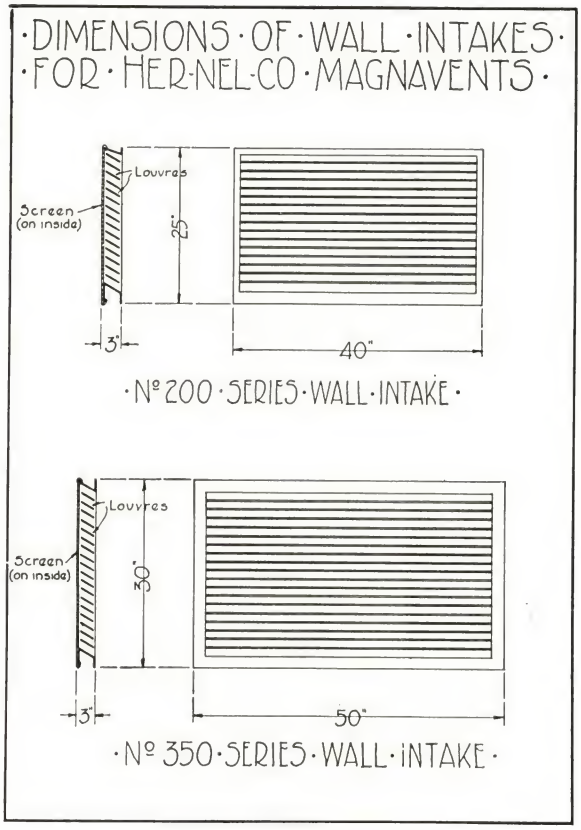
LINEAL INCHES OF RADIATION FOR VARIOUS COMBINATIONS OF HERMAN NELSON WEDGE CORE RADIATORS.

No. OF SECTIONS = n	LENGTH OF SECTION = "A"								
	15	20	25	30	35	40	45	50	55
1	15	20	25	30	35	40	45	50	55
2	30	40	50	60	70	80	90	100	110
3	45	60	75	90	105	120	135	150	165
4	60	80	100	120	140	160	180	200	220
5	75	100	125	150	175	200	225	250	275
6	90	120	150	180	210	240	270	300	330



SINGLE SECTION





Selection and Application of the Her-Nel-Co Magnavent

The Her-Nel-Co Magnavent should be selected on exactly the same basis as the Her-Nel-Co Ventilator as explained on page 20, namely, to circulate the air in the room at a rate of not less than five (5) nor more than ten (10) room volumes per hour.

There are several principles underlying the proper application of the Magnavent for individual rooms. The first two principles are the same as given on page 22 for the HER-NEL-CO Ventilator as follows and, therefore, do not require further explanation.

First Principle

Use one or more Magnavents for each room to be ventilated.

Second Principle

Install all Magnavents in such a manner that they may be easily and quickly inspected and cleaned.

Third Principle

Locate the Magnavent as low as possible and use adjustable deflectors in the discharge opening, arranged to direct the air upward.

Deflectors and discharge grilles should have a free area of 24 sq. in. per 100 c.f.m. Due to the fact that a large volume of air is introduced at one point, care should be taken to allow the discharged air sufficient time to thoroughly mix with the air in the room by locating the Magnavent as low as possible and directing the air upwards.

Fourth Principle

The duct work should be as short and direct as possible with a minimum number of turns and a minimum area of 24 sq. in. per 100 c. f. m.

These areas are recommended because it is essential that the resistance of the ducts, etc., be kept at a practical minimum in order to avoid reducing the air delivery.

Fifth Principle

The room air should be recirculated from the floor through a grille having a free air area of 24 sq. in. per 100 c. f. m.

The air should be drawn into the duct work at the floor in order to thoroughly mix the air in the room.

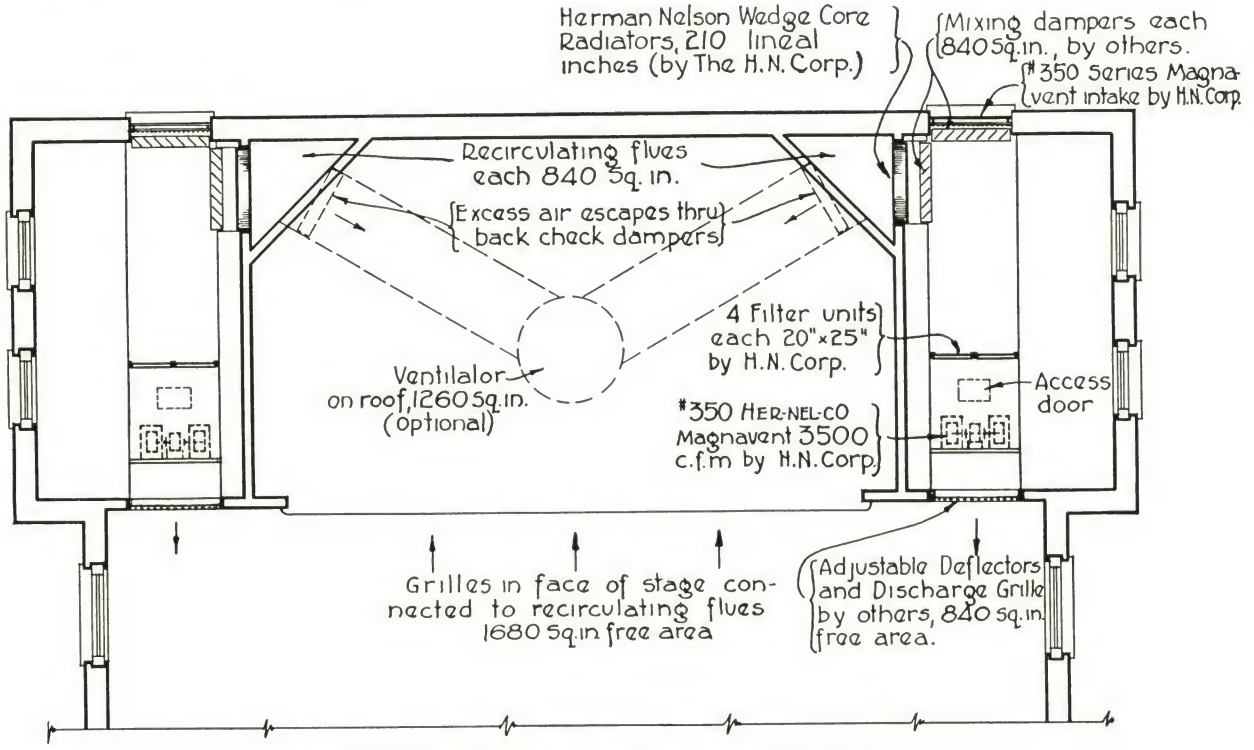
Sixth Principle

Vent flues usually are not required but in the case of exceptionally tight rooms they may be desirable.

Such vents should have a maximum free area of 18 sq. in. per 100 c. f. m. and should be provided with back check dampers or pneumatic dampers operated in conjunction with the outdoor dampers. In class rooms and similar rooms where there is a large amount of opening around windows and doors as compared to the maximum amount of outdoor air introduced, it is not necessary to provide vents. However, in some larger rooms where the amount of opening around doors and windows is small as compared to the maximum amount of outdoor air introduced, considerable pressure may be built up in the room causing the doors to stand open, etc. For this reason, it is sometimes advisable to provide vent flues equipped with back check dampers to relieve this pressure.

Selection of Her-Nel-Co Magnavents
TYPICAL AUDITORIUM (70° F.)

Prevailing Wind—North | 0° F. Assumed Outdoor Temperature | Room Exposure—East, South and West



Physical Data

Both walls and the stage exposed—heated space below—roof above.
Dimensions—40 × 80 × 20 ft.
Contents, including stage = 73000 cu. ft.
Total window opening = 640 sq. ft.
Windows—wood sash, not weather stripped.
Lineal feet of crack = 560.
Outside wall—13 in. brick furred with metal lath and plaster.
Net exposed wall area = 3645 sq. ft.
Ceiling—4 in. concrete—suspended ceiling.
Net exposed ceiling area = 3800 sq. ft.

Selection of the Magnavents

1. DETERMINATION OF AIR DELIVERY OF MAGNAVENTS.

Minimum air delivery (5 room volumes per hour) $= \frac{73000}{12} = 6083$ c.f.m.

Therefore, two (2) 350 Series Voluvents, having a total air delivery of 2 × 3500 or 7000 c.f.m. will be required.

2. DETERMINATION OF HEATING CAPACITY.

Heat losses based on 0° to 70° F. with 10 mile wind—A. S. H. & V. E. 1930 Guide.

Windows	640 × 1.13 × 70 ÷ 240 =	211 sq. ft.	equivalent direct radiation
Walls	3645 × .216 × 70 ÷ 240 =	230 sq. ft.	" " "
Infiltration	560 × 107 ÷ 240 =	250 sq. ft.	" " "
Ceiling	3800 × .334 × 70 ÷ 240 =	370 sq. ft.	" " "
Allowance for quick heating	$\frac{73000 \times 70}{13200}$ =	387 sq. ft.	" " "
	TOTAL =	1448 sq. ft.	equivalent direct radiation
Heating capacity of two No. 355 Magnavents, delivering 3500 c.f.m., with 210 lineal inches of Herman Nelson Wedge Core Radiators, each = 2 × 380.... =		760 sq. ft.	equivalent direct radiation
Supplementary radiation required.....		688 sq. ft.	equivalent direct radiation

3. INSTALLATION DATA (FOR EACH MAGNAVENT).

Wall Intake Size—50 × 30 in.
Filters—four units, each 20 × 25 in.
Herman Nelson Wedge Core Radiators required. Use six (6) 35-in. sections, having a total length of 210 in. for each Magnavent.
Free area of discharge grille, adjustable deflectors, room air grille, duct work and mixing dampers $= \frac{3500 \times 24}{100} = 840$ sq. in.
Free area of ventilator (if used) and duct work..... $= \frac{2 \times 3500 \times 18}{100} = 1260$ sq. in. (for both Magnavents)

Two (2) No. 200 Series Magnavents might be selected to deliver 3000 c.f.m. In this case the heating capacity of each Magnavent would be 345 sq. ft. instead of 380 sq. ft. Under these conditions the supplementary radiation would be increased to 758 sq. ft., but the Herman Nelson Wedge Core Radiators, duct work, grilles, dampers, etc., could be reduced.

Typical Application

On page 36 will be found a typical Magnavent application in a small auditorium worked out in keeping with the above recommendations. Other large rooms, including gymnasiums, assembly rooms, etc., should be treated in a similar manner.

Existing Buildings

Existing buildings that are heated with radiators may be easily equipped with the Her-Nel-Co System of Ventilation. The Her-Nel-Co Magnavent may be installed complete with the Herman Nelson Wedge Core Radiators and connected to the existing piping. In this case, some of the existing radiation may be removed.

Or, if desired, the Magnavent may be installed without the Herman Nelson Wedge Core Radiators as explained for the Her-Nel-Co Ventilator on page 23. In this case, the Magnavent has no heating capacity and the existing radiators should be left in place. In either case, no change need be made in the boilers or piping if they are of sufficient size for good heating results, and no additional fuel is required. As explained in the case of the Her-Nel-Co Ventilator on page 23, the effectiveness of the Her-Nel-Co System is not impaired by this change.

In either case, the control cycles are the same as explained on pages 10 and 11.

Temperature Control

The cycle employed with automatic control is more economical than the one employed with hand control. For this reason, and because of its greater accuracy, automatic control is recommended.

When the Magnavent installation is to be controlled automatically, a damper motor should be arranged to operate the outdoor and room air dampers and a diaphragm valve should be installed on the Herman Nelson Wedge Core Radiators, as shown on page 39. With automatic temperature control the cycle of operation is in every way similar to that explained for the Her-Nel-Co Ventilator.

It should be carefully noted that the mixing dampers are not supplied by THE HERMAN NELSON CORPORATION but should be furnished as a part of the automatic temperature control equipment.

With manual control the outdoor and room air dampers should be furnished by the ventilating contractor, complete with chain controls located where they may be readily operated. See page 38. The chain markers and a combination instruction plate and chain holder are furnished by THE HERMAN NELSON CORPORATION. The markers should be carefully located on the chain. Marker "R" should be at the low point when the room air damper is wide open and marker "O" should be at the low point when the outdoor damper is wide open.

The method of controlling the Magnavent installation manually is the same for all types of heating systems.

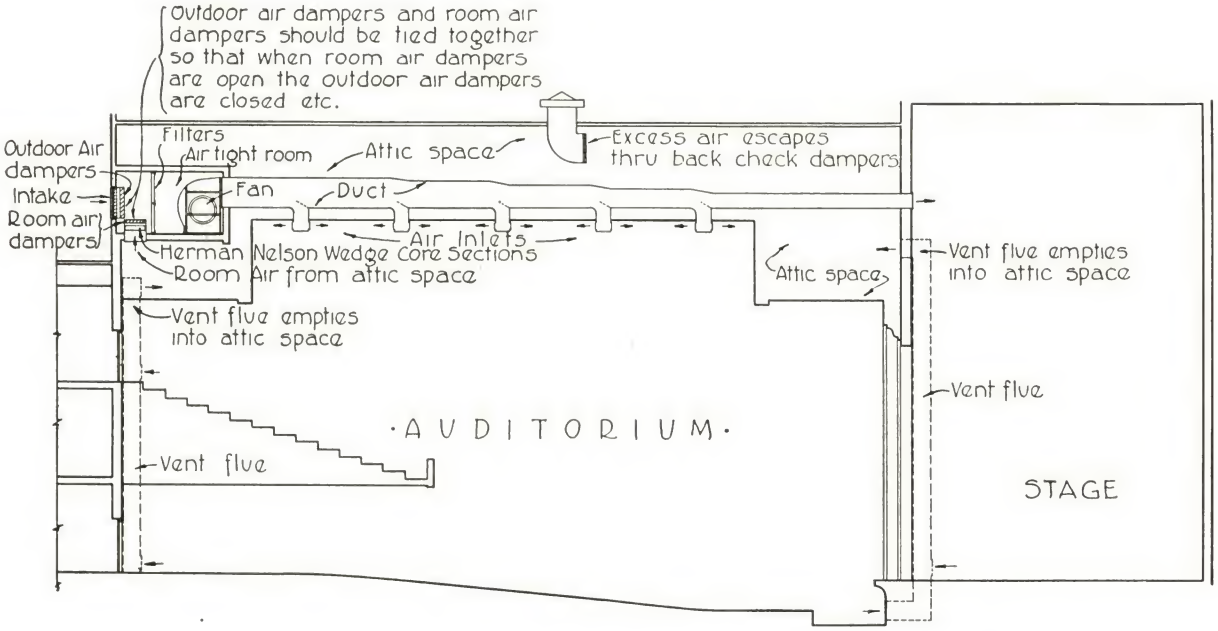
Large Auditoriums, Etc.

As explained on page 30, the Her-Nel-Co System of Ventilation is not limited to any specific application or type of equipment. It is a patented idea which broadly covers any means for accomplishing the results outlined in the first section of this catalogue.

Two general types of equipment—the Her-Nel-Co Ventilator and Magnavent—are manufactured by THE HERMAN NELSON CORPORATION to apply the Her-Nel-Co System of Ventilation.

It is clearly recognized that some rooms are too large, or so arranged, that it is impractical to ventilate them with either of these two types of equipment. For such applications, a duct system, as shown in the illustration below, is recommended. Such a system should be arranged to operate as explained for the Her-Nel-Co Magnavent.

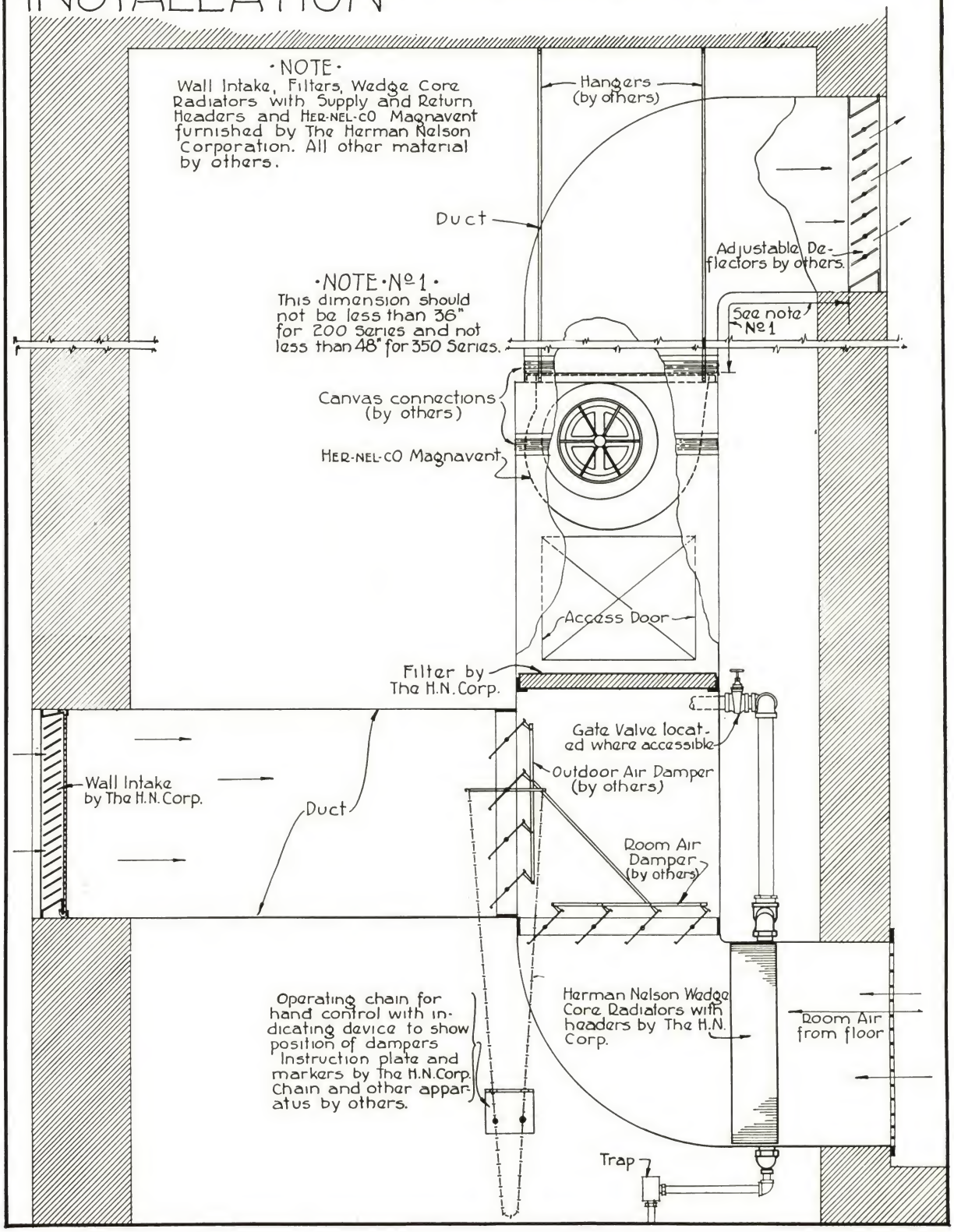
Full details will be gladly furnished to those who are interested.



·TYPICAL·AUDITORIUM·INSTALLATION·
OF
THE HERMAN NELSON SYSTEM OF VENTILATION
USING A DUCT DISTRIBUTING SYSTEM

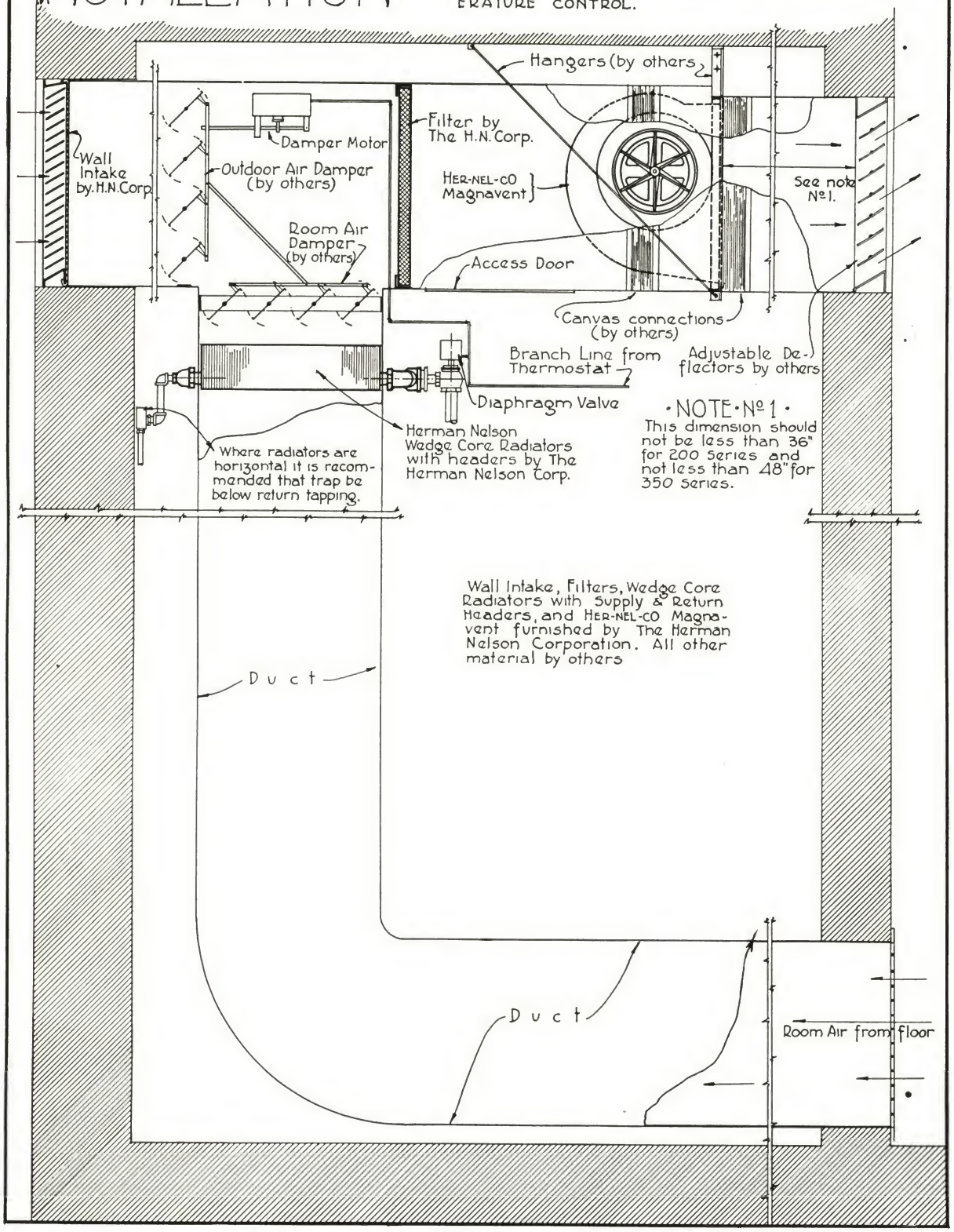
TYPICAL HER-NEL-CO MAGNAVENT INSTALLATION

HER-NEL-CO MAGNAVENT INSTALLED WITH VERTICAL DISCHARGE AND ARRANGED FOR HAND CONTROL.



TYPICAL HER-NEL-CO MAGNAVENT INSTALLATION

HER-NEL-CO MAGNAVENT INSTALLED WITH HORIZONTAL DISCHARGE AND ARRANGED FOR AUTOMATIC TEMPERATURE CONTROL.



Wiring Data

Her-Nel-Co Magnavent motors are of the adjustable speed type, with speed control obtained by means of Her-Nel-Co Speed Controllers. For this reason, the wiring arrangements are different than those for standard motors.

All single-phase Her-Nel-Co Magnavent motors have high efficiency and power factor and low starting current, and are very quiet over the entire range of speeds. All three-phase Her-Nel-Co Magnavent motors are also specially designed to have the same characteristics.

All single-phase and direct current motors have only two leads, while the three-phase motors have three.

As shown below, each alternating current motor or group of motors, should be preceded by a Her-Nel-Co Speed Controller. In the same way, each direct current motor or group of motors should be controlled by a rheostat. Where a group of motors are controlled by a rheostat, or Her-Nel-Co Speed Controller (illustrated on page 32), each motor should be provided with a separate switch and fuses, as shown. In addition, each rheostat or controller should be preceded by a switch and fuses, as shown.

Due to the low starting current and high power factor, single-phase Her-Nel-Co Magnavent motors may be used on the separate phase of a three-phase service, as shown. A separate controller should be used for each phase.

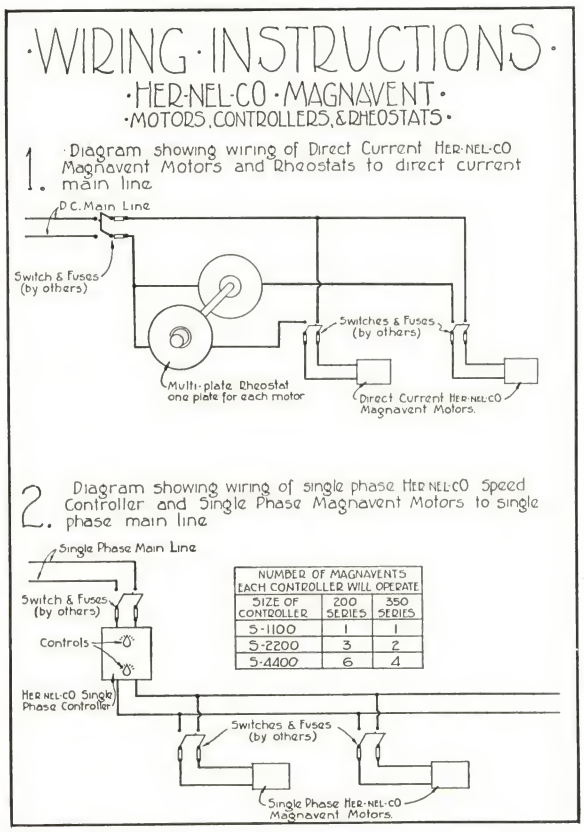
All Her-Nel-Co Speed Controllers are mounted in substantial steel cases, and have two adjustment knobs, both of which are provided with limit stops and indicators.

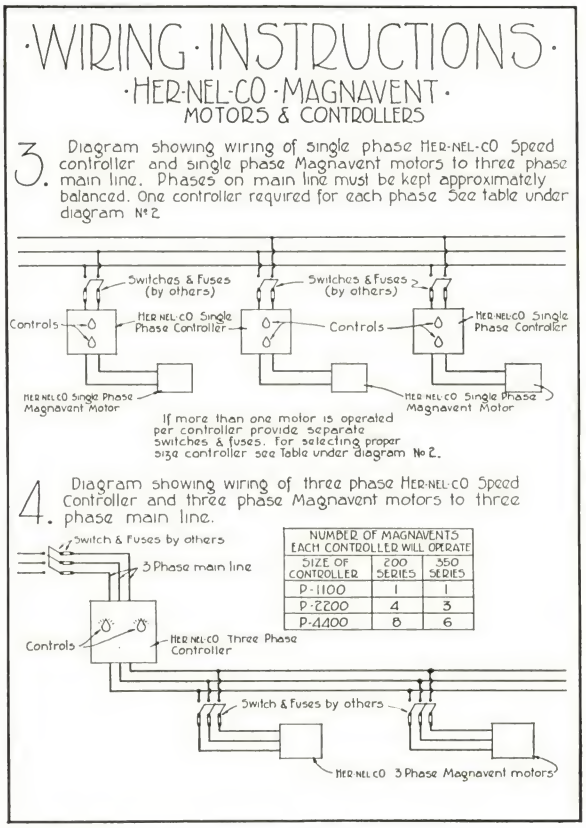
No switches or fuses are provided with Her-Nel-Co motors or Speed Controllers.

All wires should be sized to limit the voltage drop at the last motor to three (3) volts.

Type of current	Number of phases	Frequency	Voltage	Code word	Approx. amperes per leads 200 Series	Approx. amperes per leads 350 Series
Alternating	1 phase	25	110	Macar	6.0	8.4
			220	Macho	3.0	4.2
		50	110	Maleo	5.0	7.0
			220	Malic	2.5	3.5
		60	110	Malva	6.0	8.4
			220	Mango	3.0	4.2
	3 phase	50	220	Meros	1.75	1.8
			440	Molar	.65	.9
		60	220	Monal	1.5	2.1
			440	Moody	.75	1.1
Direct			110-125	Moray	4.8	7.0
			220-250	Mosey	2.4	3.5

Note: The above data will be useful in determining wire sizes, etc.





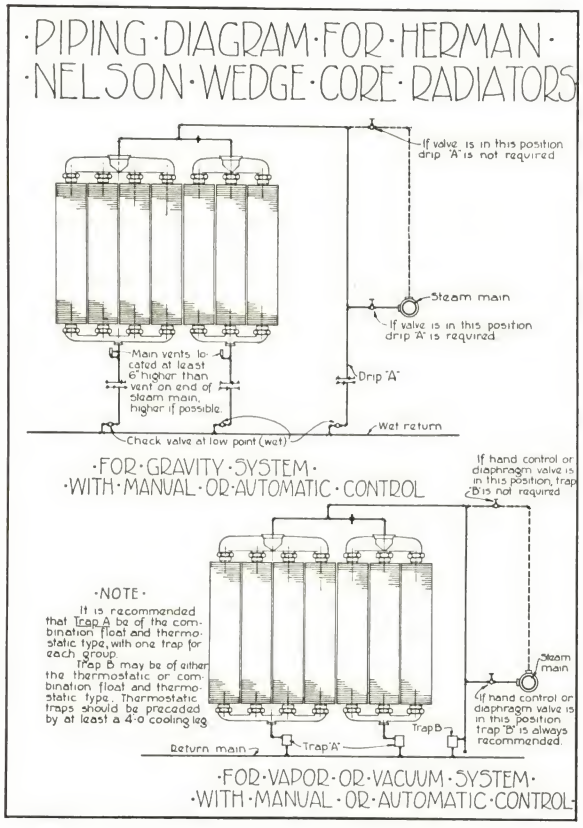
Piping Suggestions

The Herman Nelson Wedge Core Radiators used with Her-Nel-Co Magnavents should be piped as an ordinary radiator having the same heating capacity.

Headers

The Herman Nelson Wedge Core Radiators are shipped in groups as shown on page 34, with supply and return headers in place.

When ordered for use on vapor or vacuum or gravity steam systems, the headers are shipped as shown. When ordered for use on a forced circulation hot water system, both headers are the same as the supply header. When used for hot water and the sections are installed in a vertical position, an air vent should be provided above the upper header. When the sections are horizontal, this information should be given in order that individual vents may be provided in the sections.



Vapor and Vacuum Systems

For vapor and vacuum systems, combination float and thermostatic traps are always recommended. A separate trap should be provided for each group.

Gravity Systems

When connected to a gravity system the Herman Nelson Radiators should have two pipe connections even though all other radiators on the job have one pipe connection. Care should be taken to provide a tight check valve in each return connection located at the lowest possible point.

Hot Water Systems

Where hot water systems are used with the Her-Nel-Co Ventilator forced circulation should be employed as gravity systems are not recommended.

Supply Valves

Hand Control—When the Magnavent is controlled by hand, the supply valve on the Herman Nelson Radiators is either fully open or fully closed. For this reason, a gate valve should be used for all types of hand controlled systems.

Automatic Temperature Control—When automatic temperature control is used, the steam supply is throttled in the same way as with the Her-Nel-Co Ventilator. For this reason the regular diaphragm valve should be used.

Location of Supply Valves for Vapor, Vacuum or Gravity Systems

The location of the supply valve is very important for either hand or automatic temperature control. When the valve is at the same level or above the supply tapping and the piping is so arranged that water cannot stand in the piping between the valve and the radiators, no special precautions are necessary.

On the other hand, when the supply valve is below the supply tapping, the riser between the valve and the radiators should be drained in order to prevent water from accumulating at this point, as shown at the left.

All piping, valves and traps should be sized on the basis of the heating capacities given on page 32 for the Magnavent selected.

THE HERMAN NELSON UNIVENT

The Herman Nelson Univent is a unit ventilator arranged to introduce, in a positive way, a fixed amount of outdoor air at all times. It takes air directly from out-of-doors, cleans it, warms it to a comfortable degree and distributes it throughout the room with gentle air motion but without drafts. It makes the amount of air admitted, the motion of the air and the temperature of the room all easy to control.

General Construction

The Univent, as shown on this and the following page, consists of a substantial steel cabinet, a fan and motor assembly, filter, and a pair of Herman Nelson Wedge Core Radiators.

Operation

The air is drawn into the fan and forced upward through the filter where it is cleaned. Then, when heating is required, the air passes upward through the Herman Nelson Radiator where it is warmed. If the air does not require heating, it passes through the by-pass in back of the radiator.

The air is then discharged vertically upward at high velocity, thus thoroughly diffusing the air throughout the room. The amount of heat added to the air is determined by the position of the mixing damper.

Application

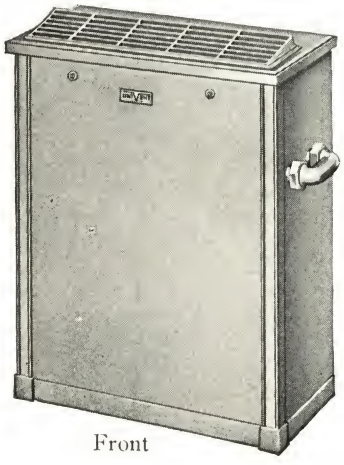
Rooms in which odors or fumes occur, or, which have excessive humidity, such as chemical and cooking laboratories, cafeterias, locker rooms, toilet rooms, swimming pools, etc., should be ventilated in such a manner that they are made livable, and so that adjoining rooms are not contaminated. Experience has shown that this result can be best accomplished by mechanically exhausting a fixed amount of air from the room. Experience has also shown that whenever the amount of air exhausted by mechanical means exceeds two room volumes per hour, means should be provided to replace practically all of the exhausted air with clean air at the proper temperature in a positive manner.

When such means are not provided the leakage around the windows, doors, etc., is greatly increased, causing drafts, and bringing in a great deal of dirt. No fuel is saved by depending upon leakage because whether the air is introduced positively or comes in through leakage, the same amount of air has to be heated through the same temperature range, requiring the same amount of fuel. A logical way to replace the exhausted air is by means of the Herman Nelson Univent. Toilet rooms, etc., are exceptions to these recommendations.

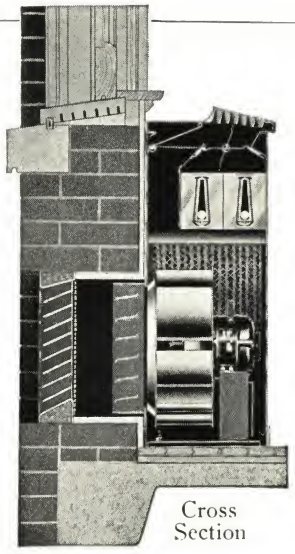
Then, too, in very special cases, where body odors may be present to an abnormal extent, it may be desired to introduce the full volume of outdoor air at all times. In such cases the Univent system is an ideal means of accomplishing this result.

However, it should be carefully noticed that a system of this kind which introduces the full amount of outdoor air at all times must heat this air from the outdoor to the room temperature. Heating all of the air through this temperature range requires a large amount of heat, with a result that the first cost is materially greater than the Her-Nel-Co System because the boilers, piping, chimney, etc., are larger. The fuel consumption is also much greater.

In short the full amount of outdoor air may be introduced at all times, providing the owners are willing to pay the additional first cost and for the additional fuel required.



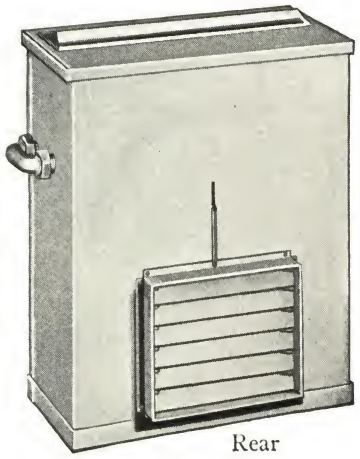
Front



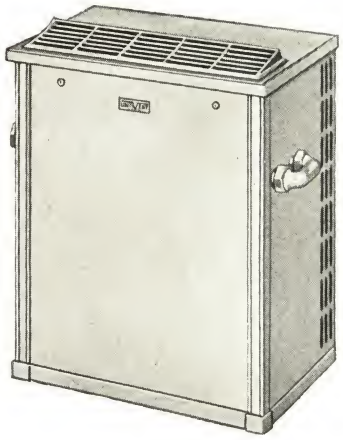
Cross Section

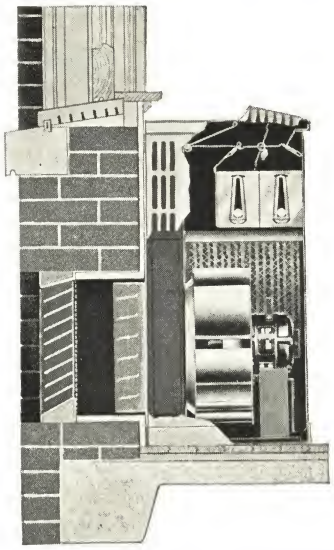
Model "SD" Univent

Designed for use where no provision for recirculating the air within the room is required. It is equipped with movable dampers at the outdoor air intake, which may be operated by hand or automatically



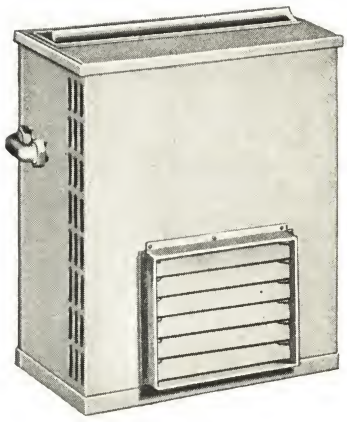
Rear

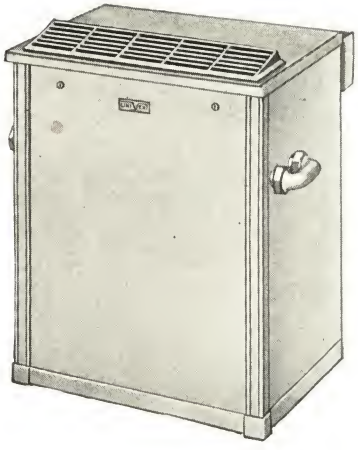




Model "R" Univent

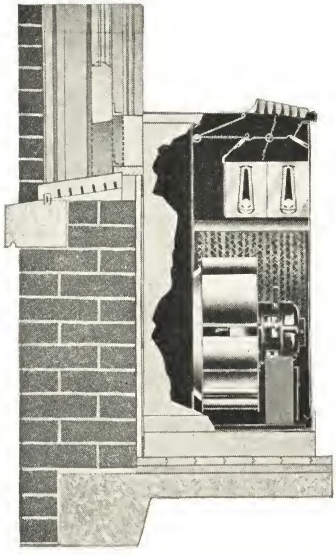
Equipped with combination outdoor air intake and recirculating dampers for use where it is desired, at times, to recirculate the air within the room. Dampers are arranged for either manual or automatic control.

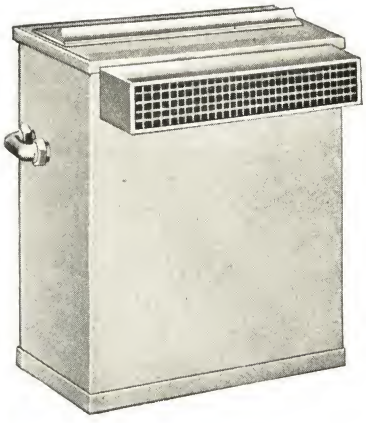


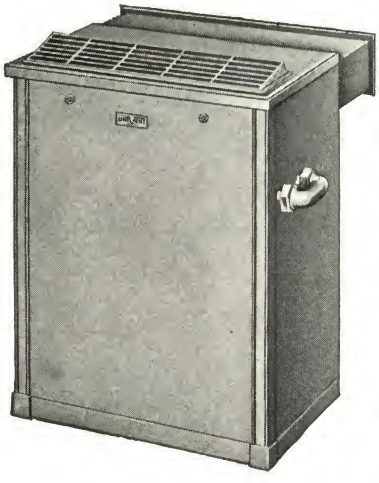


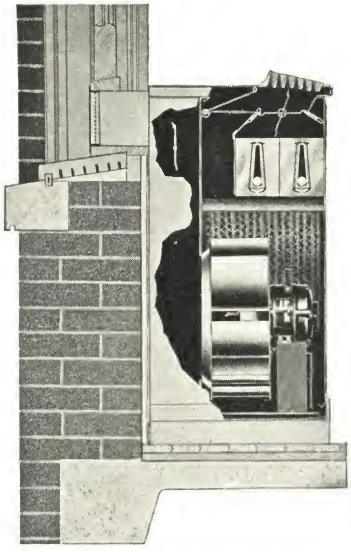
Model "O" Univent

Designed for use where it is more practical to draw outdoor air through the lower part of the window. Can be more conveniently installed in existing buildings where it is impractical to cut openings through the wall. When outside air supply is required, lower window sash is raised. No dampers required for this control.



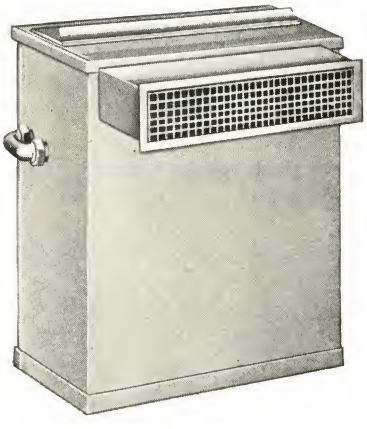






Model "W" Univent

Essentially the same as Model "O" except that it is arranged for *permanent* connection to lower window sash, and for this reason is better adapted for schoolrooms where it may not be advisable to leave control of air supply to room occupants. No provision is made for recirculating air in room. If recirculation is desirable select Model "WR" which is identical to Model "W" except for the recirculating feature as shown in Model "R."



Features of the Univent

Cabinet

The Univent cabinet is fabricated from high grade furniture steel and is finished in genuine "Morocco" enamel with plated hardware. It is arranged to be fastened against the wall with a gasket which prevents any air leakage. The entire front is removable giving free access to all parts.

Motor and Fan Unit

In the lower compartment of the Univent there is a small electric motor which operates a slow-speed fan. The Univent Her-Nel-Co motor is carefully designed and proportioned for the specific service to which it is applied and is extremely quiet in operation. The motor may be had for all the more and usual current characteristics.

The fan is specially designed to deliver the required quantity of air at a sufficiently high velocity to assure good diffusion. It is so built that it prevents cross currents and eddies in the air stream, thereby reducing power costs.

Filter

Every Univent provides for the insertion above the fan and motor unit of a filter which, while not supplied as standard, can be furnished at comparatively small additional cost. Air passing through this filter, specially built for use in the Univent loses 95 to 98 per cent of its dust and soot content.

Heating Element

The heating element in the Univent consists of two Herman Nelson Wedge Core Radiator Sections (see pages 2 and 3). The radiator is built entirely of aluminum which, because of its light weight and high conductivity, will transmit about twice as much heat per unit of weight as either copper or silver, six times as much as brass and twelve times as much as cast iron. Unfailing service is assured with this radiator because it is impervious to rust, expansion, contraction and water hammer strains.

Humidifier

The Univent can be fitted with a humidifier consisting of a tube fitted its entire length with a row of small venturi nozzles.

Temperature Control

Temperature control is accomplished by means of dampers located immediately above the radiators. All Univent mixing dampers are mounted on rust-proof ball bearings and operate against felt cushions to insure smooth and quiet operation.

These dampers may be operated either manually, with a knob at the end of the cabinet, or automatically, by any of the well-known systems of automatic control.

Automatic temperature control is always desirable, for it eliminates the necessity for attention by the teacher.

Any of the systems on the market can be very easily applied to the Univent. Temperature control may be applied to the radiator itself as well as to the dampers. This is recommended because it reduces the tendency to overheat.

Pipe Connections

Univents are normally furnished with the supply and return connections at the right end as you face the cabinet, with the supply connection in front. If so ordered, they may be furnished with supply and return on the left end or on opposite ends.

Air Intakes

Each Univent is regularly furnished with an air intake. The intakes are sold as part of the Univent, and are usually furnished in advance for insertion in the wall during the building construction. They are built of wrought steel, cadmium plated after fabrication and finished with two coats of standard brown lacquer.

When some other color is desired to blend with the building exterior, they may be painted on the job over the lacquer.

We make no secret of the fact that other ventilating systems are, as a rule, priced lower than the Univent. Rather, we prefer to emphasize this fact—then ask this question: "Why is it, that despite its seemingly higher cost, school boards, architects and engineers have chosen to install Univent Ventilation in thousands of America's schools?"

The answer is simple. They have selected the Univent because of factors which first cost does not show. They have selected it, first, because they know it will accomplish definite results—the results which they are seeking. Second, because its own higher first cost is many times more than offset by the savings that it effects in building construction. And, third, because of its low cost of operation and maintenance.

When we consider the fact that truly effective ventilation promotes the daily comfort, mental efficiency and physical fitness of every child in the schoolroom—and when we further consider that good ventilation cannot possibly be attained by haphazard methods—we realize the folly of compromise on the subject of schoolroom ventilation.

School executives, architects and engineers have found liberal and emphatic proof that the results of Univent Ventilation cannot be bettered—frequently not equalled—by substituting other equipment. One of the many reasons is—that many important Univent features are patented and exclusive to the Univent as manufactured by THE HERMAN NELSON CORPORATION.

How to Apply the Univent

The Univent is a compact ventilating unit, scientifically designed and constructed to accomplish a definite ventilating result. As with any other mechanical equipment, the measure in which this result is obtained depends to a great extent upon the manner of the application. To secure the best possible ventilating results the architect or engineer should always insist upon the proper application of the Univent, for improper application will defeat its purpose. When properly applied, Univent Ventilation will accomplish all that is claimed for it, as thousands of installations in the United States and foreign countries have conclusively demonstrated.

Univent Principles

There are four (4) fundamental principles that should always be carefully considered by the engineer in the application of the Univent system.

First—Each room or space should be provided with its own ventilating system, independent of the systems in all other rooms or spaces. The use of a Univent for each room or space provides properly controlled ventilation in keeping with the requirements of each individual room. Using ducts on the outlet of the Univent to ventilate two or more spaces obviously defeats this principle of Univent Ventilation by substituting group room control for unit room control.

Second—All inaccessible and uncleanable ducts, flues, chambers, etc., should be avoided. When the Univent is properly applied the entire path of air from outdoors through the Univent and into the room is easily and quickly accessible for cleaning. Concealing or fully recessing the Univent or the addition of inlet and outlet ducts for other than standard application are all discouraged because they invariably result in uncleanable and, therefore, unsanitary spaces. Partially recessing the Univent to save aisle space may be accomplished, as shown on pages 52 to 61, without interfering with the accessibility or cleanliness of the system.

Third—The air for ventilation should be thoroughly diffused throughout the room or occupied space with agreeable air motion but without *drafts*. The comparatively high velocity vertical jet employed in the Univent is largely responsible for the satisfactory Univent results. Anything that interferes with this jet, such as outlet ducts, etc., will defeat this principle of Univent Ventilation. In order to obtain the full benefit from the high velocity vertical jet, the Univent should be located as near as possible to the center of the most exposed wall. If this wall is longer than 35 ft., two or more Univents are required and should be spaced uniformly along the wall. Experience has demonstrated that the rate at which the air is changed in the room greatly influences the diffusion. For thorough diffusion the Univent should change the air of the room from six to ten times per hour depending upon individual room requirements.

Fourth—The operation of the ventilating system should be obvious to the most casual observer. For this reason, the Univent should be located where it will be exposed to view. "Seeing is believing"—teachers or other occupants should be able to observe the process of ventilation.

Venting

It is true that all the air forced into the room by the Univent must leave the room in some way or other. However, contrary to common conception, it is not necessary to provide large openings or apertures to serve the purpose. Because of this prevailing erroneous assumption, many laws and ordinances require the provision of large vent openings. However, experience has demonstrated that far better ventilating results are obtained when the vent outlets are restricted in such a manner that a slight pressure is built up in the room. This slight pressure is very effective in counteracting infiltration or inward leakage of cold air and, in addition, improves the diffusion of the air in the room. We, therefore, recommend that the vent opening, regardless of its arrangement, be restricted to a maximum of 18 sq. in. for each 100 cu. ft. per minute of Univent air capacity. This area should not be exceeded in the free opening of the grille or in the vent flue, if one is used. In addition, provision should be made for tightly closing the individual room vents or the roof ventilators. However, local laws or codes may govern the procedure.

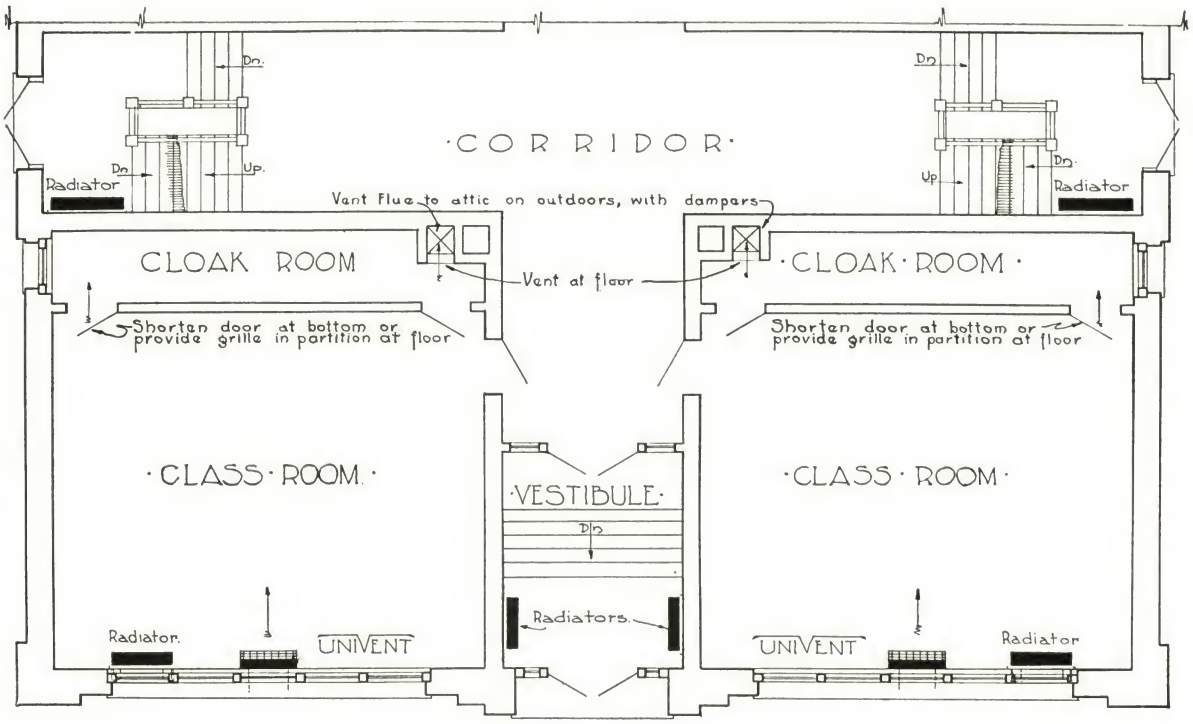
Vent Flues—One method of venting is by means of vent flues which connect each room to the attic or directly to the outdoors, as shown on diagram on page 46. This method involves considerable construction and building cost but is sometimes required by local laws.

Corridor Venting—A number of years ago this company suggested "Corridor Venting" in which the air from the room escapes into the corridor through a small grille at the base of the door or in the wall near the floor, as shown in diagram, page 46. This method was found just as satisfactory from a ventilation standpoint as individual vent flues, and, in addition, reduced building cost by decreasing the size and cost of the building itself. This suggestion, made ten years ago by this company, has since met with favor and has been acted upon by many well-known authorities. In several cases, code requirements have been changed to permit "Corridor Venting."

Summation of Procedures

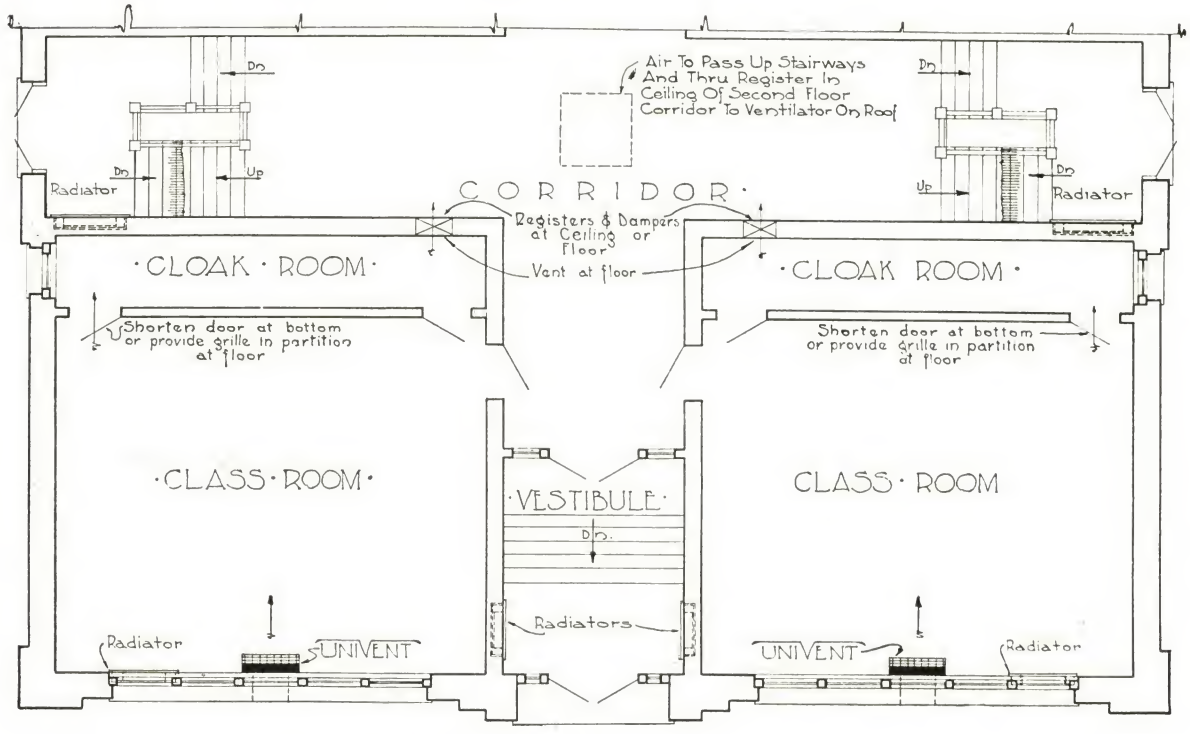
The following procedures are therefore recommended for the proper application of the Univent:

1. Use one or more Univents for each room to be ventilated.
2. Install all Univents in such a manner that they may be easily and quickly inspected and cleaned. Partial recessing may be accomplished without jeopardizing the cleanliness of the system, but do not conceal or fully recess Univents.
3. Do not add duct extensions to the Univent outlets because they destroy the high velocity jet principle of diffusion.
4. Locate the Univent in the center of the most exposed wall. If this wall is longer than thirty-five feet, use two or more Univents.
5. Univents should have sufficient capacity to change the air in the room from six to ten times per hour.
6. The Univent should be exposed to view to make the ventilating process obvious to the most casual observer.
7. Provide vent outlets having a maximum area of 18 sq. in. per 100 cu. ft. and equipped with tight shut-off dampers.



Typical Univent Installation Employing Vent Flues

Exposed radiators have been used



Typical Univent Installation Employing Corridor Venting

Herman Nelson Invisible Radiators have been used

How to Select the Proper Univent

The results obtained from any system of ventilation will depend as much upon the competency of the engineer as upon the system or character of equipment selected. While both are extremely important, it is recommended that the services of a competent, experienced engineer be employed to insure the proper selection and application of equipment and design of the system, as a whole, to meet the requirements of the particular building to be ventilated.

Air Delivery

The amount of air to be circulated for ventilation in classrooms is frequently stipulated in the local ventilation ordinances —30 c.f.m. per pupil is one of the most usual requirements. To obtain proper diffusion, Univents should be selected to change the air in the rooms at a rate of from six to ten times per hour, depending upon individual room requirements and whether a *"split," "modified"* or *"blast"* system is employed.

In a *"split"* system, the Univent is used for ventilating only, and heats the incoming air to approximately room temperature. Direct radiators are used for heating. In a *"blast"* system, all of the heating is done by the Univent. In the *"modified"* system, which was introduced by this company some years ago, half of the heating load is taken care of by the Univent while the remainder is supplied by direct radiation.

By referring to pages 48 to 51, it will be found that the Univent is made in four (4) lengths, from 25 to 55 in., and that each length is equipped with three radiator sizes. For each radiator size, three air deliveries are given. The low deliveries give comparatively low outlet velocities and are recommended for low ceiling heights (10 ft. or less). Likewise, the medium velocity units are for medium ceiling heights (10 to 12 ft.) and the high velocity units for high ceilings (12 ft. and over). The performance for any other air delivery within the range of the tables may be determined by interpolation.

Heating Capacity

After the required air delivery has been determined, the next step is to determine the amount of heating capacity required in the Univent. This is purely a matter of engineering and involves the calculation of the heat losses of the room. From the total heat losses, the heat output from direct radiators to be installed in the room should be subtracted. The difference is the additional heating capacity required and the Univent should be selected with a radiator giving this heating capacity. (See bold face figures in capacity tables.)

The total capacity (light figures) represents the total load the Univent places on the boiler for both the heating and ventilating duty and should be used in determining the size of boiler, piping, etc.

Univent Models

Each size of Univent is built in five (5) models depending upon the method of admitting the air to the fan, as shown on pages 52 to 61. Thus, 180 combinations are offered to enable the engineer to select the Univent to meet most any condition found in practice.

Selecting the Model

The following example will serve to illustrate the method of selecting Univents:

Room to Be Ventilated—Assume a standard size classroom, 30 ft. long, 24 ft. wide, with a ceiling height of 12 ft. and a seating capacity of 40 pupils.

Assume that the Model "SD" Univent is to be used.

Assume that the heat losses have been calculated in the regular way and found to be 160 sq. ft. of direct radiation for a room temperature of 70° F., a minimum outdoor temperature of minus 10° F. and including an allowance for quick heating.

Air Delivery of the Univent—Allowing 30 c.f.m. per pupil, 1200 c.f.m. is required. On this basis a high outlet velocity 4500 series Univent having a capacity of 1260 c.f.m. is the logical selection. If the ceiling height were 10 ft. or lower, a low outlet velocity 5500 series Univent having a capacity of 1210 c.f.m. would be used.

Assume tentatively that a high outlet velocity 4500 series Univent is selected. The rate of air change for 1260 c.f.m. is found as follows:

Room content $= 30 \times 24 \times 12 = 8640$ *cu. ft.*

Air delivery $= 1260 \times 60 = 75{,}600$ *cu. ft. per hour.*

$$\textit{Rate of air change} = \frac{75{,}600}{8640} = 8.75 \textit{ changes per hour.}$$

This should be a satisfactory selection for a *"splti"* or *"modified"* system but for a *"blast"* system a greater number of air changes are recommended.

For the *"blast"* system a high outlet velocity 5500 series Univent should be used, for which the rate of air change is found as follows:

Air delivery $= 1540 \times 60 = 92{,}400.$

$$\textit{Rate of air change} = \frac{92{,}400}{8640} = 10.7 \textit{ changes per hour.}$$

This is a satisfactory rate of air change for the *"blast"* system.

Therefore, the proper selections are a high outlet velocity 4500 series Univent for a *"split"* or *"modified"* system, and a high outlet velocity, large air delivery, 5500 series Univent for a *"blast"* system.

Heating Capacity of the Univent—After the air delivery has been determined the next step is to select the Univent having the proper heating capacity, depending upon the design of the system.

"Split" System—With a *"split"* system the Univent does not carry any of the heating load. Therefore, the proper selection is a Number 4531 "SD" Univent, having a final air temperature of 73° F. and an additional heating capacity of 15 sq. ft. In addition, at least 145 sq. ft. of radiation should be installed to take care of the heat losses.

"Modified" System—With a *"modified"* system the Univent takes care of approximately one-half the heating load. Therefore, a Number 4532 "SD" Univent, having a final air temperature of 85° F., and a heating capacity of 82 sq. ft. should be selected. In addition, at least 80 sq. ft. of radiation should be installed to take care of the balance of the heat losses.

"Blast" System—With a *"blast"* system the Univent supplies all the heat required. Therefore, the proper selection is a Number 5533 "SD" Univent, having a final air temperature of 96° F. and a heating capacity of 182 sq. ft. of direct radiation. No additional radiation is required unless the heat losses are greater than the Univent heating capacity.

MODELS SD–R

CAPACITY TABLES

FOR ENTERING AIR TEMPERATURES BELOW 0° F.

Serial No.	Code Word	Cu. ft. of air per min.	Total Capacities, Heating Capacities and Final Temperatures at various entering air temperatures.																		Increment
			−30°			−25°			−20°			−15°			−10°			−5°			
			Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	
2500 SERIES																					
2511	Uhlan	550	252	**4**	72	246	**10**	74	240	**17**	77	234	**23**	79	228	**29**	82	221	**36**	84	.501
2512	Ulmus	550	286	**38**	85	278	**44**	88	272	**50**	90	265	**55**	92	258	**60**	94	251	**65**	97	.446
2513	Ulnar	550	319	**72**	99	312	**77**	101	304	**82**	103	296	**86**	105	289	**91**	107	282	**96**	109	.391
2521	Ultra	625	276	**–**	68	269	**2**	71	262	**9**	73	256	**16**	76	248	**24**	78	242	**31**	81	.520
2522	Umber	625	311	**29**	80	304	**36**	83	296	**42**	85	289	**50**	88	281	**56**	90	275	**62**	92	.467
2523	Unarm	625	346	**65**	93	338	**71**	95	330	**76**	97	322	**82**	99	314	**89**	102	305	**94**	103	.414
2531	Unapt	700	285	**–**	61	280	**–**	64	274	**–**	67	268	**0**	70	261	**8**	73	253	**16**	75	.553
2532	Unbag	700	328	**13**	74	321	**22**	77	314	**30**	80	306	**38**	82	298	**46**	85	290	**53**	87	.493
2533	Unbid	700	372	**56**	88	362	**63**	90	353	**69**	92	344	**76**	94	335	**83**	96	326	**90**	99	.434
3500 SERIES																					
3511	Uncap	770	352	**6**	72	344	**14**	74	336	**24**	77	327	**32**	79	318	**41**	82	310	**50**	84	.501
3512	Uncia	770	400	**53**	85	390	**61**	88	381	**69**	90	371	**77**	92	362	**85**	94	352	**92**	97	.446
3513	Uncus	770	447	**101**	99	437	**108**	101	427	**115**	103	415	**121**	105	405	**128**	107	394	**135**	109	.391
3521	Under	875	384	**–**	68	374	**2**	71	367	**13**	73	358	**23**	76	348	**33**	78	338	**43**	81	.520
3522	Undue	875	434	**40**	80	424	**51**	83	414	**59**	85	404	**69**	88	394	**79**	90	382	**87**	92	.467
3523	Unfix	875	484	**91**	93	473	**99**	95	461	**107**	97	450	**115**	99	440	**124**	102	427	**131**	103	.414
3531	Unhap	980	395	**–**	61	388	**–**	64	380	**–**	67	371	**0**	70	361	**12**	73	350	**23**	75	.553
3532	Uniat	980	455	**18**	74	445	**31**	77	434	**44**	80	423	**53**	82	413	**63**	85	402	**74**	87	.493
3533	Unify	980	514	**78**	88	501	**87**	90	489	**96**	92	477	**106**	94	463	**115**	96	452	**125**	99	.434
4500 SERIES																					
4511	Union	990	453	**8**	72	443	**19**	74	432	**30**	77	420	**42**	79	410	**53**	82	398	**64**	84	.501
4512	Unity	990	515	**68**	85	502	**78**	88	490	**89**	90	477	**99**	92	465	**109**	94	453	**119**	97	.446
4513	Unlaw	990	575	**129**	99	562	**138**	101	549	**148**	103	534	**155**	105	522	**165**	107	507	**173**	109	.391
4521	Unman	1125	495	**–**	68	485	**3**	71	473	**16**	73	461	**29**	76	448	**43**	78	436	**55**	81	.520
4522	Unpin	1125	559	**52**	80	547	**65**	83	532	**76**	85	520	**89**	88	507	**101**	90	495	**112**	92	.467
4523	Unpeg	1125	623	**116**	93	609	**127**	95	594	**138**	97	580	**148**	99	565	**159**	102	550	**169**	103	.414
4531	Unoil	1260	517	**–**	61	508	**–**	64	497	**–**	67	486	**0**	70	473	**15**	73	458	**30**	75	.553
4532	Unrig	1260	591	**24**	74	578	**40**	77	564	**54**	80	550	**69**	82	536	**82**	85	522	**96**	87	.493
4533	Untie	1260	668	**101**	88	652	**113**	90	635	**125**	92	619	**137**	94	603	**149**	96	588	**162**	99	.434
5500 SERIES																					
5511	Upper	1210	553	**9**	72	540	**23**	74	527	**37**	77	513	**51**	79	500	**65**	82	487	**78**	84	.501
5512	Upset	1210	630	**84**	85	613	**96**	88	600	**109**	90	584	**120**	92	570	**133**	94	553	**145**	97	.446
5513	Urban	1210	704	**159**	99	687	**169**	101	670	**180**	103	653	**190**	105	637	**201**	107	620	**211**	109	.391
5521	Usage	1375	605	**–**	68	592	**4**	71	578	**20**	73	562	**36**	76	547	**52**	78	533	**68**	81	.520
5522	Usher	1375	682	**64**	80	668	**80**	83	650	**93**	85	635	**109**	88	620	**123**	90	602	**137**	92	.467
5523	Usual	1375	762	**142**	93	743	**156**	95	725	**169**	97	708	**181**	99	690	**195**	102	672	**206**	103	.414
5531	Usurp	1540	627	**–**	61	615	**–**	64	602	**–**	67	589	**0**	70	573	**19**	73	557	**37**	75	.553
5532	Utile	1540	720	**29**	74	705	**48**	77	689	**69**	80	673	**84**	82	655	**101**	85	637	**118**	87	.493
5533	Utter	1540	815	**123**	88	795	**138**	90	775	**152**	92	757	**168**	94	736	**182**	96	717	**198**	99	.434

All rated capacities are based on a steam temperature in the radiators of 218° F. and on an air delivery determined by the A. S. H. & V. E. standard anemometer method over the net area of the discharge outlet.

For each series there are three rated air deliveries with outlet velocities ranging from 800 to 1000 f.p.m.

The total capacity (equivalent square feet of direct radiation) shown in light figures, should be used to determine boiler, piping, trap and valve sizes.

Bold face figures indicate the additional heating capacity (equivalent square feet of direct radiation) available for warming the room to 70° F. after ventilation requirements have been taken care of.

MODELS SD–R

CAPACITY TABLES

FOR ENTERING AIR TEMPERATURES 0° F. AND ABOVE

Serial No.	Code Word	Cu. ft. of air per min.	Total Capacities, Heating Capacities and Final Temperatures at various entering air temperatures.																		Increment
			0°			+10°			+20°			+30°			+40°			+70°			
			Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	
2500 SERIES																					
2511	Uhlan	550	215	**42**	87	202	**54**	92	190	**66**	97	178	**79**	102	166	**92**	107	128	**128**	122	.501
2512	Ulmus	550	245	**72**	99	230	**82**	103	217	**94**	108	200	**104**	111	186	**111**	115	149	**149**	130	.446
2513	Ulnar	550	274	**101**	111	259	**111**	115	244	**120**	119	224	**125**	121	210	**136**	125	169	**169**	138	.391
2521	Ultra	625	235	**38**	84	220	**51**	88	207	**67**	94	194	**81**	99	180	**96**	104	140	**140**	120	.520
2522	Umber	625	266	**69**	95	250	**81**	99	235	**95**	104	220	**108**	108	205	**121**	113	160	**160**	127	.467
2523	Unarm	625	297	**99**	105	280	**111**	110	263	**123**	114	247	**135**	118	230	**146**	122	181	**181**	134	.414
2531	Unapt	700	246	**26**	78	232	**43**	84	218	**60**	89	203	**77**	94	186	**91**	99	145	**145**	116	.553
2532	Unbag	700	282	**61**	89	266	**77**	94	250	**92**	99	234	**107**	104	217	**123**	109	169	**169**	124	.493
2533	Unbid	700	317	**97**	101	300	**111**	105	282	**125**	110	264	**138**	114	246	**151**	118	193	**193**	131	.434
3500 SERIES																					
3511	Uncap	770	301	**58**	87	283	**75**	92	266	**93**	97	249	**110**	102	232	**128**	107	180	**180**	122	.501
3512	Uncia	770	343	**100**	99	323	**115**	103	304	**131**	108	281	**142**	111	260	**156**	115	208	**208**	130	.446
3513	Uncus	770	384	**142**	111	362	**155**	115	342	**169**	119	314	**175**	121	294	**190**	125	236	**236**	138	.391
3521	Under	875	329	**53**	84	308	**71**	88	290	**93**	94	271	**114**	99	252	**134**	104	195	**195**	120	.520
3522	Undue	875	372	**96**	95	350	**114**	99	329	**133**	104	309	**151**	108	288	**169**	113	225	**225**	127	.467
3523	Unfix	875	415	**139**	105	392	**156**	110	369	**172**	114	346	**188**	118	323	**205**	122	253	**253**	134	.414
3531	Unhap	980	341	**35**	78	322	**59**	84	301	**82**	89	281	**106**	94	260	**128**	99	200	**200**	116	.553
3532	Uniat	980	390	**85**	89	368	**106**	94	346	**127**	99	324	**149**	104	304	**172**	109	234	**234**	124	.493
3533	Unify	980	440	**131**	101	415	**153**	105	391	**172**	110	366	**192**	114	344	**212**	118	267	**267**	131	.434
4500 SERIES																					
4511	Union	990	387	**76**	87	364	**97**	92	342	**119**	97	320	**142**	102	298	**165**	107	231	**231**	122	.501
4512	Unity	990	441	**129**	99	415	**148**	103	387	**168**	108	361	**183**	111	334	**200**	115	268	**268**	130	.446
4513	Unlaw	990	494	**182**	111	467	**199**	115	440	**217**	119	403	**234**	121	379	**245**	125	304	**304**	138	.391
4521	Unman	1125	423	**68**	84	396	**94**	88	373	**120**	94	350	**146**	99	324	**172**	104	251	**251**	120	.520
4522	Unpin	1125	478	**124**	95	450	**146**	99	424	**171**	104	397	**194**	108	370	**218**	113	289	**289**	127	.467
4523	Unpeg	1125	535	**179**	105	505	**200**	110	475	**221**	114	445	**242**	118	415	**263**	122	326	**326**	134	.414
4531	Unoil	1260	446	**46**	78	421	**77**	84	394	**107**	89	363	**138**	94	334	**164**	99	262	**262**	116	.553
4532	Unrig	1260	507	**110**	89	478	**138**	94	448	**166**	99	420	**193**	104	391	**221**	109	304	**304**	124	.493
4533	Untie	1260	571	**174**	101	539	**199**	105	507	**224**	110	475	**248**	114	442	**272**	118	347	**347**	131	.434
5500 SERIES																					
5511	Upper	1210	473	**92**	87	445	**118**	92	418	**146**	97	392	**173**	102	365	**201**	107	283	**283**	122	.501
5512	Upset	1210	538	**157**	99	508	**181**	103	478	**206**	108	442	**224**	111	408	**245**	115	327	**327**	130	.446
5513	Urban	1210	603	**223**	111	570	**244**	115	538	**265**	119	493	**275**	121	463	**299**	125	372	**372**	138	.391
5521	Usage	1375	517	**84**	84	485	**113**	88	456	**147**	94	427	**179**	99	396	**211**	104	308	**308**	120	.520
5522	Usher	1375	585	**152**	95	550	**179**	99	518	**209**	104	486	**238**	108	452	**266**	113	353	**353**	127	.467
5523	Usual	1375	653	**219**	105	616	**245**	110	580	**271**	114	544	**297**	118	508	**322**	122	399	**399**	134	.414
5531	Usurp	1540	541	**55**	78	510	**94**	84	478	**131**	89	446	**168**	94	409	**201**	99	318	**318**	116	.553
5532	Utile	1540	619	**134**	89	585	**169**	94	548	**202**	99	513	**236**	104	478	**270**	109	371	**371**	124	.493
5533	Utter	1540	697	**213**	101	658	**243**	105	620	**274**	110	581	**304**	114	540	**333**	118	423	**423**	131	.434

The last column shows the increment to be added or deducted to the final temperature per degree change in entering air temperature.

If it be desired to find the final temperature of a given machine when the entering air temperature is —35°, subtract the increment multiplied by 5 from the final temperature shown in the —30° column.

If it be desired to find the final temperature when the entering air is +35°, add the increment multiplied by 5 to the final temperature shown in the +30° column.

Note that the increment is added for higher entering air temperatures and subtracted for lower entering air temperatures.

MODELS O—W—WR

CAPACITY TABLES

FOR ENTERING AIR TEMPERATURES BELOW 0° F.

Serial No.	Code Word	Cu. ft. of air per min.	Total Capacities, Heating Capacities and Final Temperatures at various entering air temperatures.																		Increment
			−30°			−25°			−20°			−15°			−10°			−5°			
			Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	
2500 SERIES																					
2511	Uhlan	500	238	**13**	76	233	**19**	79	227	**25**	81	221	**30**	83	215	**35**	86	209	**40**	88	.485
2512	Ulmus	500	270	**45**	90	264	**50**	92	258	**55**	95	251	**60**	96	244	**65**	99	238	**69**	101	.428
2513	Ulnar	500	302	**77**	104	295	**81**	106	287	**85**	108	280	**89**	110	274	**94**	112	266	**97**	113	.370
2521	Ultra	570	261	**4**	72	254	**11**	74	248	**17**	77	242	**23**	79	236	**30**	82	230	**37**	85	.501
2522	Umber	570	294	**38**	85	288	**44**	87	280	**49**	89	273	**55**	91	266	**61**	94	259	**67**	96	.447
2523	Unarm	570	328	**71**	98	320	**76**	100	312	**81**	102	304	**86**	104	296	**91**	106	288	**97**	108	.394
2531	Unapt	650	284	**–**	67	278	**0**	70	270	**7**	73	263	**15**	75	256	**22**	78	249	**30**	80	.520
2532	Unbag	650	320	**27**	79	312	**35**	82	304	**41**	84	296	**48**	86	289	**55**	89	281	**62**	91	.471
2533	Unbid	650	355	**63**	91	347	**69**	94	338	**75**	96	330	**81**	98	321	**87**	100	313	**94**	102	.421
3500 SERIES																					
3511	Uncap	700	334	**19**	76	326	**27**	79	319	**35**	81	310	**42**	83	302	**50**	86	293	**56**	88	.485
3512	Uncia	700	378	**63**	90	370	**70**	92	361	**77**	95	352	**83**	96	342	**90**	99	333	**96**	101	.428
3513	Uncus	700	422	**107**	104	413	**113**	106	403	**119**	108	392	**125**	110	383	**131**	112	374	**137**	113	.370
3521	Under	800	366	**6**	72	357	**15**	74	349	**24**	77	339	**33**	79	331	**43**	82	322	**52**	85	.501
3522	Undue	800	413	**53**	85	403	**61**	87	393	**69**	89	383	**77**	91	374	**86**	94	364	**94**	96	.447
3523	Unfix	800	460	**100**	98	448	**107**	100	438	**114**	102	427	**121**	104	416	**128**	106	405	**135**	108	.394
3531	Unhap	910	397	**–**	67	389	**0**	70	378	**10**	73	368	**21**	75	358	**32**	78	348	**41**	80	.520
3532	Uniat	910	448	**38**	79	437	**48**	82	427	**58**	84	416	**67**	86	404	**77**	89	394	**87**	91	.471
3533	Unify	910	497	**88**	91	486	**97**	94	473	**105**	96	461	**113**	98	449	**122**	100	438	**131**	102	.421
4500 SERIES																					
4511	Union	900	429	**24**	76	419	**34**	79	409	**45**	81	398	**53**	83	387	**64**	86	376	**72**	88	.485
4512	Unity	900	486	**81**	90	475	**90**	92	464	**99**	95	451	**107**	96	440	**116**	99	428	**122**	101	.428
4513	Unlaw	900	543	**138**	104	531	**146**	106	518	**153**	108	505	**161**	110	492	**168**	112	480	**175**	113	.370
4521	Unman	1025	468	**8**	72	457	**20**	74	447	**31**	77	434	**42**	79	424	**55**	82	413	**66**	85	.501
4522	Unpin	1025	530	**68**	85	518	**79**	87	505	**89**	89	492	**99**	91	480	**110**	94	467	**120**	96	.447
4523	Unpeg	1025	590	**128**	98	576	**137**	100	562	**146**	102	548	**155**	104	534	**164**	106	520	**173**	108	.394
4531	Unoil	1170	510	**–**	67	500	**0**	70	487	**13**	73	475	**27**	75	462	**40**	78	448	**54**	80	.520
4532	Unrig	1170	573	**48**	79	563	**62**	82	547	**74**	84	534	**86**	86	520	**99**	89	507	**112**	91	.471
4533	Untie	1170	639	**113**	91	623	**124**	94	608	**135**	96	592	**146**	98	578	**157**	100	564	**169**	102	.421
5500 SERIES																					
5511	Upper	1100	525	**30**	76	513	**42**	79	500	**55**	81	487	**65**	83	473	**78**	86	460	**89**	88	.485
5512	Upset	1100	594	**99**	90	582	**110**	92	567	**121**	95	552	**131**	96	538	**142**	99	523	**151**	101	.428
5513	Urban	1100	663	**169**	104	649	**178**	106	632	**187**	108	617	**196**	110	602	**206**	112	586	**214**	113	.370
5521	Usage	1250	571	**9**	72	558	**24**	74	544	**38**	77	530	**51**	79	517	**67**	82	503	**82**	85	.501
5522	Usher	1250	645	**83**	85	630	**96**	87	615	**108**	89	598	**120**	91	583	**134**	94	568	**147**	96	.447
5523	Usual	1250	718	**156**	98	700	**167**	100	684	**178**	102	667	**189**	104	650	**200**	106	633	**212**	108	.394
5531	Usurp	1425	622	**–**	67	609	**0**	70	593	**16**	73	578	**33**	75	563	**49**	78	547	**65**	80	.520
5532	Utile	1425	700	**59**	79	685	**76**	82	668	**90**	84	650	**105**	86	634	**120**	89	617	**136**	91	.471
5533	Utter	1425	779	**137**	91	760	**151**	94	741	**164**	96	722	**178**	98	705	**191**	100	687	**206**	102	.421

All rated capacities are based on a steam temperature in the radiators of 218° F. and on an air delivery determined by the A. S. H. & V. E. standard anemometer method over the net area of the discharge outlet.

For each series there are three rated air deliveries with outlet velocities ranging from 800 to 1000 f.p.m.

The total capacity (equivalent square feet of direct radiation) shown in light figures, should be used to determine boiler, piping, trap and valve sizes.

Bold face figures indicate the additional heating capacity (equivalent square feet of direct radiation) available for warming the room to 70° F. after ventilation requirements have been taken care of.

MODELS O—W—WR

CAPACITY TABLES

FOR ENTERING AIR TEMPERATURES 0° F. AND ABOVE

Serial No.	Code Word	Cu. ft. of air per min.	Total Capacities, Heating Capacities and Final Temperatures at various entering air temperatures. 0°			+10°			+20°			+30°			+40°			+70°			Increment
			Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	
2500 SERIES																					
2511	Uhlan	500	203	**46**	90	193	**58**	96	181	**68**	100	168	**78**	105	158	**90**	110	123	**123**	125	.485
2512	Ulmus	500	232	**74**	103	219	**84**	107	206	**93**	111	193	**103**	116	180	**113**	120	141	**141**	133	.428
2513	Ulnar	500	259	**102**	115	245	**110**	119	231	**119**	123	217	**127**	126	203	**135**	130	160	**160**	141	.370
2521	Ultra	570	223	**44**	87	212	**58**	93	197	**69**	97	184	**82**	102	172	**95**	107	133	**133**	122	.501
2522	Umber	570	252	**73**	98	238	**85**	103	224	**95**	107	210	**107**	112	197	**120**	117	153	**153**	130	.447
2523	Unarm	570	281	**102**	110	266	**112**	114	250	**122**	118	235	**132**	122	220	**144**	126	173	**173**	137	.394
2531	Unapt	650	242	**37**	83	228	**52**	88	214	**67**	93	200	**83**	99	187	**100**	104	143	**143**	119	.520
2532	Unbag	650	273	**68**	93	258	**82**	98	242	**96**	103	227	**110**	108	214	**126**	113	165	**165**	126	.471
2533	Unbid	650	304	**100**	104	288	**112**	108	270	**124**	113	254	**137**	117	237	**149**	121	186	**186**	134	.421
3500 SERIES																					
3511	Uncap	700	285	**64**	90	270	**81**	96	252	**95**	100	236	**110**	105	221	**126**	110	172	**172**	125	.485
3512	Uncia	700	324	**104**	103	306	**118**	107	288	**130**	111	270	**144**	116	252	**158**	120	198	**198**	133	.428
3513	Uncus	700	364	**143**	115	343	**154**	119	323	**166**	123	304	**178**	126	284	**189**	130	224	**224**	141	.370
3521	Under	800	313	**61**	87	298	**82**	93	277	**96**	97	259	**115**	102	241	**133**	107	187	**187**	122	.501
3522	Undue	800	354	**102**	98	335	**119**	103	314	**134**	107	294	**150**	112	278	**169**	117	214	**214**	130	.447
3523	Unfix	800	394	**143**	110	373	**157**	114	351	**171**	118	330	**186**	122	310	**202**	126	242	**242**	137	.394
3531	Unhap	910	339	**52**	83	319	**73**	88	299	**94**	93	280	**117**	99	262	**139**	104	201	**201**	119	.520
3532	Uniat	910	382	**96**	93	361	**115**	98	339	**134**	103	318	**154**	108	299	**176**	113	231	**231**	126	.471
3533	Unify	910	427	**139**	104	407	**157**	108	379	**174**	113	355	**190**	117	332	**209**	121	260	**260**	134	.421
4500 SERIES																					
4511	Union	900	366	**82**	90	347	**103**	96	324	**122**	100	303	**141**	105	284	**162**	110	220	**220**	125	.485
4512	Unity	900	417	**133**	103	393	**151**	107	370	**168**	111	347	**185**	116	324	**202**	120	254	**254**	133	.428
4513	Unlaw	900	467	**183**	115	440	**198**	119	416	**213**	123	390	**228**	126	365	**243**	130	288	**288**	141	.370
4521	Unman	1025	402	**78**	87	382	**102**	93	354	**123**	97	332	**147**	102	309	**171**	107	239	**239**	122	.501
4522	Unpin	1025	454	**131**	98	430	**153**	103	403	**172**	107	378	**192**	112	355	**212**	117	275	**275**	130	.447
4523	Unpeg	1025	507	**183**	110	478	**200**	114	450	**219**	118	423	**238**	122	397	**258**	126	310	**310**	137	.394
4531	Unoil	1170	436	**67**	83	410	**94**	88	384	**121**	93	360	**150**	99	337	**179**	104	258	**258**	119	.520
4532	Unrig	1170	492	**123**	93	464	**148**	98	437	**173**	103	408	**198**	108	384	**226**	113	297	**297**	126	.471
4533	Untie	1170	547	**179**	104	518	**202**	108	487	**224**	113	457	**246**	117	427	**268**	121	335	**335**	134	.421
5500 SERIES																					
5511	Upper	1100	448	**101**	90	424	**127**	96	397	**149**	100	370	**173**	105	346	**198**	110	270	**270**	125	.485
5512	Upset	1100	509	**163**	103	481	**184**	107	453	**205**	111	423	**226**	116	395	**247**	120	311	**311**	133	.428
5513	Urban	1100	571	**224**	115	538	**242**	119	508	**260**	123	477	**279**	126	445	**297**	130	352	**352**	141	.370
5521	Usage	1250	490	**96**	87	465	**123**	93	432	**151**	97	404	**179**	102	376	**208**	107	292	**292**	122	.501
5522	Usher	1250	553	**159**	98	523	**186**	103	490	**210**	107	460	**234**	112	433	**264**	117	335	**335**	130	.447
5523	Usual	1250	616	**223**	110	582	**245**	114	548	**267**	118	515	**291**	122	483	**315**	126	378	**378**	137	.394
5531	Usurp	1425	532	**82**	83	500	**115**	88	468	**147**	93	440	**183**	99	410	**218**	104	314	**314**	119	.520
5532	Utile	1425	600	**150**	93	566	**181**	98	531	**210**	103	498	**241**	108	468	**276**	113	362	**362**	126	.471
5533	Utter	1425	667	**218**	104	632	**246**	108	593	**272**	113	556	**300**	117	520	**327**	121	407	**407**	134	.421

The last column shows the increment to be added or deducted to the final temperature per degree change in entering air temperature.

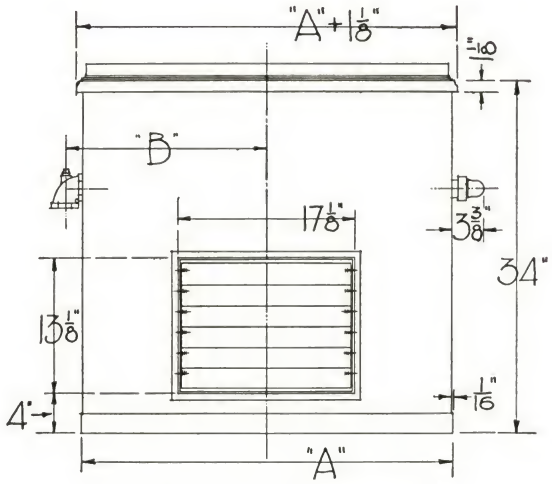
If it be desired to find the final temperature of a given machine when the entering air temperature is —35°, subtract the increment multiplied by 5 from the final temperature shown in the —30° column.

If it be desired to find the final temperature when the entering air is +35°, add the increment multiplied by 5 to the final temperature shown in the +30° column.

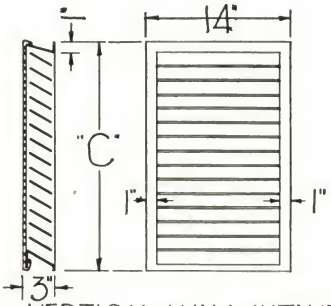
Note that the increment is added for higher entering air temperatures and subtracted for lower entering air temperatures.

MODEL SD DIMENSIONS

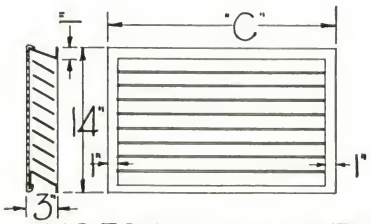
CODE WORD WAFER



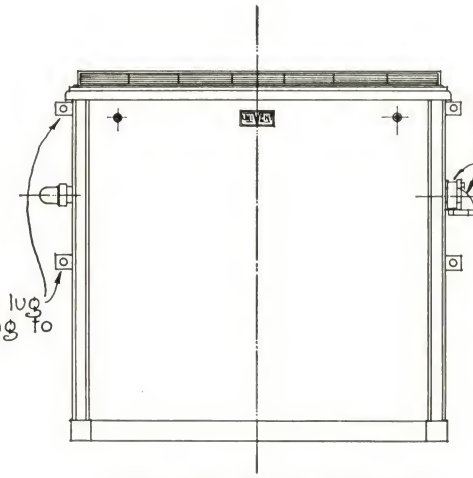
REAR ELEVATION



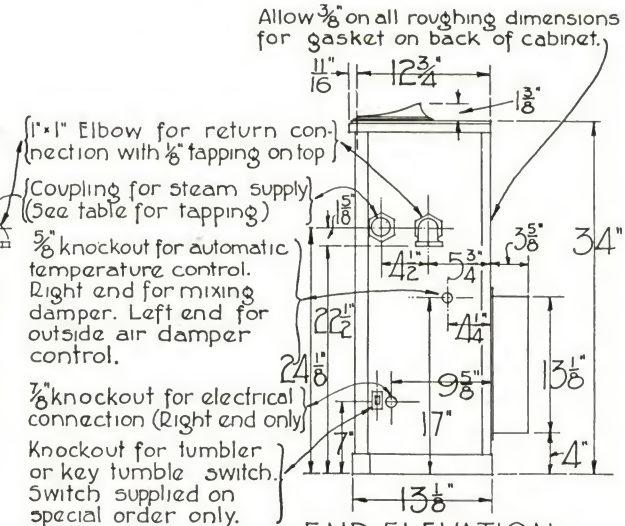
VERTICAL WALL INTAKE



HORIZONTAL WALL INTAKE



FRONT ELEVATION



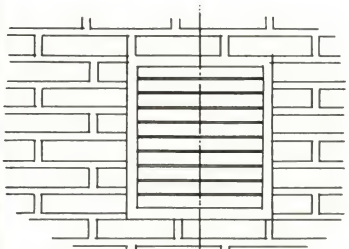
END ELEVATION

Dimensions given above are same for all series.
Values of lettered dimensions are given in table.

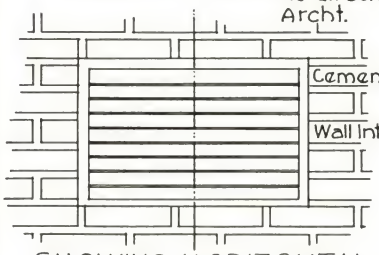
SERIES NUMBER	A	B	C	Steam Connections	
				Supply	Return.
2500 - SERIES	25⅞"	14⅞"	18"	1"	1"
3500 - SERIES	35⅞"	19⅞"	22"	1¼"	1"
4500 - SERIES	45⅞"	24⅞"	26"	1½"	1"
5500 - SERIES	55⅞"	29⅞"	32"	1½"	1"

"B" is roughing dimension from ℄ of Univent to face of supply coupling and to ℄ of return elbow when supply & return are on same end.
For roughing dimension when supply & return on opposite ends see piping connections.

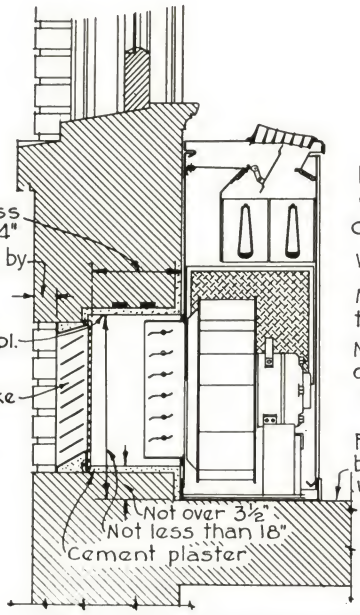
· MODEL · SD · APPLICATIONS



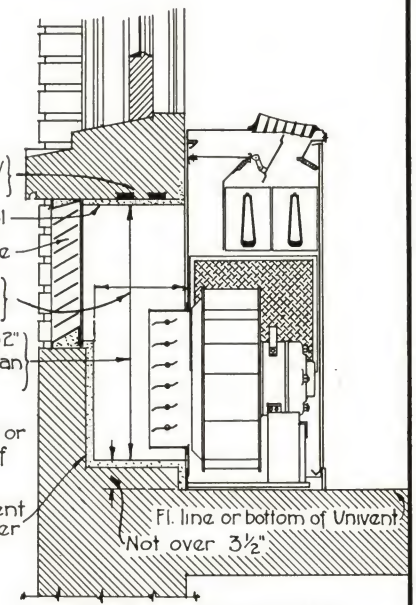
· SHOWING · VERTICAL WALL INTAKE



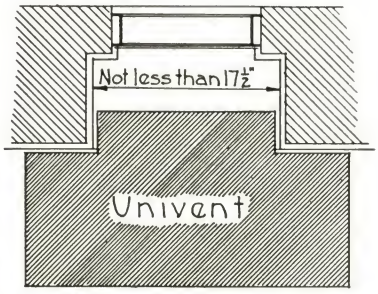
SHOWING · HORIZONTAL · · WALL · INTAKE ·



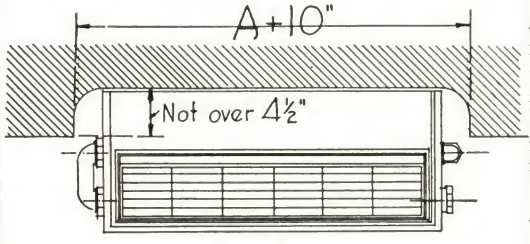
· SECTION · SHOWING · STAND- · ARD · LOCATION · OF · INTAKE · ·



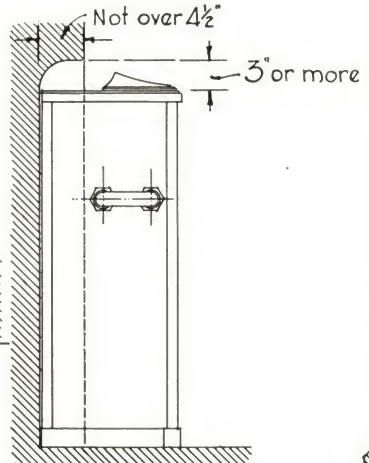
· SECTION · SHOWING · · HIGH · LOCATION · OF · INTAKE ·



· HORIZONTAL · SECTION · · THRU · WALL · INTAKE ·

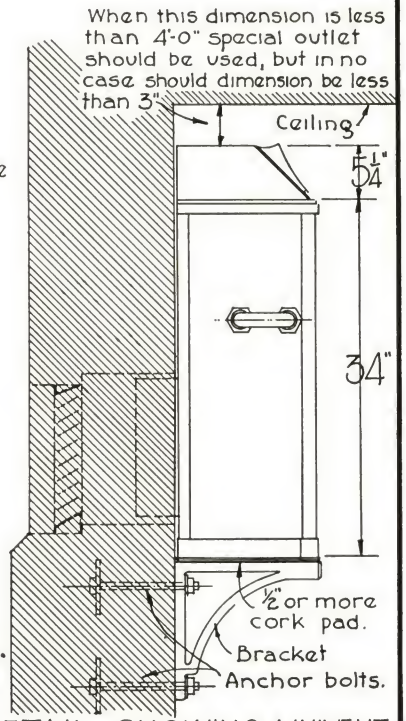


· HORIZONTAL · SECTION · · SHOWING · APPROVED · · METHOD · OF · RECESSING ·



· VERTICAL · SECTION · · SHOWING · APPROVED · · METHOD · OF · RECESSING ·

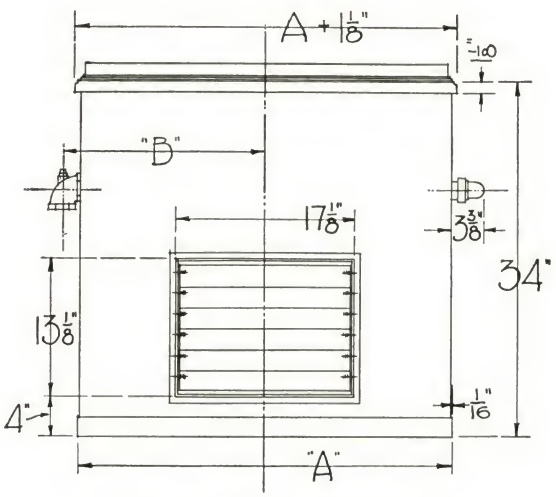
It is advisable to build recess larger than cabinet as shown. If this cannot be done openings should be cased to insure neat fit.



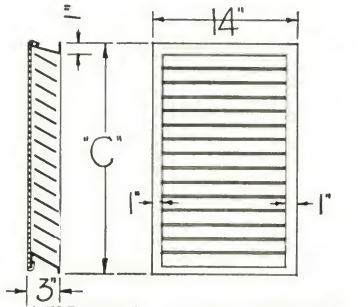
· DETAIL · SHOWING · UNIVENT · · SUSPENDED · NEAR · CEILING · · WITH · SUPPORTING · BRACKET · · AND · SPECIAL · OUTLET · ·

· MODEL · R · DIMENSIONS ·

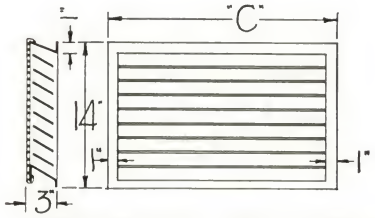
· CODE WORD · WAKIF ·



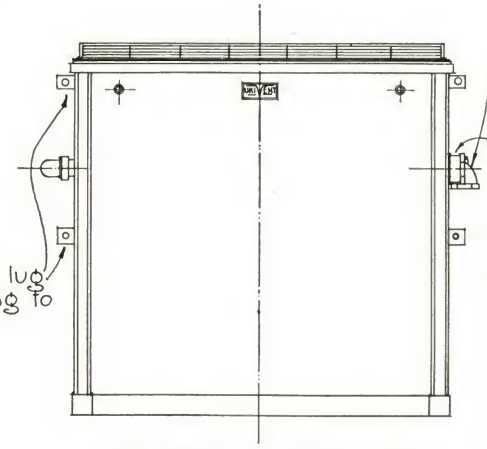
· REAR · ELEVATION ·



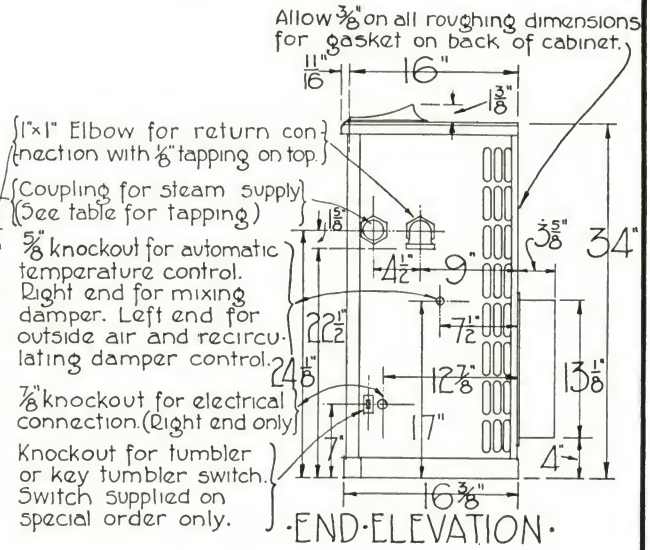
· VERTICAL · WALL · INTAKE ·



HORIZONTAL · WALL · INTAKE ·



· FRONT · ELEVATION ·



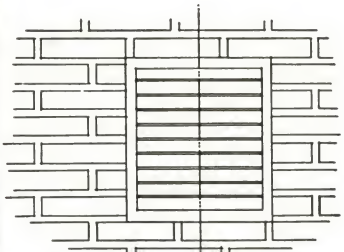
· END · ELEVATION ·

Dimensions given above are same for all series.
Values of lettered dimensions are given in table

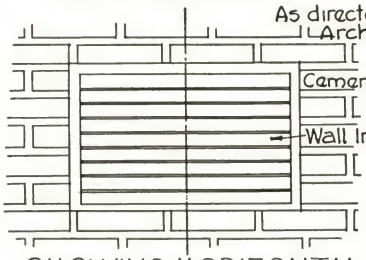
SERIES NUMBER	A	B	C	Steam Connections Supply	Steam Connections Return
2500 - SERIES	25 7/8"	14 7/8"	18"	1"	1"
3500 - SERIES	35 7/8"	19 7/8"	22"	1 1/4"	1"
4500 - SERIES	45 7/8"	24 7/8"	26"	1 1/2"	1"
5500 - SERIES	55 7/8"	29 7/8"	32"	1 1/2"	1"

"B" is roughing dimension from ℄ of univent to face of supply coupling and to ℄ of return elbow when supply & return are on same end.
For roughing dimension when supply & return on opposite ends see piping connections.

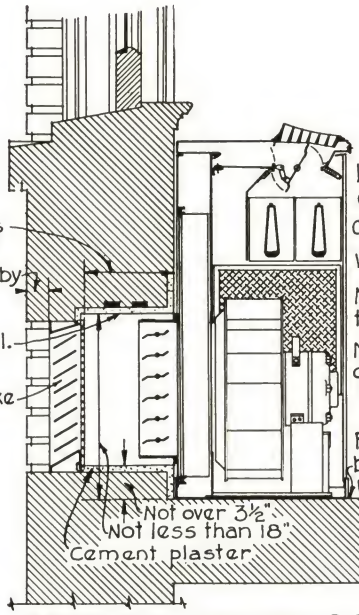
·MODEL· R ·APPLICATIONS·



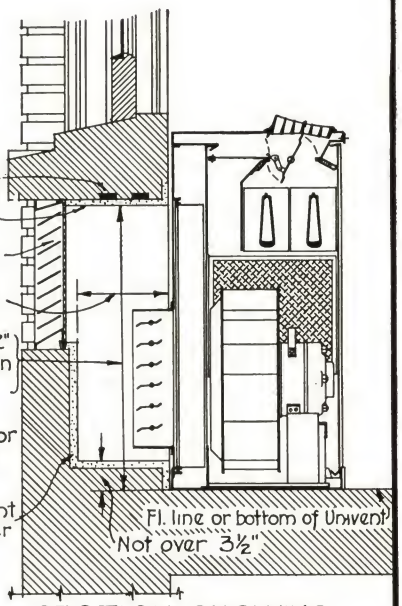
SHOWING VERTICAL WALL ·INTAKE



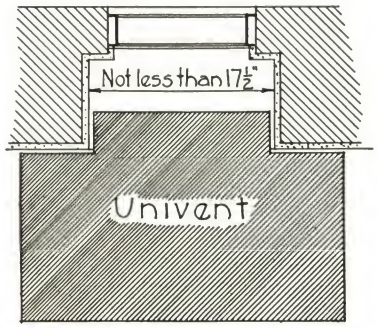
SHOWING·HORIZONTAL· ·WALL·INTAKE·



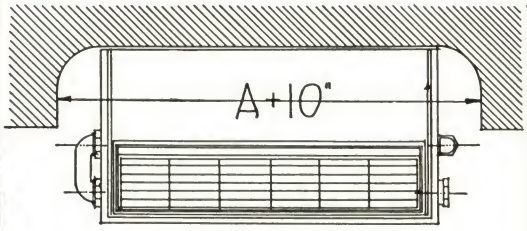
·SECTION·SHOWING·STAND· ·ARD·LOCATION·OF·INTAKE



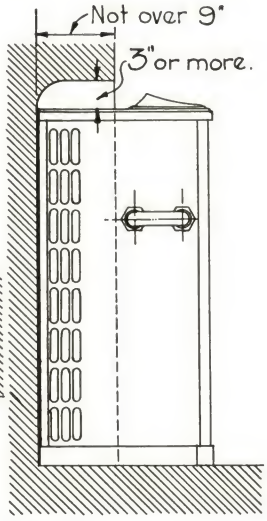
SECTION·SHOWING· HIGH·LOCATION·OF·INTAKE·



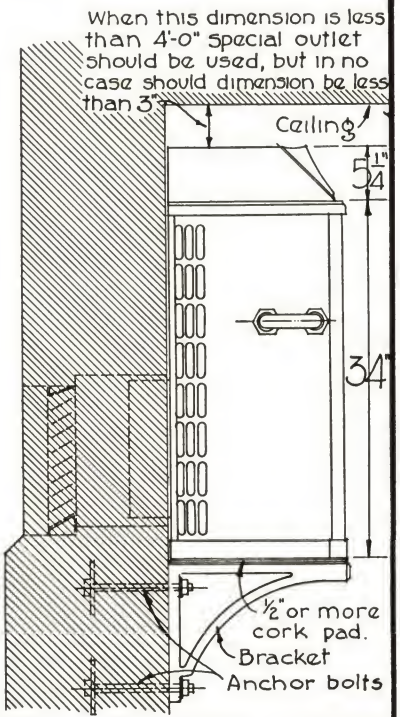
·HORIZONTAL·SECTION· ·THRU·WALL·INTAKE·



·HORIZONTAL·SECTION· ·SHOWING·APPROVED· ·METHOD·OF·RECESSING·



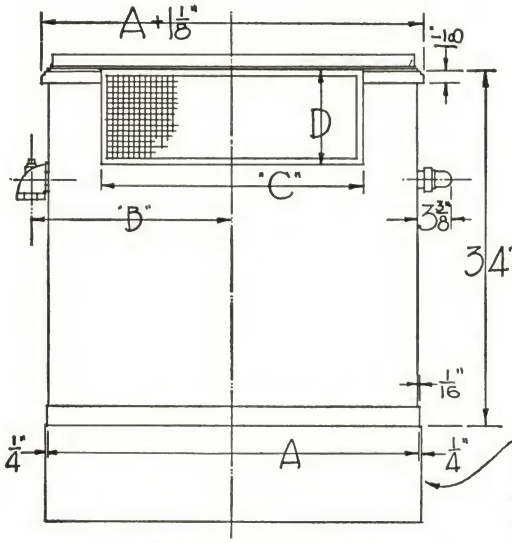
·VERTICAL·SECTION· ·SHOWING·APPROVED· METHOD·OF·RECESSING·



·DETAIL·SHOWING·UNIVENT· ·SUSPENDED·NEAR·CEILING· WITH·SUPPORTING·BRACKET· AND·SPECIAL·OUTLET··

· MODEL · O · DIMENSIONS ·

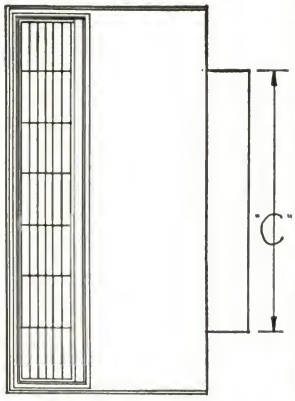
· CODE WORD · "WATCH" ·



· REAR · ELEVATION ·

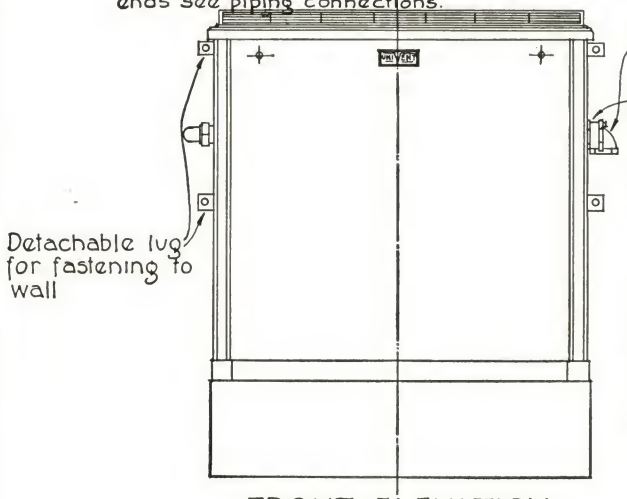
NOTE #1

Sub bases furnished on special order only. Always give dimension "F" on order. "F" cannot be more than 50"



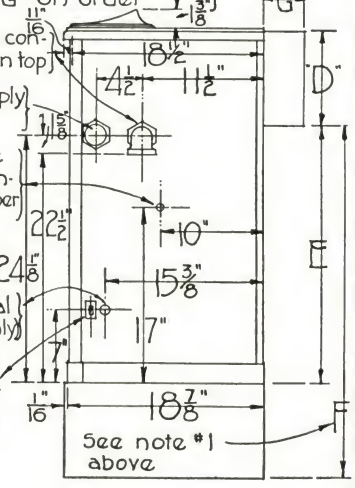
· PLAN ·

"B" is roughing dimension from ℄ of Univent to face of supply coupling and to ℄ of return elbow when supply & return are on same end For roughing dimension when supply & return are on opposite ends see piping connections.



· FRONT · ELEVATION ·

Unless otherwise ordered G = 4" If any other dimension is required give "G" on order

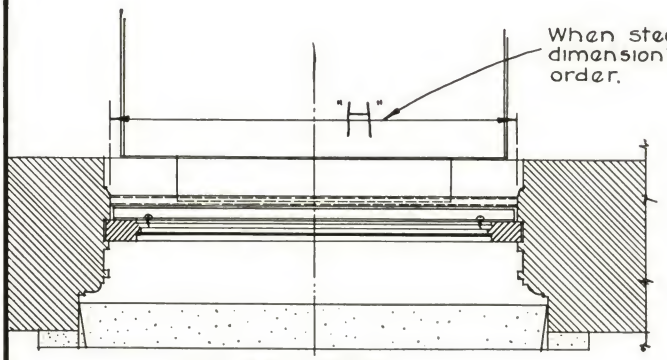


· END · ELEVATION ·

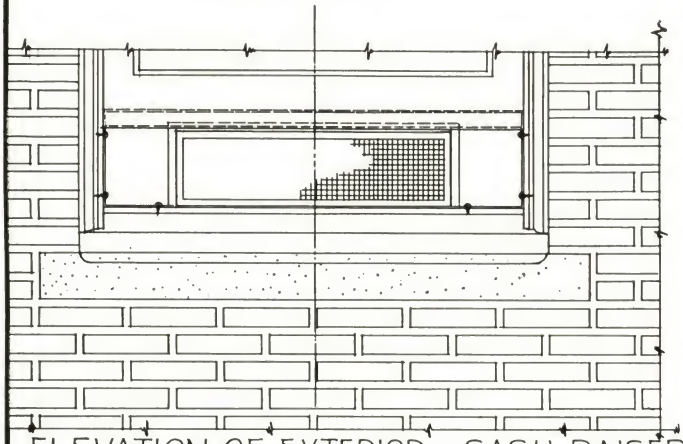
Dimensions given above are same for all series.
Values of lettered dimensions are given in table

SERIES NUMBER	A	B	C	D	E	Steam Connections	
						Supply	Return
2500 SERIES	25 7/8"	14 7/8"	18 1/8"	7/8"	26 3/4"	1"	1"
3500 SERIES	35 7/8"	19 7/8"	26 1/8"	7/8"	26 3/4"	1 1/4"	1"
4500 SERIES	45 7/8"	24 7/8"	36 1/8"	7/8"	26 3/4"	1 1/2"	1"
5500 SERIES	55 7/8"	29 7/8"	36 1/8"	9/8"	24 3/4"	1 1/2"	1"

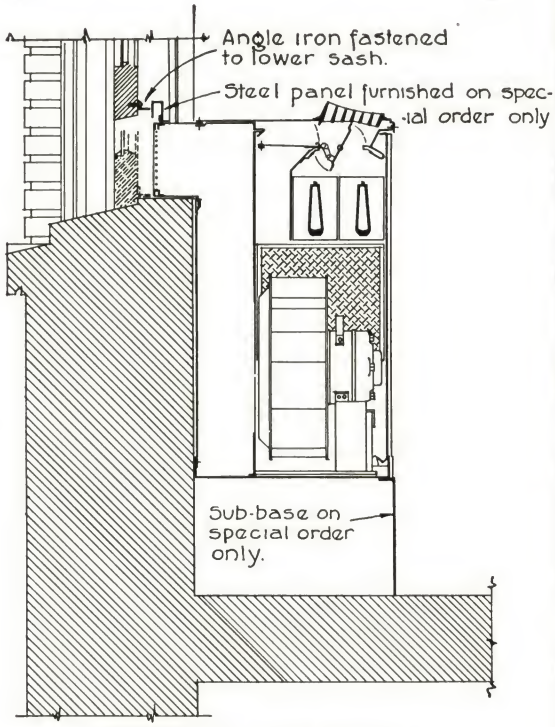
· MODEL · 0 · APPLICATIONS ·



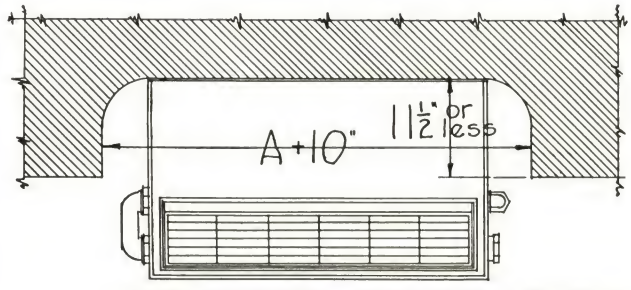
· PLAN · VIEW ·



· ELEVATION · OF · EXTERIOR · · SASH · RAISED · · SHOWING · INTAKE · & · STEEL · PANEL · ·



· SECTION · SHOWING · · UNIVENT · INTAKE · INSIDE · OF · · WINDOW · · SASH · TO · BE · · RAISED · FOR · OUTSIDE · AIR · ·

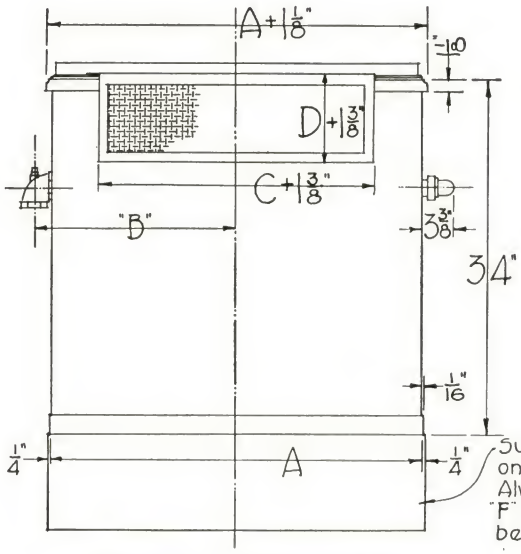


· HORIZONTAL · SECTION · SHOWING · APPROVED · METHOD · OF · · RECESSING · ·

It is advisable to build recess larger than cabinet as shown. If this cannot be done openings should be cased to insure neat fit.

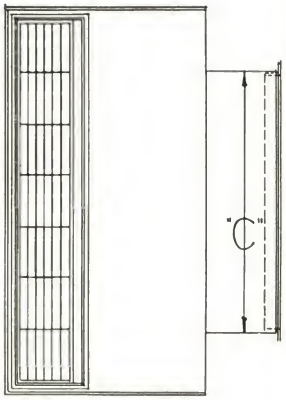
· MODEL · W · DIMENSIONS ·

· CODE WORD "WALTZ" ·



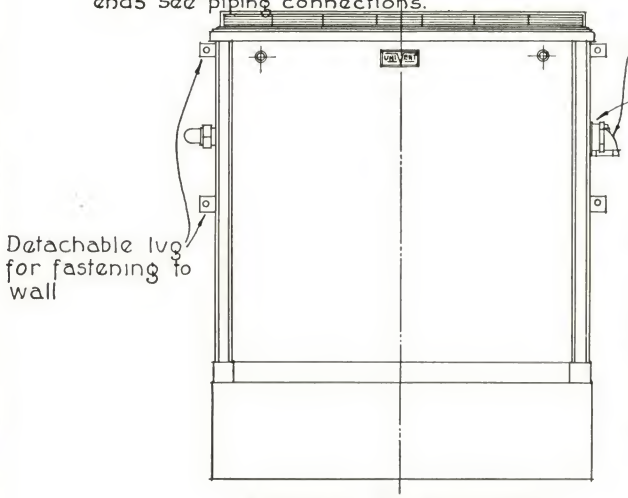
· REAR · ELEVATION ·

NOTE #1.
Sub bases furnished on special order only. Always give dimension "F" on order. "F" cannot be more than 50"



· PLAN ·

"B" is roughing dimension from ℄ of Univent to face of supply coupling and to ℄ of return elbow when supply & return are on same end. For roughing dimension when supply & return are on opposite ends see piping connections.



· FRONT · ELEVATION ·

Unless otherwise ordered G=12" and is to be cut to required length on job. If greater length is required give "G" on order.

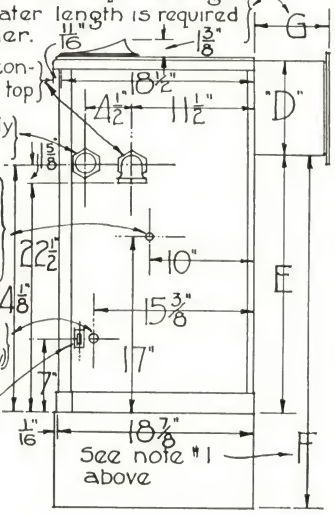
1"×1" Elbow for return connection with 1/8" tapping on top

Coupling for steam supply (See table for tapping)

5/8" knockout for automatic temperature control. Right end for mixing damper. Left end for outside air damper control

7/8" knockout for electrical connection. (Right end only)

Knockout for tumbler or key tumbler switch. Switch supplied on special order only.

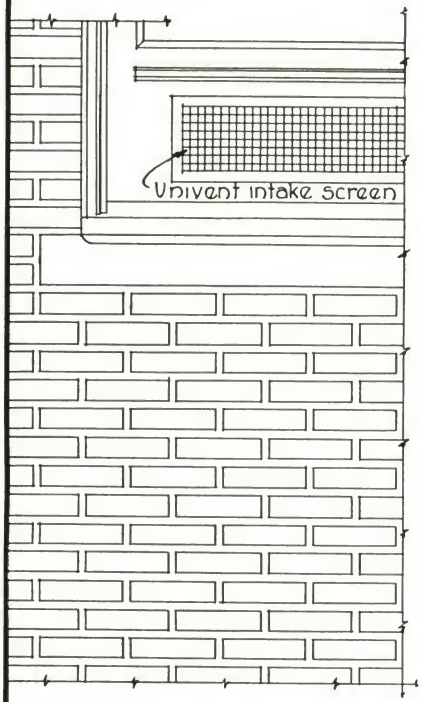


· END · ELEVATION ·

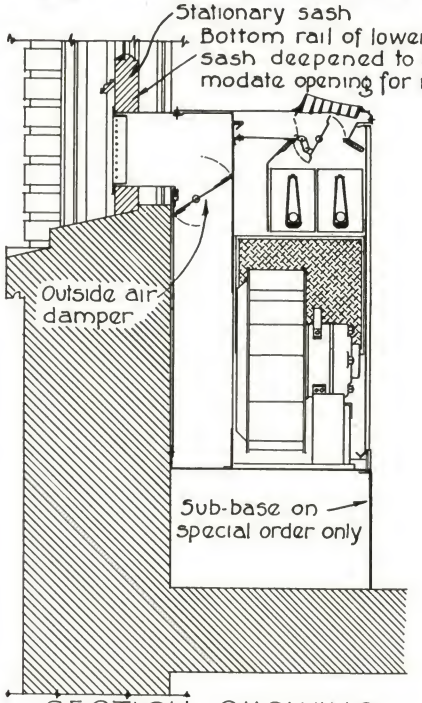
Dimensions given above are same for all series. Values of lettered dimensions are given in table

· SERIES · NUMBER	A	B	C	D	E	Steam Connections	
						Supply	Return
· 2500 · SERIES ·	25 7/8"	14 7/8"	18 1/8"	7 1/8"	26 3/4"	1"	1"
· 3500 · SERIES	35 7/8"	19 7/8"	26 1/8"	7 1/8"	26 3/4"	1 1/4"	1"
· 4500 · SERIES	45 7/8"	24 7/8"	36 1/8"	7 1/8"	26 3/4"	1 1/2"	1"
· 5500 · SERIES	55 7/8"	29 7/8"	36 1/8"	9 1/8"	24 3/4"	1 1/2"	1"

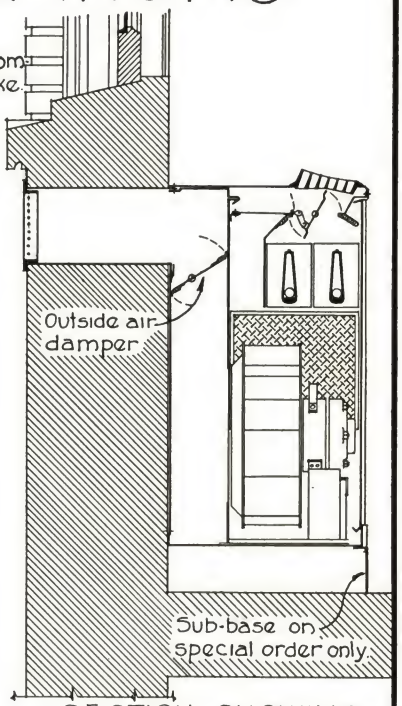
MODEL W APPLICATIONS



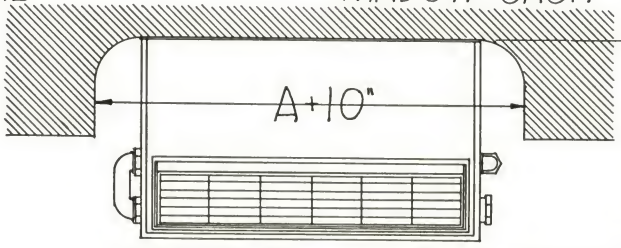
ELEVATION OF EXTERIOR SHOWING UNIVENT INTAKE



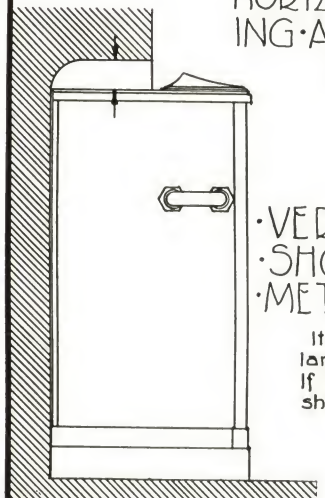
SECTION SHOWING UNIVENT WITH INTAKE THRU LOWER RAIL OF WINDOW SASH



SECTION SHOWING UNIVENT WITH INTAKE THRU WALL BELOW WINDOW SILL



HORIZONTAL SECTION SHOWING APPROVED METHOD OF RECESSING

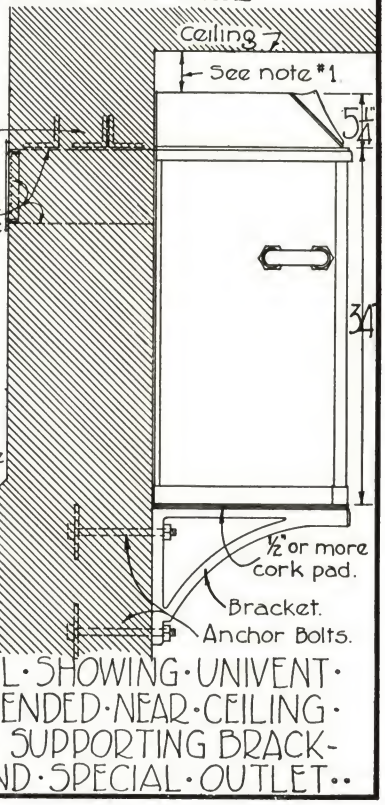


VERTICAL SECTION SHOWING APPROVED METHOD OF RECESSING

It is advisable to build recess larger than cabinet as shown. If this cannot be done openings should be cased to insure neat fit.

NOTE *1

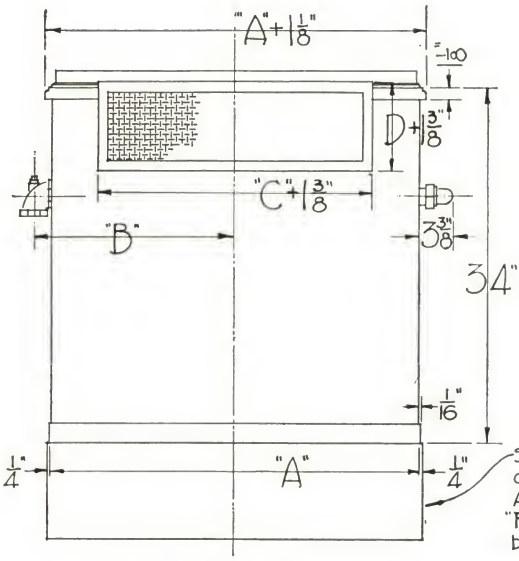
When the above dimension is less than 4'-0" special outlet should be used, but in no case should dimension be less than 3"



DETAIL SHOWING UNIVENT SUSPENDED NEAR CEILING WITH SUPPORTING BRACKET AND SPECIAL OUTLET

MODEL WR DIMENSIONS

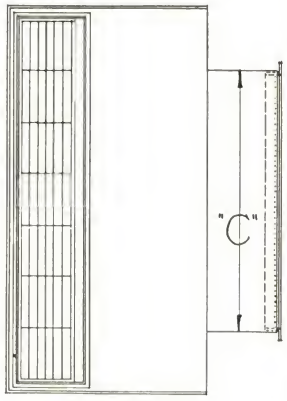
CODE WORD "WACKE"



REAR ELEVATION

NOTE-1

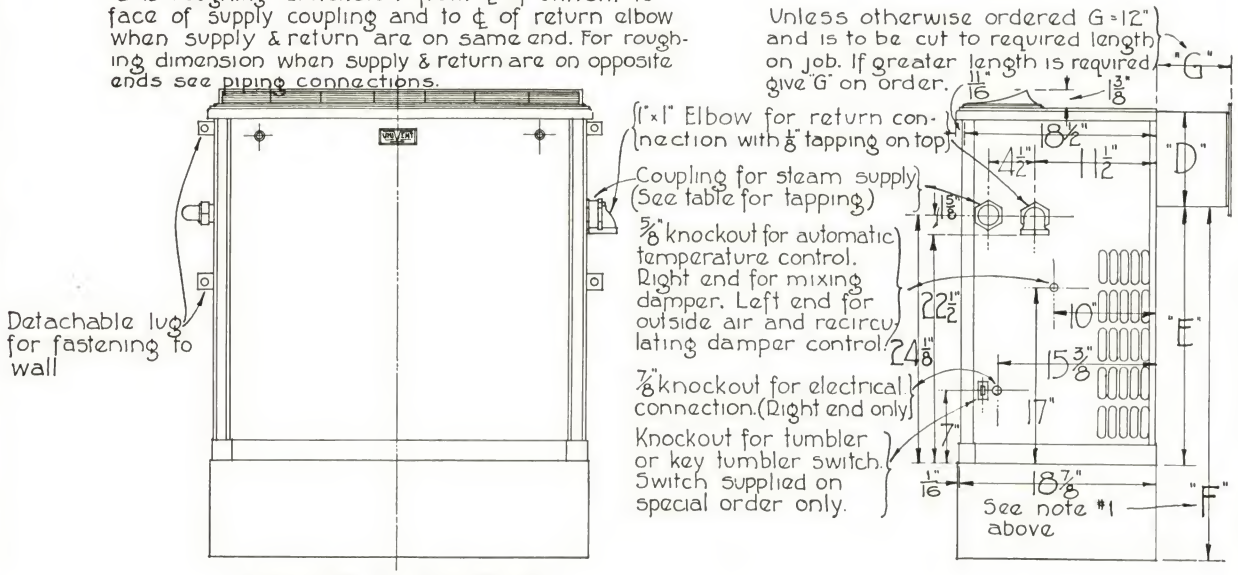
Sub bases furnished on special order only. Always give dimension "F" on order. "F" cannot be more than 50"



PLAN

"B" is roughing dimension from ℄ of Univent to face of supply coupling and to ℄ of return elbow when supply & return are on same end. For roughing dimension when supply & return are on opposite ends see piping connections.

Unless otherwise ordered G=12" and is to be cut to required length on job. If greater length is required give "G" on order.



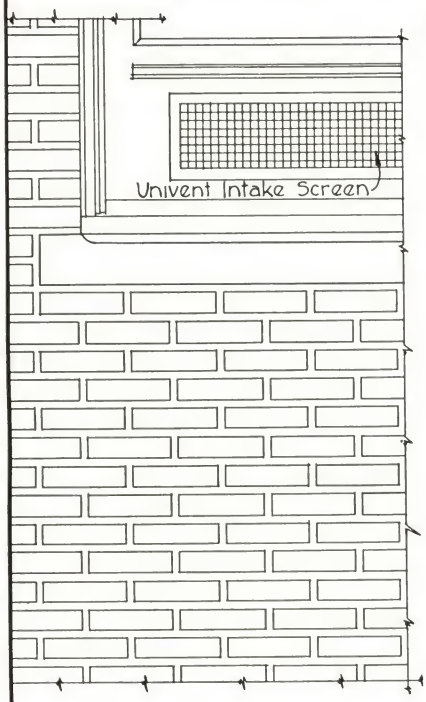
FRONT ELEVATION

END ELEVATION

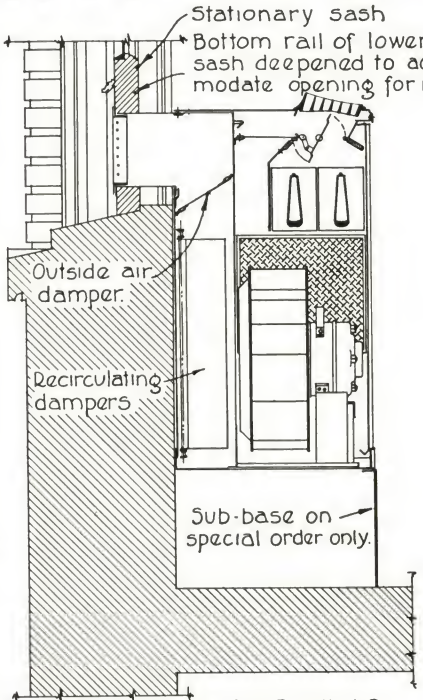
Dimensions given above are same for all series. Values of lettered dimensions are given in table.

SERIES NUMBER	A	B	C	D	E	Steam Connections	
						Supply	Return
2500 SERIES	25⅞"	14⅞"	18⅛"	7⅛"	26¾"	1"	1"
3500 SERIES	35⅞"	19⅞"	26⅛"	7⅛"	26¾"	1¼"	1"
4500 SERIES	45⅞"	24⅞"	36⅛"	7⅛"	26¾"	1½"	1"
5500 SERIES	55⅞"	29⅞"	36⅛"	9⅛"	24¾"	1½"	1"

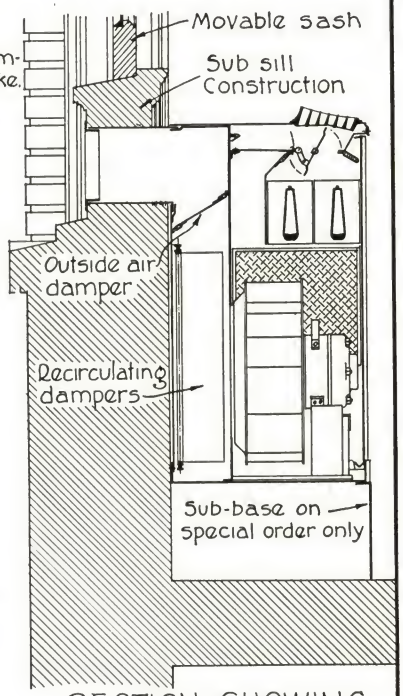
MODEL WR APPLICATIONS



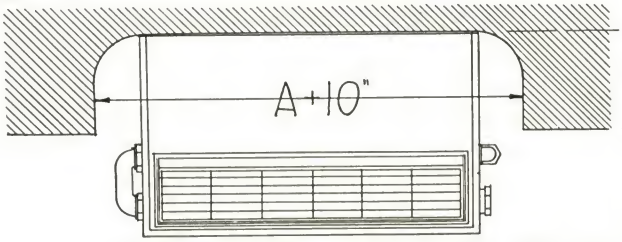
ELEVATION OF EXTERIOR SHOWING UNIVENT INTAKE



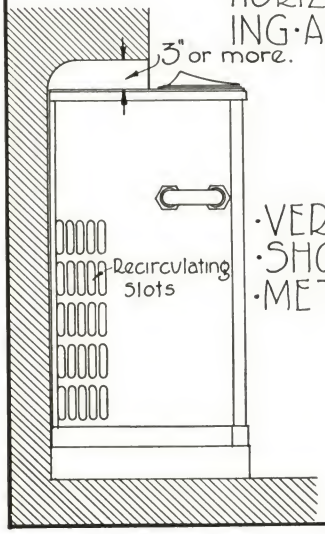
SECTION SHOWING UNIVENT WITH INTAKE THRU LOWER RAIL OF WINDOW SASH



SECTION SHOWING UNIVENT WITH INTAKE THRU SUB-SILL WINDOW CONSTRUCTION

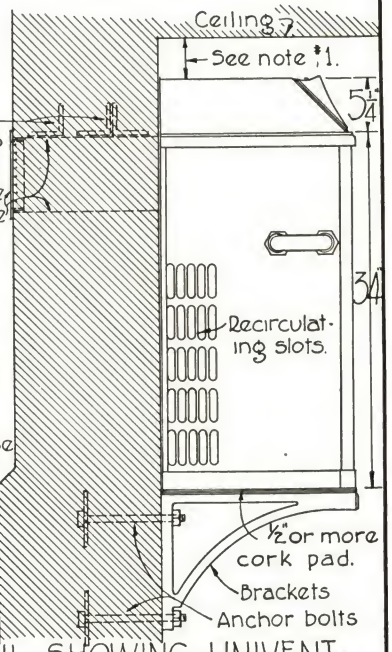


HORIZONTAL SECTION SHOWING APPROVED METHOD OF RECESSING



VERTICAL SECTION SHOWING APPROVED METHOD OF RECESSING

NOTE *1
When the above dimension is less than 4'-0" special outlet should be used, but in no case should dimension be less than 3"



DETAIL SHOWING UNIVENT SUSPENDED NEAR CEILING WITH SUPPORTING BRACKET AND SPECIAL OUTLET

Wiring Data

Method

The method of wiring recommended for Univent Her-Nel-Co motors is the same as that recommended for any standard motor. Due to their special electrical characteristics, Her-Nel-Co single-phase motors may be connected to the several phases of a two or three-phase service as shown below. Where a number of Univents are used it is recommended that independent circuits be provided for the Univent motors. It is advisable on large jobs to provide a separate circuit for each group.

Electrical wall outlets should be installed at each Univent close to the floor and at the right-hand end of the cabinet, as one stands facing it. Connections between such wall outlets and in the Univent cabinet should be in rigid, flat, or flexible conduit.

Her-Nel-Co Univent motors are furnished for the following current characteristics shown in the accompanying table.

Type of current	Number of phases	Frequency	Voltage	Code word	Approx. amperes per lead
Alternating	1	25	110	Macar	3.10
			220	Macho	1.55
		30	110	Macle	2.00
			220	Maize	1.00
		50	110	Maleo	2.60
			220	Malic	1.30
		60	110	Malva	2.20
			220	Mango	1.10
	3	50	220	Meros	1.20
		60	220	Monal	1.00
Direct			110-125	Moray	1.60
			220-250	Mosey	.80

Note: The above data will be found useful in determining wire, switch, fuse sizes, etc.

Wire Sizes

All Her-Nel-Co Univent motors should be wired as shown below. All wires shall be so sized that the maximum voltage drop at the last motor on the line does not exceed 3 volts.

Switches

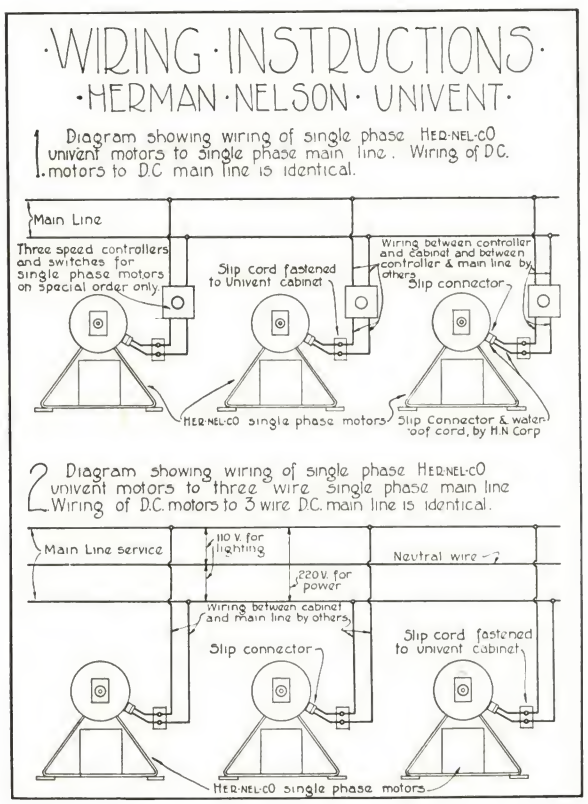
On special order, Univent cabinets will be provided with flush tumbler or key tumbler switches to start and stop the Univent as shown on pages 52 to 61. In all cases, the Univent motors may be readily disconnected by means of the slip connector provided on each motor.

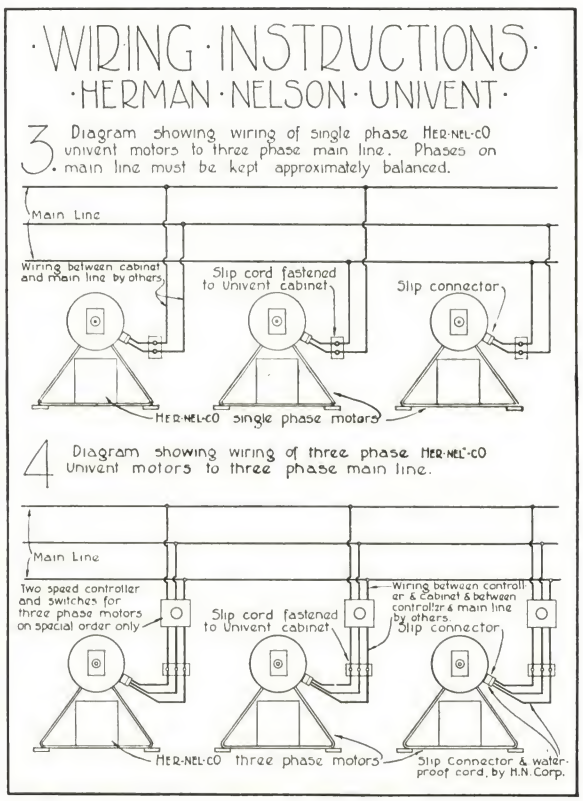
Speed Adjustment

All Her-Nel-Co Univent motors are of the adjustable speed type and are shipped from the factory with the correct speed adjustment. However, if further adjustment is required, it should be done by the heating contractor. Full instructions are furnished with each motor.

Approvals

The Univent is approved by the National Board of Fire Underwriters of the United States and the Hydro Electric Power Commission of Ontario, Canada.





Piping Suggestions

In general, Univents are piped exactly the same as radiators having a capacity equivalent to the total capacity of the Univent.

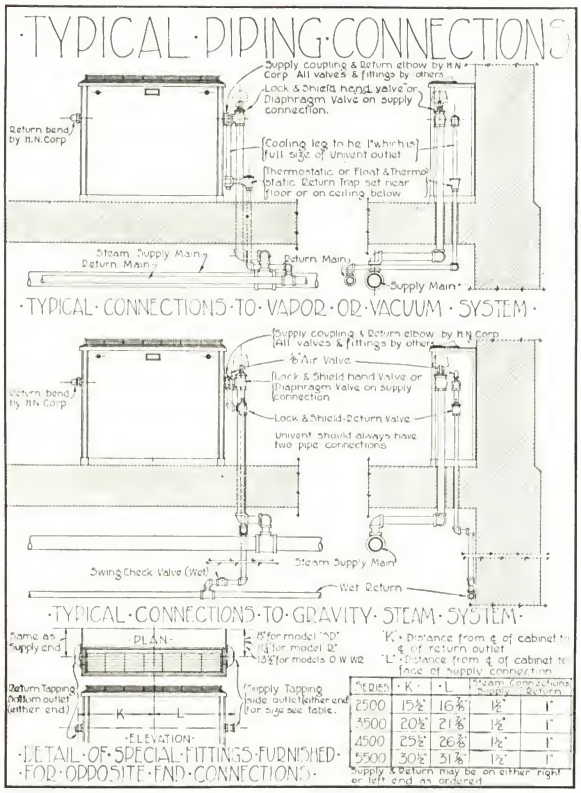
Tappings

Univents are provided with 1, 1¼ and 1½-in. female supply connections, depending on the size of the Univent, and 1-in. return elbow for all sizes as shown on pages 52 to 61. They may be arranged for supply and return at opposite ends or at the same end. Unless otherwise ordered, Univents are shipped with the supply and return at the right end, as one faces the cabinet, with the supply connections in front.

When the supply and return connections are at the same end, the supply connections should be made to the front radiator section and the return to the rear section. It is recommended that all hand valves be of the lock shield type.

Gravity Systems

When connected to a gravity system, all Univents should have two pipe connections, even though all other radiators on the job have a one pipe connection. The return elbow is provided with a special vent tapping in which an air valve should be installed on a gravity system.



Series	K	L	Steam Connections Supply	Return
2500	15½"	16⅝"	1¼"	1"
3500	20½"	21⅝"	1¼"	1"
4500	25½"	26⅝"	1¼"	1"
5500	30½"	31⅝"	1¼"	1"

Hot Water Systems

When hot water circulating systems are used, the Univent will be furnished with return connections the same size as the supply connection on any given Univent as shown on pages 52 to 61. For hot water service, the Univent radiator sections will also be equipped with special air vent tappings at the top into which the heating contractor shall install hand-operated air valves for the purpose of venting the radiators. Opposite end connections are recommended for hot water installations in order to have the length of travel through the radiators as short as possible. It is not recommended that gravity systems of hot water circulation be used with Univents. Forced circulation is always recommended.

Vapor and Vacuum Systems

For vapor and vacuum systems, the traps may be of the thermostatic or combination float and thermostatic type. Where plain thermostatic traps are used, it is essential that a drop cooling leg be provided to cool the condensate before it enters the trap.

Automatic Temperature Control Valves

If automatic temperature control is applied to the Univent radiators, the diaphragm supply valves should always be installed on the front section when the supply and return connections are at the same end.

Humidifiers

On special order, Univents will be equipped with humidifiers which consist of a long brass tube with venturi nozzles installed above the radiator. This tube is connected to the tapping at the top of the return ell or manifold. For hand control a small angle valve is provided in this connection. For automatic humidity control, a diaphragm valve should be installed in this connection and arranged to be controlled by a room humidostat. When humidifiers are used it is advisable to increase the boiler size accordingly and to provide automatic water feeders.

THE HERMAN NELSON VOLUVENT

There are many cases where some ventilation is desired but where an elaborate system is impractical. The Herman Nelson Voluvent, a large capacity, quiet operating, compact heating and ventilating unit for auditoriums, theatres, gymnasiums, natatoriums and other large spaces, meets this situation. It is sold strictly as a piece of equipment to deliver warmed air into a room and to be applied in any way that the purchaser sees fit.

It should be understood that since the Voluvent is not designed to meet specific conditions, results will depend upon its application. While intended as an inexpensive means of ventilation, it is by no means a cheap article, being on a par with all Herman Nelson products in design, workmanship and material.

Furnished in Five Series

The Voluvent is furnished in five series, namely, the No. 130 Series, No. 130SD Series, No. 130R Series, No. 210 Series and No. 360 Series. Each series has a large range of air deliveries and heating capacities. These large ranges of air deliveries are made possible by the use of the Her-Nel-Co variable speed motor and the Her-Nel-Co Speed Controller. The large ranges of heating capacities are obtained by changing the arrangement of the extended heating surface of the Herman Nelson Wedge Core Radiator.

Description and Application

No. 130, 210 and 360 Series Voluvents—These consist of two horizontal groups of Herman Nelson Wedge Core Radiators arranged for alternate control, two double inlet multiblade type fans, a variable speed Her-Nel-Co Motor with a double extended shaft, and a heavy gauge sheet steel cabinet.

Air from outside the building or recirculated air is drawn into the fans and blown through the radiator, where it is warmed. This warmed air is then discharged into the room.

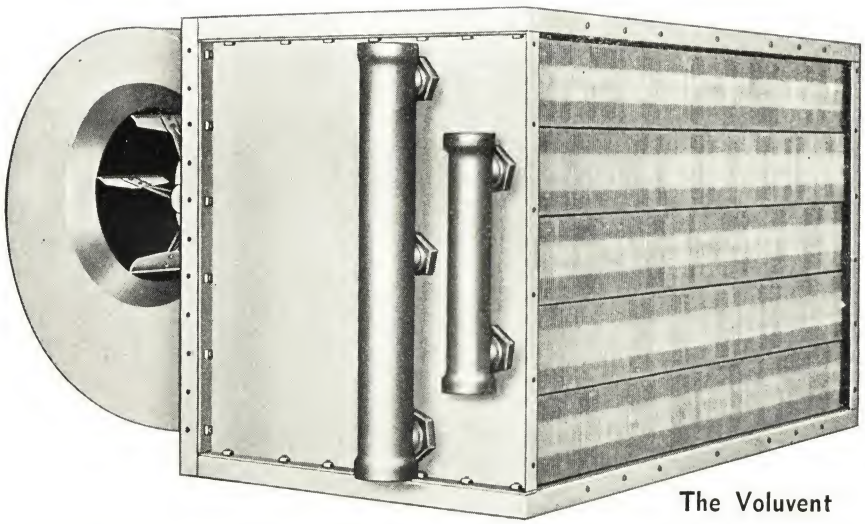
The Voluvent is designed to be installed to discharge directly into the room to be ventilated with only the radiator or a grille showing, or it can be arranged to discharge into a duct and then into the room through a grille. It can also be installed directly in the room wherever its appearance will not be objectionable.

No. 130R and 130SD Series Voluvents—These have been developed especially for use in small basement rooms where it is not possible to use floor mounted Univents. It should be clearly understood that the best results from the standpoint of thorough diffusion, uniform heating, proper air motion and freedom from draughts are obtained by using the standard Univent with its very effective high velocity vertical jet. For this reason standard Univents mounted on or near the floor should be used wherever possible. However, there are some few cases where such applications are not possible because of structural difficulties. In such cases a compromise arrangement becomes necessary and it is to provide for these cases that the No. 130R and 130SD Series Voluvents were developed.

No. 130R Series Voluvent—This Voluvent consists of a bank of three Herman Nelson Wedge Core Radiators arranged to be controlled in two groups, two double inlet multiblade fans, a variable speed Her-Nel-Co Motor, a heavy sheet steel cabinet in which the filters (if used) are mounted, outdoor air and recirculating dampers linked together, a recirculating grille and a large access door, all as illustrated on page 67.

No. 130SD Series Voluvent—This Voluvent is identical with 130R Series except that the recirculating dampers are bolted closed.

Both the No. 130R and No. 130SD Series are arranged to be hung from the ceiling.



The Voluvent

Radiator

The Herman Nelson Wedge Core Radiator used in the Voluvent is an all aluminum, light weight, compact, extended surface radiator, consisting of a multiplicity of smooth aluminum plates or fins securely mounted on a one-piece cast aluminum alloy core (see pages 2 and 3). The radiators are laid horizontally and arranged to be controlled in two alternate groups, each group having its own supply and return header. Control of the temperature of the discharge air is obtained by throttling, in turn, the larger and smaller groups of sections. This method of control eliminates all noisy, bulky, by-pass dampers and is much more effective than when a large by-pass is used.

Motors

The Her-Nel-Co Motors used in the Voluvent are of the same adjustable speed type used in the Her-Nel-Co Magnavent (see page 32). Speed variation which varies the air delivery of the Voluvent, is obtained by means of the Her-Nel-Co Speed Controller.

Intakes and Filters

Voluvent intakes and filters as shown on page 70 are similar to those furnished with Her-Nel-Co Magnavent.

Voluvent Engineering Data

The Voluvent is rated in cubic feet of air per minute as determined by the A.S.H. and V.E. standard anemometer tests and are based on a normal amount of resistance in ducts, etc. As required by these standards the velocity is determined by holding the anemometer two inches away from the face of the radiator with the grille (if used) removed. The c.f.m. is then determined by multiplying this velocity by the full area of the radiator.

The Voluvent may be used for *"split"* ventilating systems, *"modified"* systems, straight *"blast"* systems, or strictly for heating purposes with all the air recirculated.

Each size is furnished with radiators of different fin spacings, providing a wide range of heating capacities.

The Capacity Tables given on page 66 gives the total capacity, the heating capacity and the final temperature for various air deliveries for all fin spacings. The total capacities should be used in determining the boiler size, pipe sizes, trap sizes, etc. The heating capacities determine the amount of heat available for taking care of the heat losses of the room above 70 degrees.

The selection of the Voluvent is a matter of engineering and depends entirely on the way it is to be used and on the type of system that is to be employed. After the required air capacity and the excess heating capacity have been determined, it is a simple matter to refer to the Capacity tables to select the proper Voluvent to fit these conditions.

The No. 130, 210 and 360 Series Voluvents should be located where the duct work will be as short as possible, where provision can be made for recirculation from the floor line, where the motors and filters (if used) will be accessible and as low as possible.

For quiet operation canvas connections should be installed between the Voluvent cabinet and any duct work that may be attached to it.

For dimensions and typical applications, see pages 67 and 68.

Outside air ducts and recirculating ducts and registers should have not less than 1 sq. ft. of free area for each 500 c.f.m. of Voluvent capacity. Thus any duct for the No. 210 series should have not less than 6 sq. ft. cross-sectional area and not less than 10 sq. ft. for the No. 360 series.

All dampers should be specified to be furnished and installed by the ventilating contractor.

If desired, the air may be discharged through grilles into the room. These grilles should be specified to be furnished and installed by others. Care should be taken to be sure that these grilles are installed at least ½ inch away from the face of the radiator, that they are full size of the radiator and that they provide at least 72% free area.

All room vents should have back draft dampers and should be provided with some means of being shut off when the system is not in operation.

These Voluvents are medium velocity units and, therefore, should be located as close to the floor as possible. This is particularly essential in all cases where they are to take care of any heat loss and where they are to recirculate for quick heating. The recirculating and outside air connections should be made as short and as free from turns as possible.

The No. 130R Series and 130SD Series Voluvents should be located on the ceiling as close to the outside wall as possible. It is recommended that they be arranged to discharge across the short dimension of the room whenever possible.

VOLUVENT CAPACITY TABLES

Serial No. and Code Word	Cu. Ft. of Air Per Min.	Capacities Given in Equivalent Square Feet of Direct Steam Radiation for Various Entering Air Temperatures.																											
		−20°			−10°			0°			+10°			+20°			+30°			+50°			+60°			+70°		
		Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.	Tot. Cap.	Htg. Cap.	F. T.
130 SERIES																													
131 (Vague)	1210	509	**18**	73	476	**44**	78	454	**70**	83	426	**96**	88	394	**122**	92	366	**149**	97	312	**201**	107	284	**232**	112	254	**254**	116
131R (Varix)	1375	566	**5**	71	535	**35**	76	497	**65**	80	466	**95**	85	441	**130**	91	410	**159**	96	342	**218**	105	311	**249**	110	278	**278**	115
131SD (Veldt)	1540	598	**–**	66	570	**17**	72	535	**50**	77	501	**84**	82	473	**123**	88	432	**156**	92	368	**229**	103	334	**262**	108	296	**296**	112
132 (Valet)	1210	585	**92**	87	552	**114**	91	525	**140**	96	493	**162**	100	460	**184**	104	426	**210**	108	362	**253**	116	334	**280**	121	302	**302**	125
132R (Vatic)	1375	627	**70**	81	591	**94**	85	560	**125**	90	522	**149**	94	491	**179**	99	460	**209**	104	385	**264**	112	354	**293**	117	318	**318**	121
132SD (Veium)	1540	668	**45**	76	626	**72**	80	591	**106**	85	556	**139**	90	522	**173**	95	486	**206**	100	410	**273**	109	375	**306**	114	340	**340**	119
133 (Valor)	1210	674	**183**	103	640	**201**	107	608	**223**	111	569	**240**	114	536	**262**	118	498	**289**	121	427	**320**	128	394	**337**	132	369	**369**	136
133R (Veery)	1375	720	**164**	96	684	**189**	100	646	**214**	104	610	**239**	108	572	**263**	112	535	**283**	116	460	**333**	124	423	**358**	128	382	**382**	132
133SD (Venal)	1540	774	**145**	91	730	**173**	95	688	**201**	99	647	**228**	103	605	**256**	107	570	**289**	112	487	**345**	120	445	**374**	124	402	**402**	128
210 SERIES																													
211 (Vagas)	1800	845	**114**	84	805	**155**	89	773	**203**	95	708	**220**	97	668	**260**	102	610	**285**	105	505	**342**	112	456	**374**	116	407	**407**	120
	2400	1000	**22**	72	934	**65**	76	890	**130**	82	813	**163**	85	738	**195**	88	684	**250**	93	575	**358**	103	509	**400**	107	521	**521**	118
	3000	1194	**–**	68	1086	**0**	70	1004	**53**	74	935	**122**	79	842	**163**	82	773	**230**	87	638	**366**	97	569	**434**	102	516	**516**	108
212 (Valid)	1800	920	**187**	93	863	**212**	96	822	**252**	101	764	**276**	104	707	**301**	107	648	**326**	110	537	**374**	116	488	**407**	120	448	**448**	125
	2400	1085	**109**	80	1062	**195**	88	1020	**260**	94	923	**271**	95	847	**304**	98	771	**336**	101	606	**390**	106	564	**456**	112	500	**500**	116
	3000	1274	**54**	74	1233	**149**	81	1167	**218**	86	1086	**271**	90	990	**312**	93	922	**380**	98	732	**461**	104	678	**543**	110	596	**596**	114
213 (Varus)	1800	1010	**277**	104	945	**292**	106	895	**325**	110	845	**358**	114	790	**382**	117	740	**415**	121	610	**447**	125	554	**472**	128	504	**504**	132
	2400	1194	**218**	90	1140	**271**	95	1063	**304**	98	998	**347**	102	922	**380**	105	868	**434**	110	715	**498**	116	640	**532**	119	575	**575**	123
	3000	1330	**108**	78	1260	**176**	83	1178	**230**	87	1112	**298**	92	1030	**352**	96	948	**407**	100	786	**516**	108	705	**570**	112	633	**633**	117
360 SERIES																													
361 (Vaunt)	3500	1580	**158**	80	1486	**221**	84	1360	**253**	86	1300	**348**	92	1171	**380**	94	1093	**460**	99	902	**586**	107	807	**650**	111	728	**728**	116
	4000	1736	**108**	76	1626	**181**	80	1483	**217**	82	1410	**326**	88	1268	**362**	90	1191	**470**	96	958	**597**	103	813	**632**	105	795	**795**	114
	4500	1850	**20**	71	1750	**122**	76	1584	**163**	78	1525	**305**	85	1362	**346**	87	1260	**448**	92	1037	**631**	101	895	**692**	104	814	**814**	110
	5000	1990	**–**	68	1850	**45**	72	1696	**113**	75	1627	**271**	82	1446	**316**	84	1356	**452**	90	1107	**655**	99	950	**724**	102	882	**882**	109
362 (Verse)	3500	1740	**316**	90	1615	**348**	92	1520	**411**	96	1391	**443**	98	1296	**506**	102	1186	**554**	105	981	**665**	112	918	**760**	118	824	**824**	122
	4000	1880	**253**	84	1755	**307**	87	1644	**380**	91	1482	**398**	92	1411	**506**	98	1284	**561**	101	1067	**705**	109	976	**795**	114	886	**886**	119
	4500	1971	**142**	77	1850	**224**	81	1730	**306**	85	1567	**346**	87	1464	**448**	92	1342	**529**	96	1097	**692**	104	1017	**813**	110	916	**916**	115
	5000	2055	**23**	71	1920	**113**	75	1808	**226**	80	1650	**294**	83	1536	**407**	88	1400	**498**	92	1153	**700**	101	1039	**814**	106	950	**950**	112
363 (Vista)	3500	1850	**427**	97	1740	**474**	100	1646	**538**	104	1550	**601**	108	1440	**650**	111	1346	**711**	115	1138	**822**	122	1044	**886**	126	950	**950**	130
	4000	1970	**344**	89	1880	**434**	94	1770	**506**	98	1662	**580**	102	1535	**633**	105	1448	**723**	110	1212	**850**	117	1102	**921**	121	1012	**1012**	126
	4500	2095	**264**	83	1990	**366**	88	1830	**406**	90	1750	**528**	96	1627	**610**	100	1527	**711**	105	1280	**873**	113	1158	**955**	117	1036	**1036**	121
	5000	2215	**181**	78	2080	**271**	82	1962	**384**	87	1832	**475**	91	1716	**587**	96	1582	**678**	100	1356	**903**	110	1220	**994**	114	1084	**1084**	118

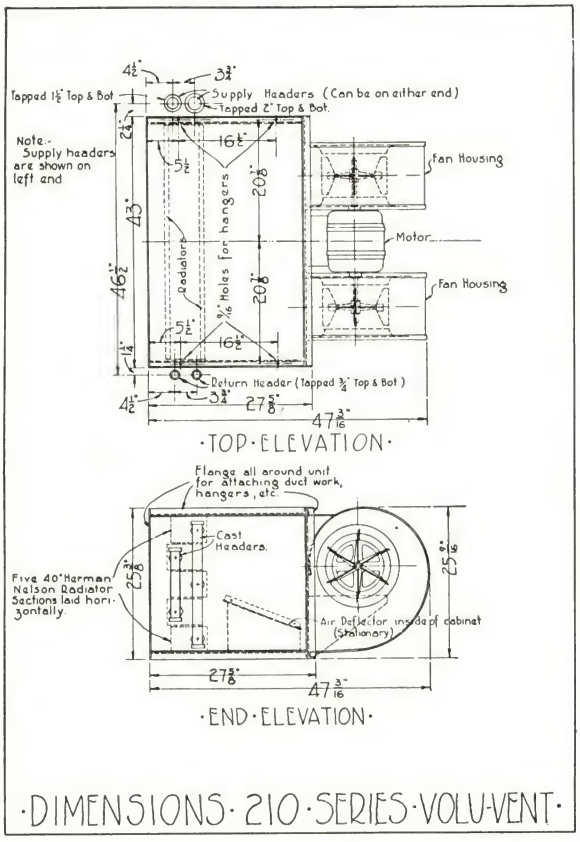
Notes

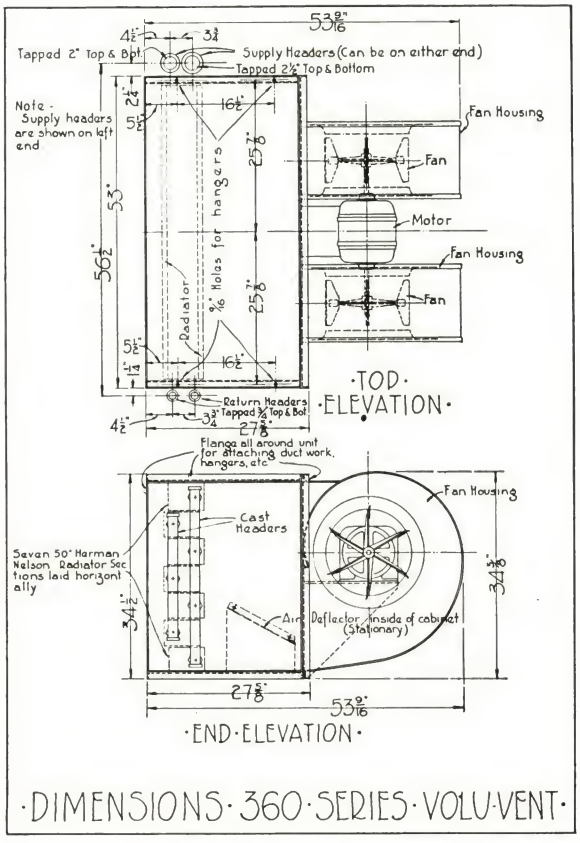
All heating capacities are based on a steam temperature in the radiator of 218° F. All air velocities are based on A.S.H. and V.E. standard anemometer measurement with the anemometer held 2 in. away from face of radiator with grille (if used) removed. All air capacities are based on this velocity and the full area of the radiator as stipulated in the A.S.H. and V.E. code.

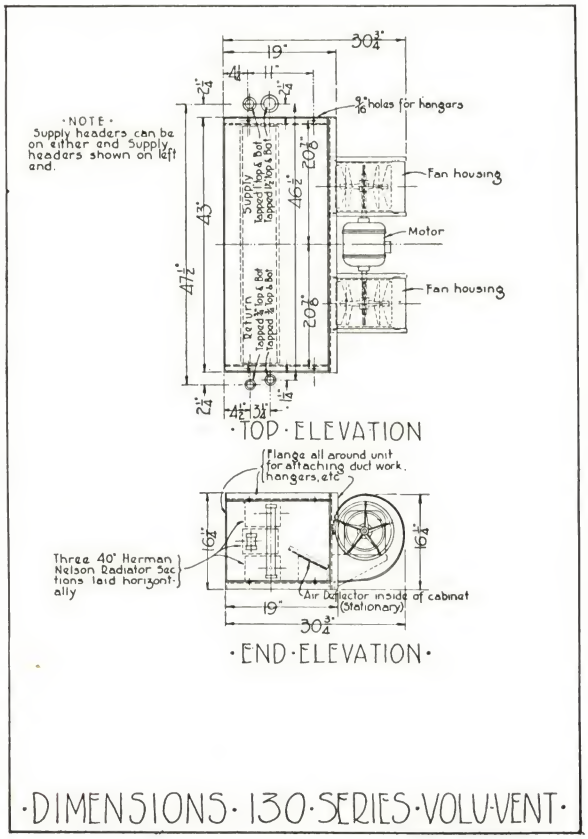
Total capacity equals total condensing capacity of unit.

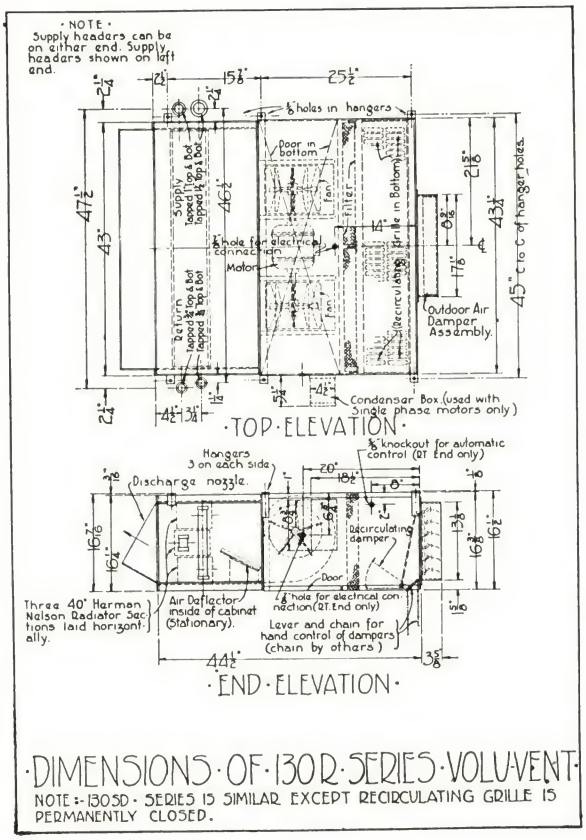
Heating capacity equals surplus capacity available for heating when room temperature is 70° F.

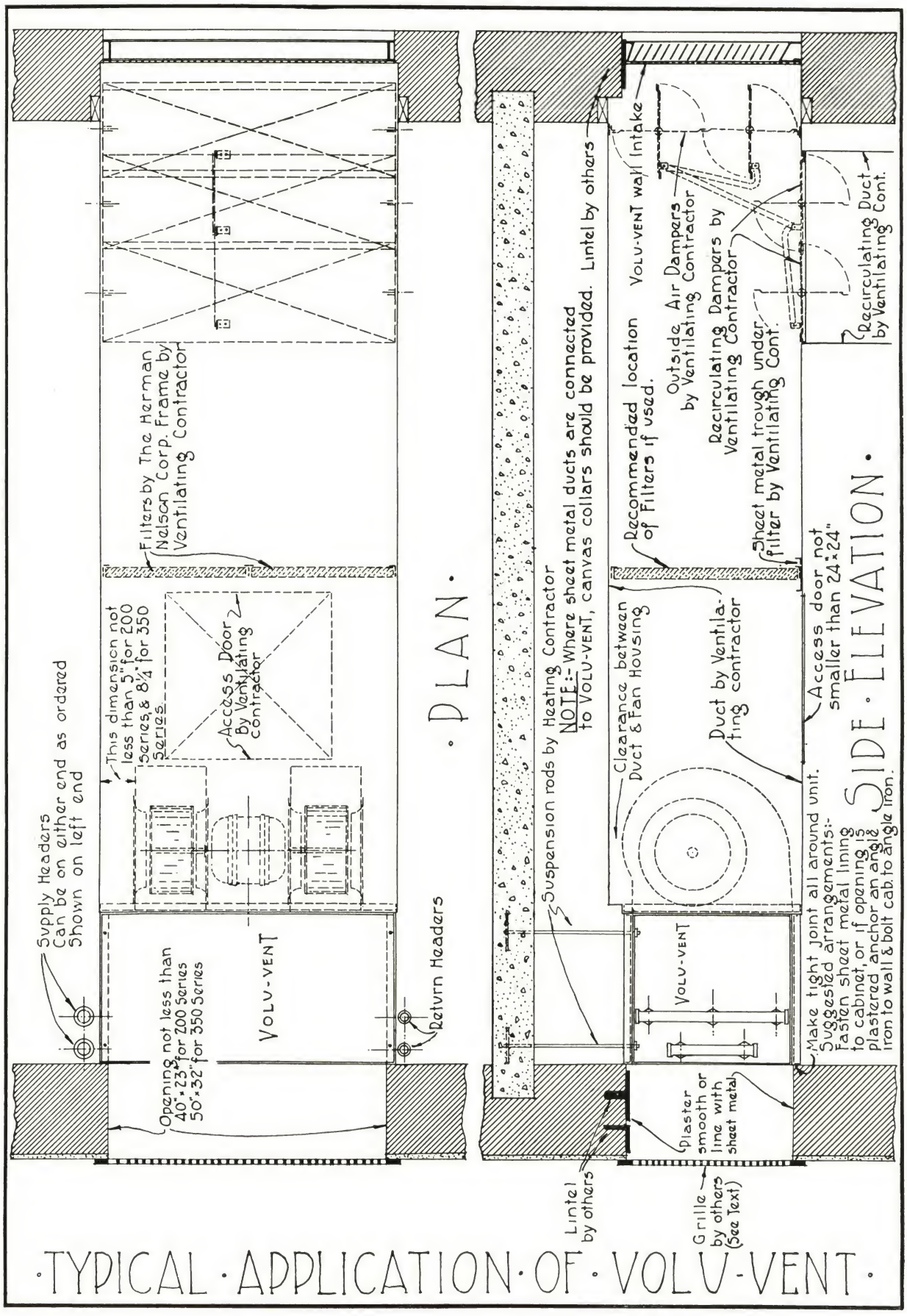
Where 25 cycle current is used the maximum capacity is 1375 c.f.m. for the 130, 130R and 130SD series, 2400 c.f.m. for the 210 series and 4500 c.f.m. for the 360 series.

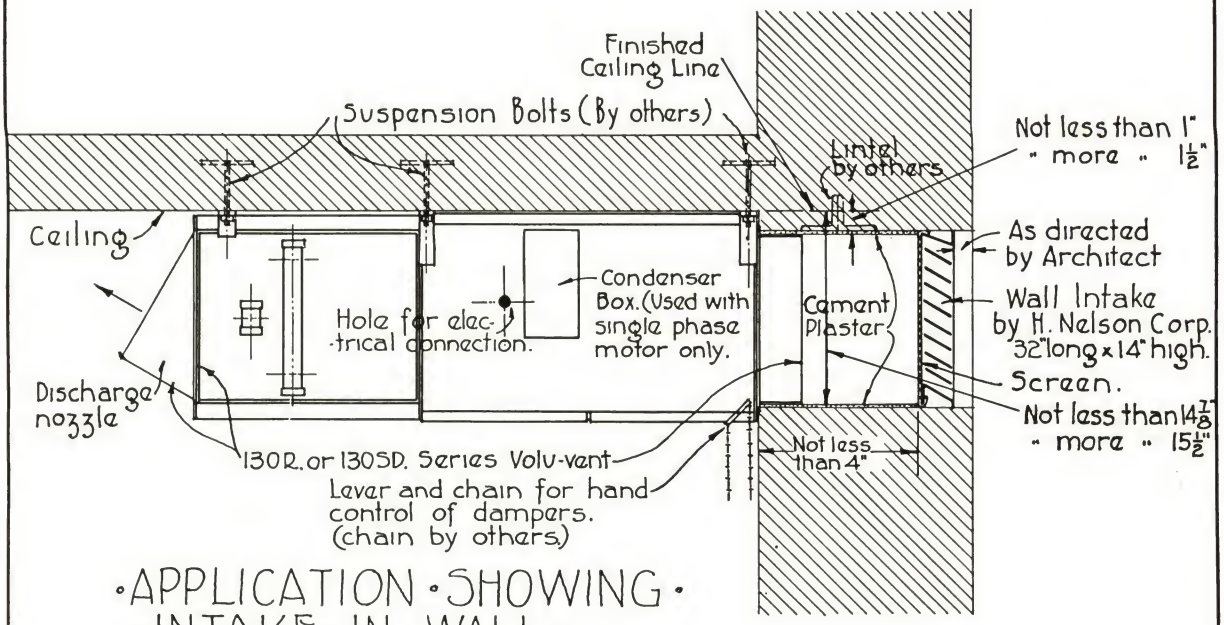

Tapped 1½" Top & Bot
Supply Headers (Can be on either end)
Tapped 2" Top & Bot.
Note.- Supply headers are shown on left end
Fan Housing
Motor
Fan Housing
Radiator
⅝" Holes for hangers
Return Header (Tapped ¾" Top & Bot)
·TOP·ELEVATION·
Flange all around unit for attaching duct work, hangers, etc.
Cast Headers.
Five 40" Herman Nelson Radiator Sections laid horizontally.
Air Deflector inside of cabinet (Stationary)
·END·ELEVATION·
·DIMENSIONS· 210 ·SERIES·VOLU-VENT·


Tapped 2" Top & Bot
Supply Headers (Can be on either end)
Tapped 2½" Top & Bottom
Note - Supply headers are shown on left end
Fan Housing
Fan
Motor
Fan Housing
Fan
Radiator
⅝" Holes for hangers
Return Headers Tapped ¾" Top & Bot
·TOP· ·ELEVATION·
Flange all around unit for attaching duct work, hangers, etc.
Cast Headers
Fan Housing
Seven 50" Herman Nelson Radiator Sections laid horizontally
Air Deflector inside of cabinet (Stationary)
·END·ELEVATION·
·DIMENSIONS· 360 ·SERIES· VOLU-VENT·

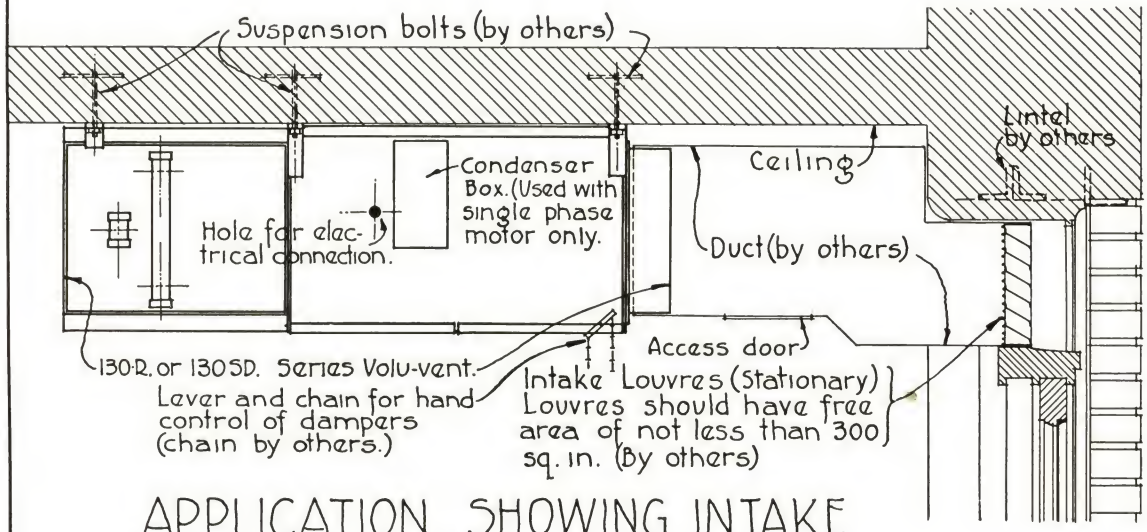

·NOTE·
Supply headers can be on either end. Supply headers shown on left end.
⅝" holes for hangers
Fan housing
Motor
Fan housing
Supply Tapped 1½ Top & Bot
Return Tapped ¾ Top & Bot
·TOP· ELEVATION
Flange all around unit for attaching duct work, hangers, etc.
Three 40" Herman Nelson Radiator Sections laid horizontally
Air Deflector inside of cabinet (Stationary)
·END·ELEVATION·
·DIMENSIONS· 130 ·SERIES· VOLU-VENT·


·NOTE·
Supply headers can be on either end. Supply headers shown on left end.
⅝ holes in hangers
Door in bottom
Fan
Filter
Motor
Hole for electrical connection
Recirculating Grille in Bottom
Outdoor Air Damper Assembly.
Supply Tapped 1½ Top & Bot
Return Tapped ¾ Top & Bot
Condensor Box (used with Single phase motors only)
·TOP· ELEVATION·
Hangers 3 on each side
⅞" knockout for automatic control (RT End only)
Discharge nozzle.
Recirculating damper
Door
Hole for electrical connection (RT End only)
Three 40" Herman Nelson Radiator Sections laid horizontally.
Air Deflector inside of cabinet (Stationary).
Lever and chain for hand control of dampers (chain by others)
·END· ELEVATION·
·DIMENSIONS· OF· 130 R· SERIES· VOLU-VENT·
NOTE:- 130SD· SERIES IS SIMILAR EXCEPT RECIRCULATING GRILLE IS PERMANENTLY CLOSED.


PLAN
Supply Headers Can be on either end as ordered Shown on left end
This dimension not less than 5" for 200 Series, & 8¼" for 350 Series
Access Door By Ventilating Contractor
Filters by The Herman Nelson Corp. Frame by Ventilating Contractor
VOLU-VENT
Return Headers
Opening not less than 40"×23" for 200 Series 50"×32" for 350 Series
SIDE ELEVATION
Suspension rods by Heating Contractor
NOTE:- Where sheet metal ducts are connected to VOLU-VENT, canvas collars should be provided.
Lintel by others
Recommended location of Filters if used.
VOLU-VENT wall Intake
Outside Air Dampers by Ventilating Contractor
Recirculating Dampers by Ventilating Contractor
Sheet metal trough under filter by Ventilating Cont.
Recirculating Duct by Ventilating Cont.
Clearance between Duct & Fan Housing
Duct by Ventilating contractor
Access door not smaller than 24"×24"
VOLU-VENT
Make tight joint all around unit. Suggested arrangements:- Fasten sheet metal lining to cabinet, or if opening is plastered anchor an angle iron to wall & bolt cab. to angle iron.
Plaster smooth or line with sheet metal
Lintel by others
Grille by others (See Text)
TYPICAL APPLICATION OF VOLU-VENT



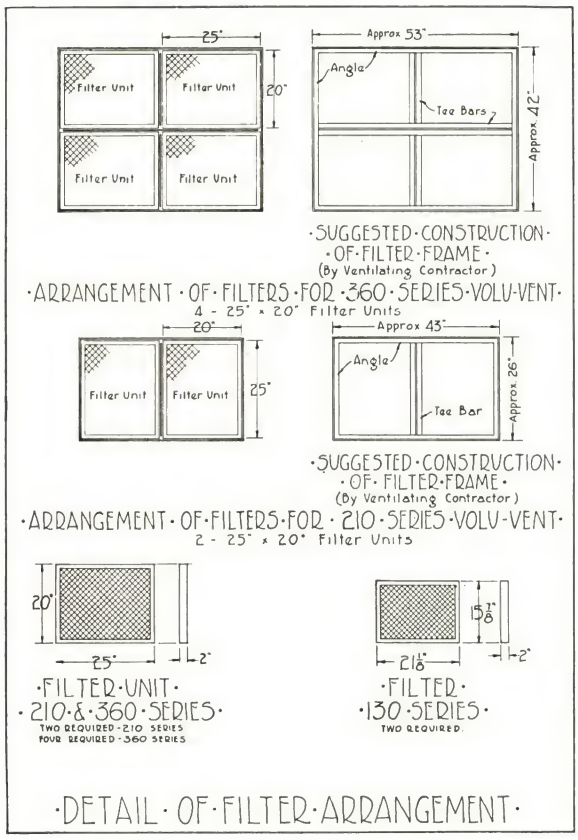
·APPLICATION·SHOWING·
·IN·TAKE·IN·WALL·

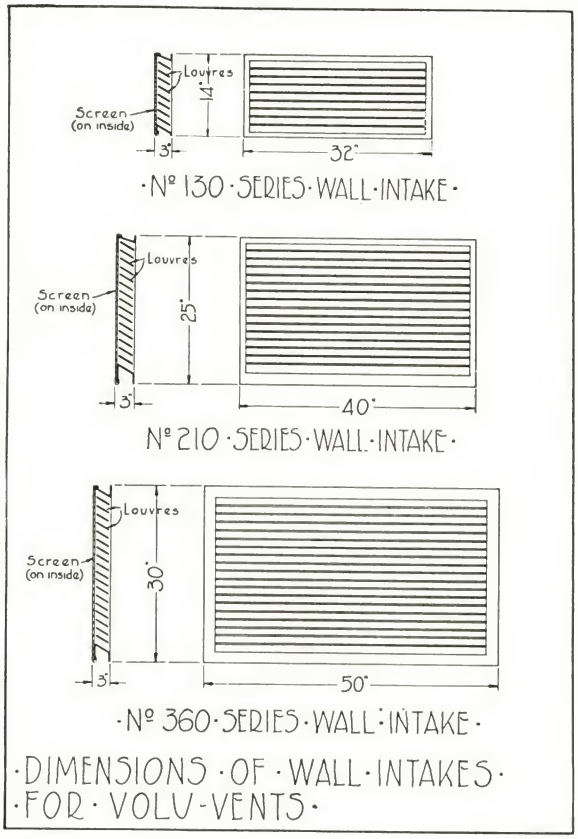


APPLICATION SHOWING INTAKE THRU WINDOW.

Note - For further details of Volu-vent 130R & 130SD Series see dimension sheet.

·APPLICATIONS·OF·130R·&·130SD·
·SERIES·VOLU-VENTS·





Temperature Control with the Voluvent

Automatic Control

The Voluvent has been designed with double supply and return headers in order to facilitate temperature control.

This method of splitting up the heater into alternate sections under separate control greatly facilitates the application of automatic temperature control without the use of large bypass and radiator shut-off dampers.

Heating and Ventilation—When the Voluvent is to be used to do some heating, one method of control is to install diaphragm valves on each supply header with a room thermostat arranged to throttle the smaller group until the valve is closed and then to throttle the larger group as required. It is further recommended that a duct thermostat be located in the air discharge of the Voluvent at the return end of the radiator and set to prevent the air from dropping below a predetermined temperature. In this way the possibility of drafts is eliminated.

Heating Only—Where the Voluvent is used for heating only it will be found most satisfactory to control both steam supply valves by the use of a room and duct thermostat as described above, with the fans running constantly to maintain diffusion.

In all cases it is recommended that the larger group be throttled last because this leaves the lower section hot as long as possible, thus thoroughly mixing the heated and unheated air. It is to be carefully noted that the unique arrangement of alternated control results in the thorough mixing of the thin streams of heated and unheated air when they are discharged into the room.

It is recommended that the fresh air, recirculating and vent dampers be all operated by air motors, in conjunction with the temperature control system and arranged to be controlled from the fan control point. The fresh air and vent dampers should be normally closed.

Manual Control

Where manual or hand control is used, separate globe valves should be provided for each header. They should be laid on their side and located so they may be readily controlled. They should be arranged for convenient operation by the use of chain controls, extended handles, etc.

Wiring Data

Wiring diagrams showing the various methods of connecting single-phase and three-phase Her-Nel-Co motors are shown below.

Due to the fact that they are easier and less expensive to protect, control and install, single-phase Voluvent Her-Nel-Co motors are recommended in preference to three-phase motors.

However, in many cases it is only possible to obtain three-phase service. In these cases it is perfectly practical to use single-phase Her-Nel-Co motors and to connect each motor with its controller across any two wires of the three-phase service as shown below. This method permits the user to enjoy the advantages of the single-phase motor and at the same time permits him to use three-phase service.

Where single-phase motors are used on three-phase service they should be balanced between the phases as evenly as possible with one controller for each phase.

Due to the fact that the starting current is quite low, single-phase and three-phase Voluvent Her-Nel-Co motors can be protected by the use of fuses having a capacity of two and one-half times the running current. A switch should be provided before each controller. Fuses should be installed where required by local ordinances.

It is recommended that thermal cut-outs be used in all cases to protect the motors and controllers, particularly in the case of three-phase equipment. Only one thermal cut-out is required for each single-phase motor, while two are required for each three-phase motor. These cut-outs are so designed that the momentary rush of current that occurs while starting will not blow them but they will be blown by a smaller amount of current that continues long enough to damage the motor. In this way thermal cut-outs provide adequate protection under all conditions.

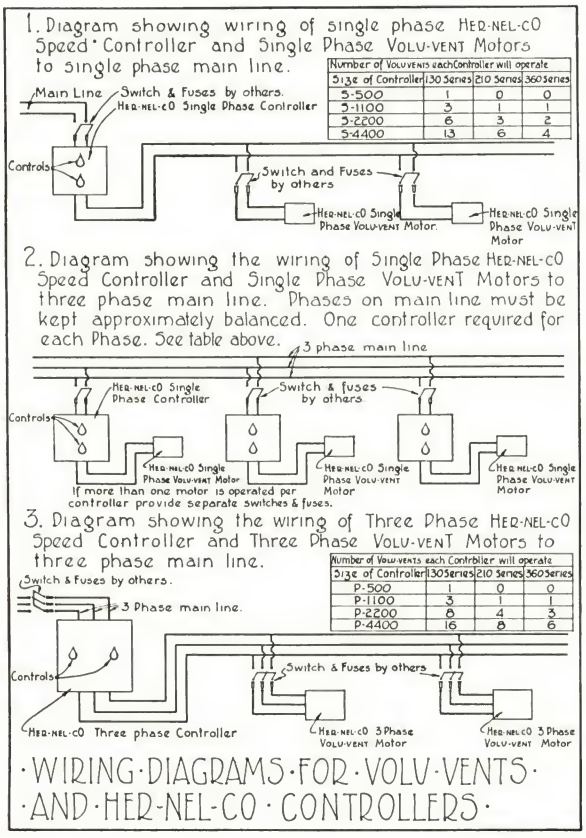
Standard fuses having a rating two and one-half times the running current of the motor should be used in each of the two or three lines before the thermal cut-outs to protect them against short circuits.

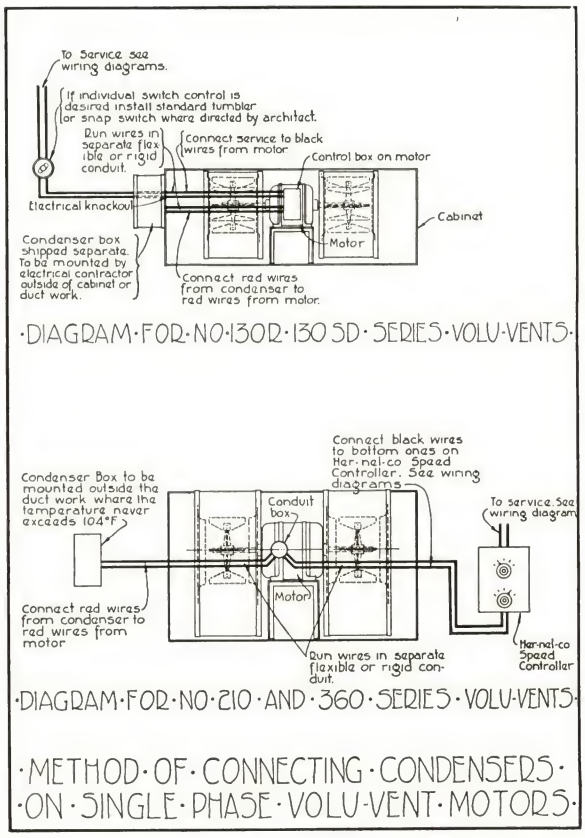
No standard or Her-Nel-Co motors should be used where the temperature exceeds 40° C. or 104° F. when the motors are running or idle.

MOTOR DATA

Voluvent series	Phase	Cycles	Amperes per lead		
			110 V.	220 V.	440 V.
130	1	60	3.0	1.5	
130R	1	50	2.5	1.25	
130SD	1	25	3.0	1.5	
	3	60		.75	
	3	50		.65	
	3	25		.75	
	D-c.		2.4	1.2	
210	1	60	6.0	3.0	
	1	50	5.0	2.5	
	1	25	6.0	3.0	
	3	60		1.5	.75
	3	50		1.25	.65
	3	25		1.5	.75
	D-c.		4.8	2.4	
360	1	60	8.4	4.2	
	1	50	7.0	3.5	
	1	25	8.4	4.2	
	3	60		2.1	1.1
	3	50		1.8	.9
	3	25		2.1	1.1
	D-c.		7.0	3.5	

Note: The above data will be found useful in determining wire sizes, etc.





Piping Suggestions

Typical piping connections for various types of systems are shown on this page.

In general, separate automatic control diaphragm valves or hand controlled globe valves should be provided for each header. All hand or diaphragm valves of the globe type should be laid on their side to avoid forming pockets in the lines. Care should be taken to carefully drain the risers after each valve (when supply is from below) so that pounding will not occur when the valves are throttled.

The face of the radiator should always be vertical, because if it is tilted either forward or backward, one group of radiators will not drain properly. The supply end of the radiator should always be on the same level as the return end or higher in order to insure proper drainage of the sections.

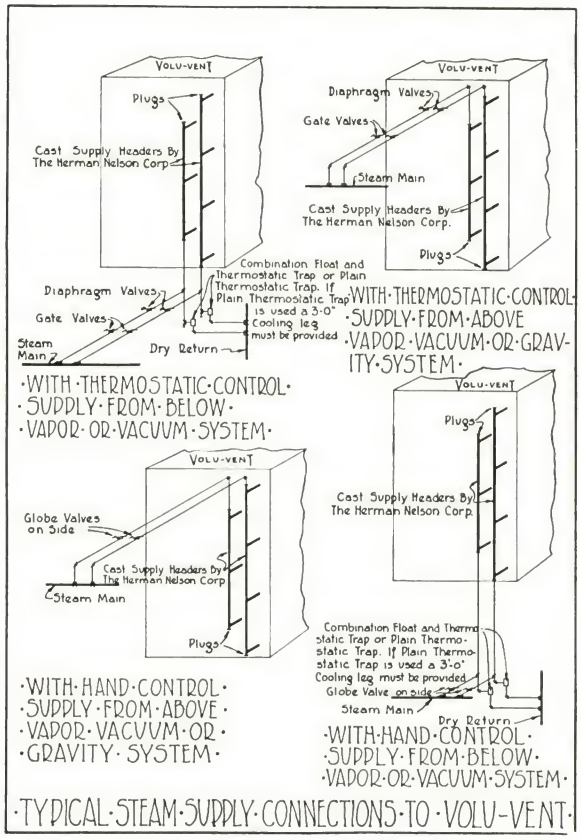
All boiler, piping, valve and trap sizes should be determined from the total heating capacity of the Voluvent when operating under the stipulated conditions.

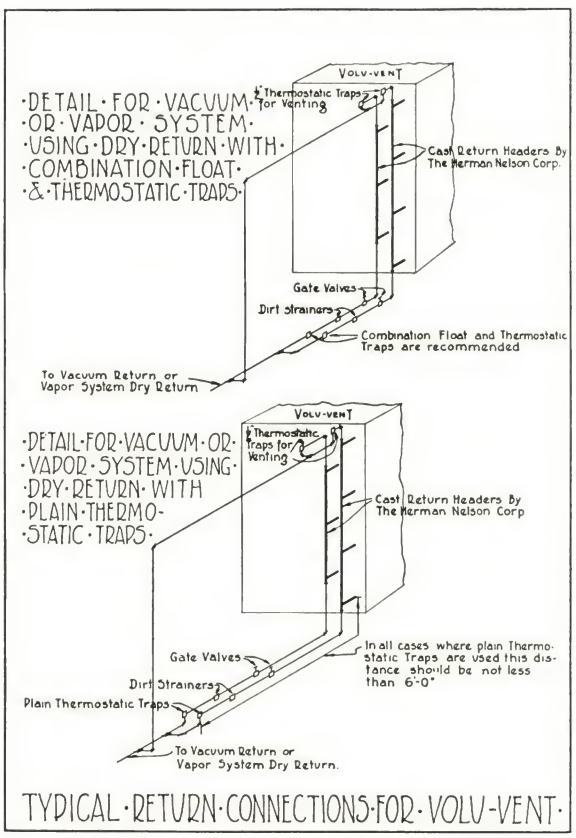
In general, it is recommended that in the case of vapor and vacuum systems where traps are used, that combination float and thermostatic traps be used to drain each return header independently and that the top of each return header be vented through a thermostatic trap.

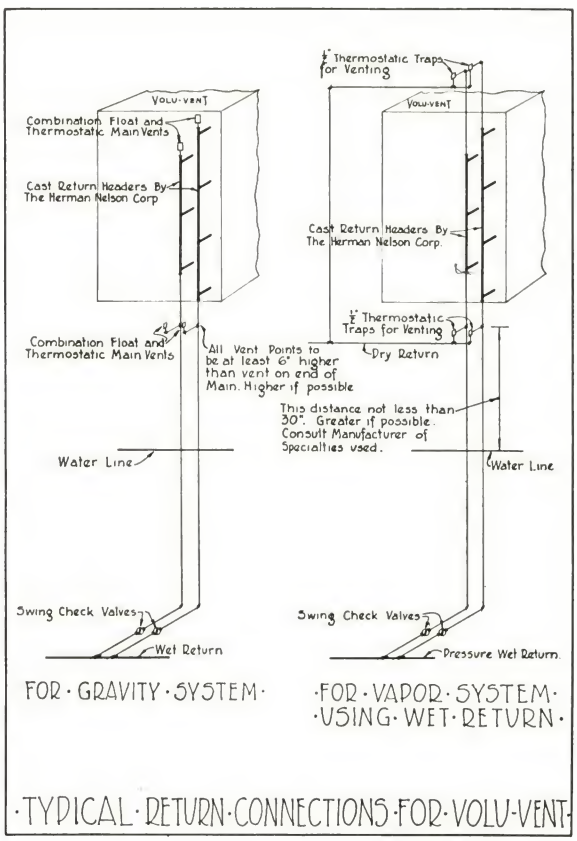
If thermostatic traps are used to drain the heater, cooling legs, at least 3 ft. long, should be provided in front of them to provide room for the water to stand while cooling to a temperature low enough to open the traps. This precaution is very important.

For gravity systems the Voluvent should have two pipe connections. All return headers should be drained from the bottom and should be vented from the top and bottom by automatic vents of the combination float and thermostatic type.

In general, in all steam systems the water of condensation should be drained from the bottom of each return header and the air should be vented from the top and bottom of each return header, except that in the case of the 130, 130R and 130SD series the upper vent may be omitted from the single center section.







SUGGESTED SPECIFICATIONS

for

HER-NEL-CO VENTILATOR
HER-NEL-CO MAGNAVENT
HERMAN NELSON UNIVENT
HERMAN NELSON VOLUVENT

It is the intention of these specifications to provide for a complete installation of the Her-Nel-Co System of Ventilation as manufactured by THE HERMAN NELSON CORPORATION, Moline, Illinois.

Alternate Proposals

If the contractor desires to bid on any other type of unit system or make of equipment, he shall submit a base bid on the Her-Nel-Co System as specified, and name in his bid the amount to be deducted or added in case a substitute system or equipment is accepted. He shall furnish with such alternate proposal complete literature and data to enable the architect and owner to determine the comparative merit of the proposed substitution, including a complete description of the equipment and its operation, fuel costs, etc. He shall specifically call attention to any changes in the building construction, sheet metal work, temperature control equipment, boiler plant, chimney size, etc., that may be required by the proposed substitution. The owner reserves the right to reject any and all alternate bids and to consider quality and merit as well as price. Unless the proposed substitute is selected in awarding the contract, the Her-Nel-Co System, as manufactured by THE HERMAN NELSON CORPORATION, shall be furnished and installed in accordance with the plans, specifications and manufacturer's literature. No substitutions will be permitted after the contract is awarded.

HER-NEL-CO VENTILATORS

Ventilators

Contractor shall furnish and install all Her-Nel-Co Ventilators of sizes, capacities and models shown on plans or accompanying schedule. All Her-Nel-Co Ventilators shall be carefully placed in locations shown and set in accordance with manufacturer's recommendations. Necessary steam supply and return connections with all valves, etc., shall be properly made by contractor who shall be held responsible for the care of all Her-Nel-Co Ventilators until the work is completed and accepted by the architect. Her-Nel-Co Ventilators shall be kept in clean, dry storage until ready for installation, when they shall be set level and firmly attached to the walls in an approved manner. No Her-Nel-Co Ventilator will be accepted on which the finish or any other part has been damaged in any way through improper handling, insufficient protection or indifferent workmanship.

Motors and Switches

All Her-Nel-Co Ventilators shall be equipped with Her-Nel-Co adjustable speed motors especially designed for this service and to operate on [110] [220] volt, [direct] [alternating] [single] [three] phase, [25] [50] [60] cycle current.

For Hand Control—All cabinets shall be equipped with switches incorporated in the hand control equipment.

For Automatic Temperature Control—All cabinets shall be equipped with key (or flush) tumbler switches.

Air Intakes

Where Model "J" Her-Nel-Co Ventilators are shown and specified, standard wall intakes of the horizontal (or vertical) type, finished with brown lacquer, as shown in manufacturer's catalogue shall be provided by the heating contractor and delivered to the masonry contractor with complete instructions for installation. All lintels will be furnished by others. Where Model "K" Her-Nel-Co Ventilators are shown or specified, necessary connections and screened intakes shall be furnished and installed by the heating contractor all as per manufacturer's literature. The heating contractor shall co-operate with and properly instruct carpenter or other contractors to insure the proper setting and connection of these intakes through the lower window sash or sill.

All intakes shall be painted by others, as directed.

Cabinets, Grilles, etc.

All cabinets shall be built of furniture steel neatly finished in "Morocco" enamel. Outlet grilles shall be of solid cast non-corrosive metal, finished in antique bronze.

Filters

All Her-Nel-Co Ventilators shall be provided with filters of the adhesive oiled type as furnished by the manufacturers and shown in their catalogue. These shall be installed within the Her-Nel-Co Ventilator in such a manner that they may be instantly removed or replaced without the use of tools of any kind.

Humidifiers (Optional)

All Her-Nel-Co Ventilators shall be equipped with steam jet, nozzle type humidifiers with hand-control valves, as shown in the manufacturer's literature.

Her-Nel-Co Ventilator Specifications (Continued)

Type of Control

For Hand Control—All Her-Nel-Co Ventilators shall be equipped for hand control. Control equipment shall be so arranged that the Her-Nel-Co Ventilator radiator and dampers will be controlled in the proper order by turning the control knob. The motor shall be started and stopped by means of a snap switch arranged to be operated by the same control knob.

The radiator valve, dampers, and operating mechanism shall all be furnished as integral parts of the Her-Nel-Co Ventilator and shall be arranged for use on a ..... system.

For Automatic Temperature Control—All Her-Nel-Co Ventilators shall be arranged for automatic control in conjunction with the ..... system of temperature regulation. The diaphragm valve for use on the Her-Nel-Co Ventilator radiator shall be furnished by the temperature control contractor and installed ready for air piping by the heating contractor.

The damper motors for operating the dampers shall be furnished by the temperature control contractor to THE HERMAN NELSON CORPORATION who will install them in the cabinets at the factory.

All adjustment of springs, thermostats, etc., shall be made on the job by the temperature control manufacturer.

Air Deliveries

All air velocities shall be determined by the A.S.H.& V.E. standard anemometer method, with the anemometer held 2 in. above the face of the discharge grille. The air delivery shall be determined by multiplying the velocity determined in this way by the gross area of the discharge grille.

HER-NEL-CO MAGNAVENTS

Magnavents

Contractor shall furnish and install all Magnavents of sizes and capacities shown on plans or accompanying schedule, complete with adjustable deflectors, duct work, etc. All Magnavents shall be carefully placed in locations shown and set in accordance with manufacturer's instructions. Groups of Herman Nelson Wedge Core Radiators as called for on the plans shall be included as part of the Magnavent equipment. Necessary steam supply and return connections with all valves, etc., shall be properly made by contractor and he shall be held responsible for the care of all Magnavents until the work is completed and accepted by the architect. Magnavents shall be kept in clean, dry storage until ready for installation.

All deflectors, grilles, duct work, access doors, etc., shall be furnished and installed by this contractor.

Motors and Speed Controllers

All Magnavents shall be equipped with Her-Nel-Co adjustable speed motors especially designed for this service and to operate on [110] [220] volt, [direct] [alternating] [single] [three] phase, [25] [50] [60] cycle current.

Her-Nel-Co Speed Controllers for controlling the motor speed shall be furnished for all Magnavents.

Air Intakes

Where Magnavents are shown or specified, standard wall intakes, finished with brown lacquer, as shown in manufacturer's literature shall be provided by the heating contractor and delivered to the masonry contractor with complete instructions for installation.

Cabinet Finish

All cabinets shall be built of furniture steel neatly finished in brown lacquer.

Filters

All Magnavents shall be provided with filters of the adhesive oiled type as furnished by the manufacturers and as shown in their literature. These shall be installed within duct work before the Magnavents in such a manner that they may be removed or replaced without the use of tools of any kind.

Type of Control

For Hand Control—All Her-Nel-Co Magnavents shall be equipped for hand control. Hand operated control dampers shall be provided in the outdoor air and room air ducts and so arranged that the amount of heating and cooling performed by the Magnavent may be controlled by chain operation of these dampers.

All dampers and control mechanism, including the necessary chain, shall be furnished and installed by this contractor. Chain markers and instruction plate shall be furnished by THE HERMAN NELSON CORPORATION.

The valves on the Herman Nelson Wedge Core Radiators shall be of the gate type, so located that they will be readily accessible.

For Automatic Temperature Control—All Magnavents shall be arranged for automatic control by providing mixing dampers, furnished and installed by the temperature control contractor, in the outside air and room air ducts and a diaphragm valve on the Herman Nelson Wedge Core Radiators. The diaphragm valve on the Wedge Core Radiators shall be furnished by the temperature control contractor and installed ready for air piping by the heating contractor.

All adjustments of springs, thermostats, etc., shall be made on the job by the temperature control manufacturer.

ELECTRIC WIRING SPECIFICATIONS

The electrical contractor shall furnish and install a complete system of wiring for the operation of all Her-Nel-Co Ventilators and Magnavents as shown on plans, in accordance with the manufacturer's literature and other printed instructions.

All wiring shall be done in full accordance with the rules and regulations of the National Board of Fire Underwriters and such state, municipal or local Power Company rules and regulations as may be in force. The general character of the wiring shall be the same as for the lighting system, so far as materials are concerned, providing it meets the requirements above stated. The sizes of wire used shall be such that the greatest drop in voltage, when all motors are running, shall not exceed three volts. The current requirements for the various Her-Nel-Co Ventilators and Magnavents may be obtained from the manufacturer's literature.

Electrical contractor shall leave a wall outlet for each Her-Nel-Co Ventilator close to the floor and at the right hand end of the cabinet as one stands facing it and shall also confer with the heating and ventilating contractor concerning the exact location of these outlets.

Wiring connections between wall outlets and cabinets shall be made in flexible, flat or rigid conduits, and the work shall be done in a neat, workmanlike manner.

No additional switches are required with Her-Nel-Co Ventilators.

Electrical contractor shall mount and wire all Her-Nel-Co Speed Controllers used to control the Magnavent motors. Each Her-Nel-Co Speed Controller and each one of any group of motors controlled by one Controller shall be equipped with switches and fuses furnished and installed by this contractor.

AUTOMATIC TEMPERATURE CONTROL SPECIFICATIONS

(To be added to the heating and ventilating specification when automatic temperature control is desired.)

All rooms in which Her-Nel-Co Ventilators or Magnavents are shown shall be equipped with a..... system of automatic temperature control applied to the Her-Nel-Co Ventilator and Magnavent radiators and dampers and all supplementary radiation.

The complete temperature control system shall be furnished and installed by the manufacturer of the above system.

Thermostats

All thermostats for the control of Her-Nel-Co Ventilators and Magnavents shall be of the graduated or intermediate type arranged to control the supplementary radiators and the Her-Nel-Co Ventilator radiators and dampers, or the Herman Nelson Wedge Core Radiators and mixing dampers in the case of the Magnavent, with a true graduated motion.

If desired, compound thermostats may be used, arranged to control the supplementary radiation positively and the other equipment with a graduated action.

All thermostats shall control with a minimum range in room temperatures from full heating to full cooling and shall be adjustable over a 5° range. They shall all be located two (2) feet from the floor.

All rooms shall be provided with a high grade, easy reading thermometer mounted at the five foot level, where directed.

Diaphragm Valves

All supplementary radiators, Her-Nel-Co Ventilator radiators and Herman Nelson Wedge Core Radiators used in conjunction with the Magnavents, shall be equipped with diaphragm valves with springs of the required tension.

Damper Motors

All Her-Nel-Co Ventilator dampers shall be operated by damper motors furnished by the temperature control contractor and installed in the cabinet at the factory by the ventilator manufacturer.

All mixing dampers and damper motors used in conjunction with Magnavents shall be furnished and installed by the temperature control contractor.

Cycle of Operation

The Her-Nel-Co Ventilators and Magnavents and the supplementary radiators shall be controlled in keeping with the cycle recommended by the manufacturer.

All thermostats and spring adjustments required to obtain this cycle of operation shall be made on the job by the temperature control manufacturer.

HERMAN NELSON UNIVENTS

It is the intention of these specifications to provide for a complete installation of Univent Ventilation incorporating the Univent equipment as manufactured by THE HERMAN NELSON CORPORATION, MOLINE, ILLINOIS.

Alternate Proposals

If contractor desires to bid on any other make of equipment, he shall submit a base bid on the Univent System and the Univents as specified, and name in his bid the amount to be deducted or added in case substitute equipment is accepted. He shall furnish with such alternate proposal complete literature and data to enable the architect and owner to determine the comparative merit of the proposed substitution. He shall specifically call attention to any changes in the balance of the work that may be required by the proposed substitution. The owner reserves the right to reject any and all alternate bids and to consider quality and merit as well as price. Unless the proposed substitute is selected in awarding the contract, the Univent System, as manufactured by THE HERMAN NELSON CORPORATION shall be furnished and installed in accordance with the plans, specifications and manufacturer's catalogue. No substitutions will be permitted after the contract is awarded.

Univents

Contractor shall furnish and install all Univents of sizes, capacities and models shown on plans or accompanying schedule. All Univents shall be carefully placed in locations shown and set in accordance with manufacturer's Mechanic's Handbook. Necessary steam supply and return connections with all valves, etc., shall be properly made by contractor and he shall be held responsible for the care of all Univents until the work is completed and accepted by the architect. Univents shall be kept in clean, dry storage until ready for erection, when they shall be set level and firmly attached to the walls in an approved manner. No Univent will be accepted on which the finish or any other part has been damaged in any way through improper handling, insufficient protection or indifferent workmanship.

Univent Motors

All Univents shall be equipped with Her-Nel-Co adjustable speed motors especially designed for Univent service and to operate on [110] [220] volt, [direct] [alternating] [single] [three] phase, [25] [50] [60] cycle current.

Air Intakes

Where Models "SD" and "R" Univents are shown and specified, standard wall intakes as shown in Univent manufacturer's catalogue shall be provided by the heating contractor and delivered to the masonry contractor with complete instructions for installation. Where Model "O", "W" or "WR" Univents are shown or specified, necessary connections and screened intakes shall be furnished and installed by the heating contractor all as per Univent manufacturer's catalogue. The heating contractor shall co-operate with and properly instruct carpenter or other contractors to insure the proper setting and connection of these intakes through the lower window sash or sill.

Univent Finish

All Univent cabinets shall be built of furniture steel neatly finished in "Morocco" brown baked enamel. Outlet grilles shall be of solid cast non-corrosive metal, finished in antique bronze.

Filters

All Univents shall be provided with filters of the adhesive oiled type as furnished by the Univent manufacturers and shown in their catalogue. These shall be installed within the Univent in such a manner that they may be instantly removed or replaced without the use of tools of any kind.

Grilles or Register Faces

Heating contractor shall furnish and install all vent outlet grilles and register faces as per design and construction specified or as called for in drawings in connection with the heating and ventilating system.

Roof Ventilators

Contractor shall furnish and install roof ventilators when and if required of the size and style called for in the drawings. All roof ventilators shall be equipped with tight closing dampers so arranged with cable connections that they may be operated from top story corridor. Where dampers are to be pneumatically controlled, they will be furnished by temperature control manufacturer, and installed by heating contractor.

Humidifiers (Optional)

Where humidifiers are to be specified in connection with the Univents, it will be necessary to correspondingly increase the capacity of the heating plant and the specifications should provide that Univents be equipped with steam jet, nozzle type humidifiers with hand-control valves, as shown and illustrated in the Univent manufacturer's catalogue. If automatic control of humidifiers is required, the automatic control specifications should provide for necessary humidistats, valves and connections.

UNIVENT ELECTRIC WIRING SPECIFICATIONS

The electrical contractors shall furnish and install a complete system of wiring for the operation of all Univents shown on plans, in accordance with the manufacturer's catalogue and other printed instruction.

All wiring shall be done in full accordance with the rules and regulations of the National Board of Fire Underwriters and such state, municipal or local Power Company rules and regulations as may be in force. The general character of the wiring shall be the same as for the lighting system, so far as materials are concerned, providing it meets the requirements above stated. The sizes of wire used shall be such that the greatest drop in voltage, when all Univents are running, shall not exceed three volts. The current requirements for the various Univents may be obtained from the Mechanics' Handbook published by the Univent manufacturers for the convenience of installation mechanics.

Electrical contractor shall leave a wall outlet for each Univent close to the floor and at the right hand end of the cabinet as one stands facing it and shall also confer with the heating and ventilating contractor concerning the exact location of these outlets. Connections between wall outlets and cut-out blocks shall be flexible, flat or rigid conduit, and the work shall be done in a neat, workmanlike manner.

Separate circuits shall be run as follows:

UNIVENT AUTOMATIC TEMPERATURE CONTROL SPECIFICATIONS

(Where automatic temperature regulation is to be specified, the following paragraphs should be inserted in such specifications)

Thermostats

Thermostats which are to control Univent mixing dampers shall be of the intermediate or gradual acting type so arranged that when the air is released from the temperature control system, the Univent warm air dampers will automatically open. Where Univent mixing dampers and direct radiators are to be controlled in the same room, the temperature control system shall be so arranged that the steam supply to the radiators will be closed until such time as the heat from such radiators is required to assist the Univent in maintaining required room temperatures. Where it is desired to also automatically control the Univent radiators, the specifications should provide that the steam supply to the Univent radiators will not be closed until after warm air dampers have been closed and direct radiators have been shut off.

Outside Air or Recirculating Damper Control

Outside air or recirculating dampers shall be arranged so they may be opened and closed in groups from a central point as shown on plans or as required for most satisfactory and convenient operation.

Damper Motors

The manufacturer of the system of automatic temperature control specified shall furnish and deliver to the Univent manufacturers all necessary diaphragm motors, brackets and levers for use in controlling Univent dampers where specified.

The Univent manufacturers shall install them complete within the Univent cabinets and make them ready for connection with the compressed air piping system, which connections shall be made by the mechanic for the automatic temperature control manufacturer.

The latter manufacturer shall make all necessary adjustments and test the operation of the equipment after installation and deliver it to the owner in a first-class operating condition.

Roof Ventilators

Temperature control manufacturers shall furnish all necessary dampers for roof ventilators and connect them for pneumatic operation so that they will always be closed when outdoor air dampers on Univents are closed.

HERMAN NELSON VOLUVENTS

Voluvents

This contractor shall furnish and install in the location shown on the (heating) (general) plans ..... No..... Series Voluvents as manufactured by THE HERMAN NELSON CORPORATION, Moline, Illinois.

Each Voluvent shall be complete with a variable speed Her-Nel-Co Motor, two double inlet multiblade fans, heavy gauge steel cabinet with internal air deflectors and two separate groups of Herman Nelson Wedge Core Radiators.

Voluvents shall be adequately supported as approved by the Architect and shall be set complete with sheet metal and canvas connections as shown on the plans. All lintels over Voluvents and intakes will be furnished and installed by others. The entire Voluvent, except the radiators, shall be furnished in brown lacquer.

Motors

Each Voluvent shall be equipped with a variable speed Her-Nel-Co motor, especially designed and built for quiet operation at all speeds on [110] [220] [direct] [alternating] [single] [three] phase, [25] [50] [60] cycle current.

All motors shall be equipped with fully housed, quiet-running, grease-retaining combination radial and thrust ball-bearings.

All alternating current motors shall be electrically self-starting, free from hum and radio interference and shall not have brushes, commutators, nor mechanical switches of any kind.

All windings shall be carefully insulated and shall have not less than two coats of insulating varnish baked on. All rotors and stators shall be rust-proof.

Each No. 210 and No. 360 Series Voluvent, or group of Voluvents where they are all installed in the same room shall be controlled by a Her-Nel-Co Speed Controller.

All No. 130, 130R and 130SD Series Voluvents shall be provided with tumbler or snap switches located where directed.

All wiring will be done by (this contractor) (other contractor) as specified under Wiring.

Intakes

This contractor shall deliver to the general contractor for setting standard Voluvent heavy steel intakes as furnished by THE HERMAN NELSON CORPORATION and as called for on the (general) (heating) plans. These intakes shall be substantially built of heavy gauge steel with all joints carefully welded and shall have heavy gauge steel louvres, wire screen and frame. They shall be heavily electroplated with cadmium after fabrication and then finished with two coats of brown lacquer.

All lintels over intakes will be furnished and installed by others. All intakes will be painted after erection by the decorating contractor.

Filters (If Used)

This contractor shall furnish and install where shown on the (general) (heating) plans high grade standard make adhesive type filter units as furnished by THE HERMAN NELSON CORPORATION.

Each No. 130R and 130SD Series Voluvent shall be provided with two 21⅛x15⅝x2 in. filter units mounted in a frame inside the cabinet.

Each No. 210 Series Voluvent shall be provided with two (2) 25x20 in. filter units, and each No. 360 Series shall have four (4) 25x20 in. units. These filters shall be mounted on substantial steel angle iron and tee iron frames furnished and installed by this contractor and built as an integral part of the duct in which it is installed.

Furnish one extra filter unit for each four units required for regular service, but not less than two units of each size.

Installation, Duct Work, Dampers, Grilles, etc.

No. 130, 210 and 360 Series Voluvents.—This contractor shall furnish and install the duct work, operating dampers, grilles, etc. as shown on the (general) (heating) plans. All duct work shall be installed substantially as shown, shall be heavy enough to be self-supporting, free from vibration, and shall be thoroughly reinforced to safely carry any load that may be ordinarily put upon it. Furnish and install tight hinged access doors with catches where shown on the plans and where required for access to the motor, fans, filters, dampers, etc.

A suitable canvas connection shall be installed between any duct work and the Voluvent cabinet. Each cabinet shall either be supported from below on not less than 2 in. cork board at all corners in order to prevent the transmission of vibration. Ducts shall be lined with sound absorbing material as shown on plans.

Automatic Control—All dampers as shown on the plans and as specified, and the necessary damper motors shall be furnished by the temperature control manufacturer. All dampers shall be delivered to the ventilating contractor who will install them.

All diaphragm valves shall be furnished by the temperature control contractor and installed by the heating contractor.

Hand Control—All dampers as shown on the plans and as specified shall be furnished and installed by the ventilating contractor and arranged for chain operation as directed.

This contractor shall furnish and install all recirculating and discharge grilles as shown.

Installation of No. 130R and 130SD Voluvents—Each No. 130R and 130SD Voluvent will be furnished complete with all necessary dampers, filter frames, mounting clips, etc. They shall be securely bolted to the ceiling in locations shown on the plans and in accordance with the manufacturer's instructions.

Automatic Control—A damper motor for the operation of the dampers in each unit shall be furnished by the temperature control contractor to the Voluvent manufacturer who will mount it in the cabinet at the factory ready for air piping. Two diaphragm valves shall be furnished for each unit by the temperature control manufacturer and installed by the heating contractor.

Hand Control—The Voluvents will be furnished by the manufacturer and arranged for hand operation of the dampers but the operating chains shall be furnished and installed by the heating contractor as directed by the architect.

Wiring

(In electrical or heating specifications)

This contractor shall wire the Voluvents and controllers complete in accordance with the National Electrical Code and all local ordinances.

This contractor shall furnish and install suitable knife switches and fuses before each No. 210 and No. 360 Series Voluvent motor and Controller, and suitable tumbler or snap switches before each No. 130, 130R and 130SD Voluvent motor where directed.

Piping

This contractor shall furnish and install complete piping connections for each Voluvent in such a manner as to insure free and positive circulation of steam through each group of radiators at all times when the valves are open.

Each supply header shall be provided with a separate (diaphragm valve laid on its side preceded by a gate valve) (or globe valve laid on its side) for control of the radiator.

Vapor and Vacuum System Using Traps—Each return header shall be independently drained through a combination float and thermostatic trap with the top of each return header vented through a small radiator trap.

Gravity System—Each return header shall be independently drained. The top and bottom of each return header shall be vented by combination float and thermostatic main vents.

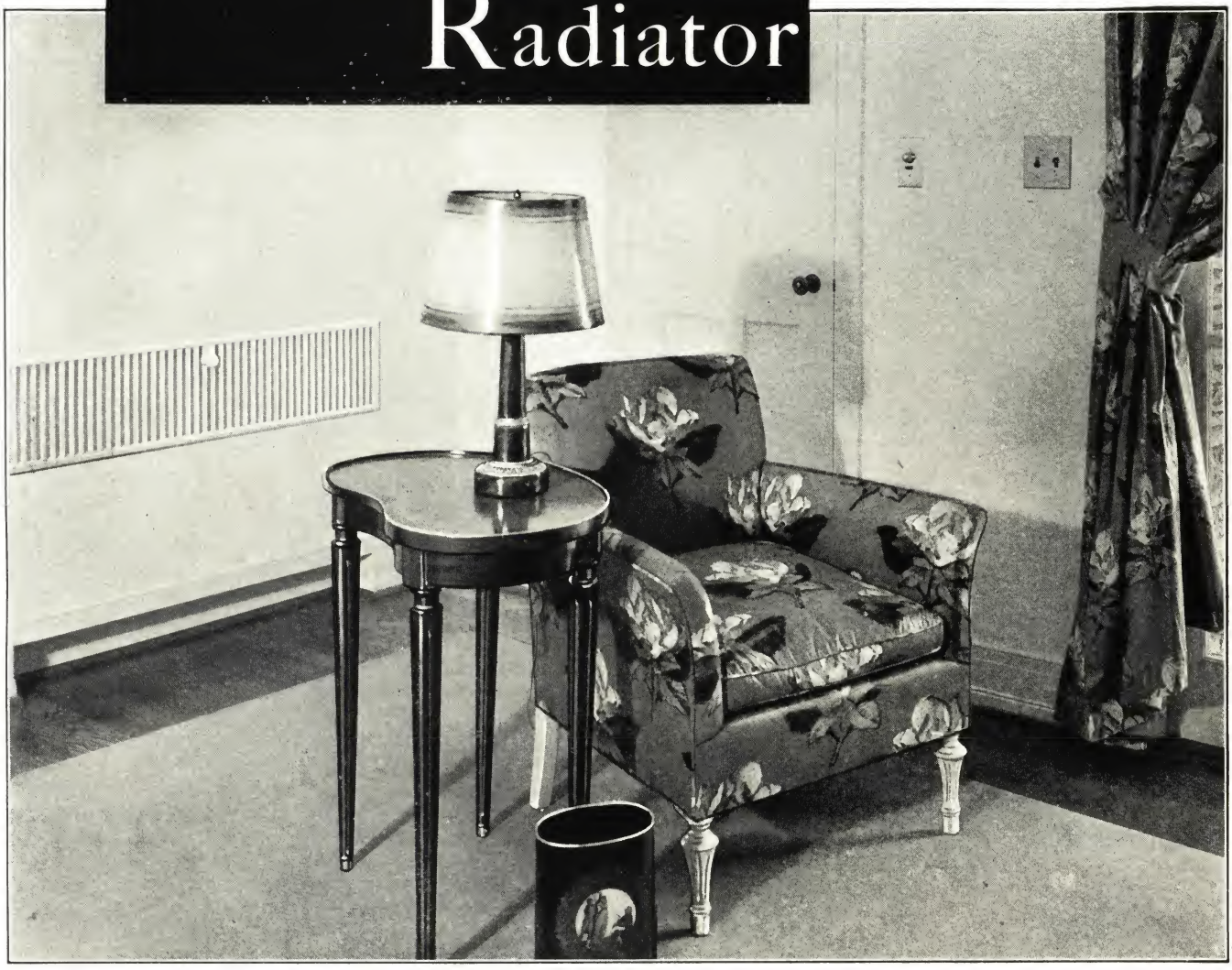
Air Deliveries

After completion of the installation the heating contractor shall mark on the face of the Her-Nel-Co Speed Controller the setting that will run the Voluvents at the proper speed to deliver the volume of air called for on the (heating) (general) plans.

All air deliveries shall be determined with the grilles removed and with the anemometer held two inches away from the face of the radiator in accordance with the A.S.H. & V. standards. The velocity determined in this manner shall be multiplied by the full area of the radiator to obtain the cubic feet of air per minute.

The Herman Nelson *Invisible* Radiator

{ *Encased Within The Wall . . . .*

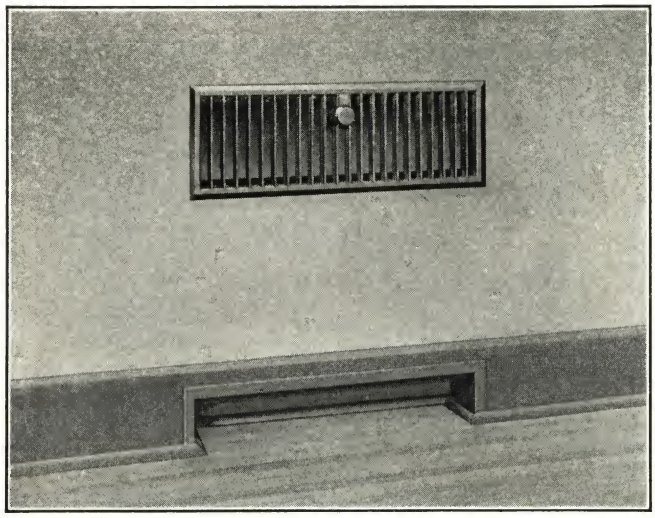


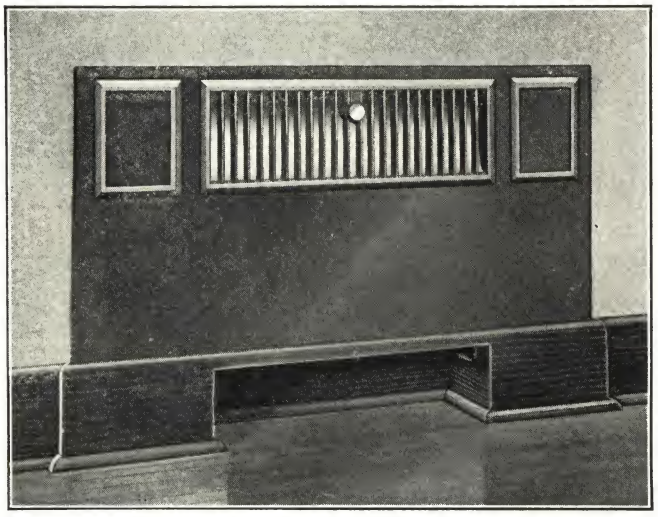
WHEN planning a home, consider the selection of the radiators from two angles. First, what effect will they have on the beauty and comfort of the rooms? Second, will they render long and worry-free service?

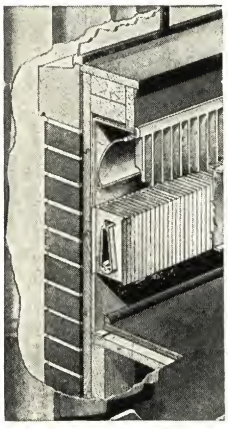
From both angles, the HERMAN NELSON INVISIBLE RADIATOR will be found worthy of your choice. Here is a heating unit so compact that it fits within the wall—thus it does not interfere with the arrangement of the furniture or draperies, and blends with any type of interior decoration.

The Herman Nelson
INVISIBLE RADIATOR

FOR STEAM, VAPOR, VACUUM OR HOT WATER HEATING
FURNISHED IN TWO TYPES: THE "IMMURED" AND THE "PANELED"







In the "Immured" Type, the heating element comes installed in a sturdily built, scientifically designed cabinet with heat outlet grille, and is furnished complete by the manufacturer and installed by the heating contractor into a pocket or recess in wall.

Metal lath and plaster are then applied over the entire front of the cabinet, leaving only the grille exposed to view

"Immured" Type

This type is completely sealed within the wall of the room, permitting the plaster, tile or other wall finish to be run continuously across the front of the radiator.

Control of heat delivery is accomplished to the finest degree by operating the damper.

To attempt provisions for valve control at the radiator with this type is considered impractical and not good engineering. Therefore, this type is recommended for residences, or other buildings, where cut off or automatic control valves and traps may be installed on the pipe branches in the basement, or below the room in which the radiator is installed.

For fine residences and similar buildings, where the ultimate in appearance is desired, the "Immured" type Herman Nelson Invisible Radiator has been accepted and approved as the "last word."

"Paneled" Type

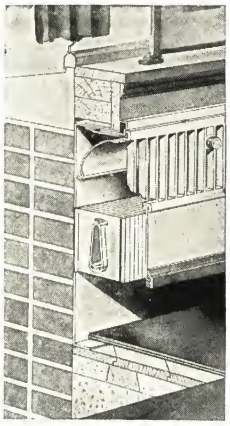
With this type the heat delivery to the room may also be controlled by hand operation of the damper. In addition, the steam or water circulation may be controlled *at the radiator* by a hand or automatic control valve.

The radiator valve is operated by reaching through the small panels at each end. The entire front is instantly removable, without tools, giving complete access to valves, traps and connections.

Recommended for multi-story buildings such as offices, hotels, apartments, etc., where it is impractical to run separate pipe risers, and, in which event, valves and traps should be installed at each radiator where they will be conveniently accessible.

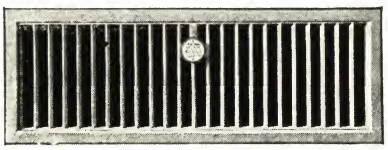
The quality of materials used and the workmanship are identical with that of the "Immured" type.

This radiator occupies no space on the floor or in the room.



In the "Paneled" Type, piping and valve connections are made at opposite ends of radiator. When plastering is finished around the cabinet, the front panel is slipped into place. No furring of walls; no special construction; the complete installation is simple and durable.

Attractive self-closing doors are fitted to front panel for access to valves

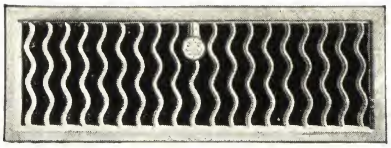


The Standard

Always furnished unless another design is specifically ordered. Because of its straight-forward simplicity, it does not strike a discordant note in any room decoration. Where a more sympathetic design is desired, one of the other grilles shown will meet almost any situation

The Tracery

The Gothic tendency of this design qualifies it for use in English and French Gothic interiors. However, it will also harmonize very nicely with interiors of the Spanish or Italian Renaissance periods



The Wave

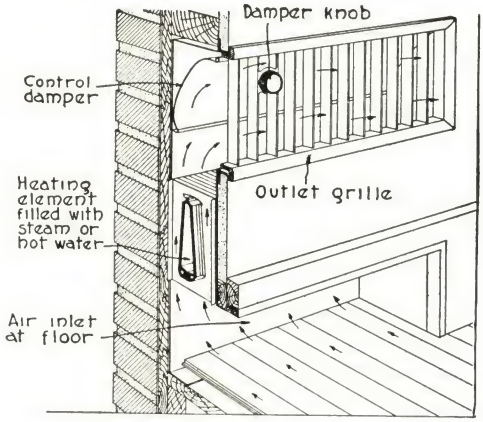
To be fully appreciated, this grille should be considered as a part of an interior rather than a separate design. It is at its best in either formal or informal rooms of the English, Spanish or French Renaissance, while its adaptability to Georgian or modern interiors is obvious

Design and Construction of Cabinet

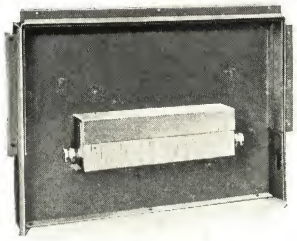
Both types of Invisible Radiators consist of a steel cabinet in which the heating element is mounted. An air inlet opening is provided at the base of the cabinet and a warm air outlet with grille is furnished above the heating element. Cabinets for both types are built of 16 gauge steel with welded and riveted joints.

The operation of all Invisible Radiators depends entirely upon the chimney action caused by the heating element, with the cabinet acting as a flue. This action is always positive, but any slight change in the shape or dimensions of the cabinet, heating element, grille, or air inlet opening will materially affect the capacity of the complete unit. For these reasons, the manufacturers maintain a policy of only furnishing the complete Invisible Radiator, in order that their guarantee of heating capacities can be maintained.

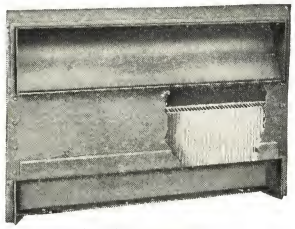
No access is required to the wedge core radiator in Herman Nelson Invisible Radiators. Therefore, it is built into the cabinet of the "Immured" type at the factory. The front of the "Paneled" radiator may be instantly removed or replaced without the use of tools of any kind. No screws or bolts are required to hold the panel in place.



Method of Operation



The "Immured"



The "Paneled"

Cabinets and Heating Elements as They Are Shipped from the Factory

Cast Grilles

Heat outlet grilles are cast of a light aluminum alloy. The grilles illustrated on the bottom of this and the preceding page are furnished for either the "Immured" or "Paneled" type radiators. These grilles were designed by artists of note, and provide a selection that will harmonize with any style of interior decoration.

Grille and Damper Assembly

Herman Nelson Wedge Core Radiator

The Wedge Core Heating Element (described on pages 2 and 3) has served unfailingly for years in the various products of The Herman Nelson Corporation.

Selecting the Radiator

On the following pages will be found diagrams showing the arrangement of both the "Immured" and "Paneled" type Herman Nelson Invisible Radiators when installed in outside walls.

If the number of square feet of radiation required for a given room has been determined for the system to be used in terms of equivalent direct cast iron radiation set exposed, it is only necessary to refer to the tables of dimensions and capacities to select a Herman Nelson Invisible Radiator or radiators to fit the space requirements and to have capacity equal to the required amount. This is equally true for gravity steam, vapor, vacuum, or hot water system radiators.

If the heat loss is determined in terms of B.t.u. per hour, as recommended by the A.S.H. & V.E. it is necessary to divide the B.t.u. per hour by a factor which depends upon the type of steam used, the temperature of the heating medium in the radiator, and the room temperature.

In the case of vapor, vacuum or gravity steam systems, this factor is 240 B.t.u. per hour for 215° F. temperature and 70° room temperature. This factor is higher for either greater steam temperatures or lower room temperatures and is lower for either lower steam temperatures or higher room temperatures.

In the case of hot water installations this factor varies with the mean temperature of the water in the radiator for which the system is designed and with the room temperature. As in the case of the vapor, vacuum or gravity steam systems the factor is higher for lower room temperatures and vice versa.

The following table will serve as a guide in determining the B.t.u. output per square foot of hot water installations for various water temperatures:

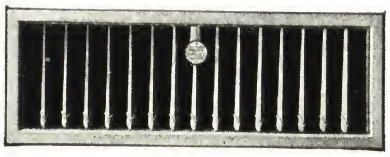
Average temperature of water in radiator, degrees	B.t.u. emitted per sq. ft. of equivalent direct cast iron radiation set exposed for 70° room temperature
160	129
170	148
180	167
190	187
200	208

For example: if the temperature of the water at the inlet is 190° and the temperature at the outlet is 170° the mean temperature of the water in the radiator is 180°. With a room temperature of 70°, 167 B.t.u. will be emitted per hour per square foot of direct cast iron radiation. Then if the total heat loss from the room is divided by this factor the result will be the number of square feet of equivalent direct cast iron radiation required. This figure then determines the size of the radiator as given in the tables of capacities.

Dimensions and Capacities

For the sake of brevity the following table is prepared to indicate the height, length and width of standard stock radiators regularly furnished in both the "Immured" and "Paneled" types.

"Immured" Type			"Paneled" Type		
Width, in.	Height, in.	Length in.	Width, in.	Height, in.	Length in.
3 5/8	20 3/4	15	5 1/2	20 3/8	15
4 7/8	24 3/8	20	7 1/2	24 3/8	20
7 1/2	30 3/8	25		30 3/8	25
		30			30
		35			35
		40			40
		45			45
		50			50

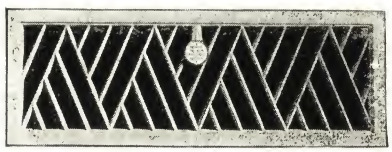


The Bud

This design, based on the sprouting bud motif combines originality, classic simplicity and delicacy without fragility. Because of these qualities it will be found to be in good taste in any formal Georgian, English, French, Adam, Directoire or modern room

The Floral

This pleasing design has unlimited possibilities in informal or semi-informal interiors. It is particularly well suited to Early American rooms



The Geometric

A truly modern design without being faddish. It has characteristics that harmonize with rooms of Early American, English, Chippendale, or Heppelwhite setting, while its suitability for modern and ultra modern rooms is apparent

··CAPACITIES·AND·DIMENSIONS··

··THE HERMAN NELSON INVISIBLE RADIATOR··

·IMMURED TYPE· ·PANELED TYPE·

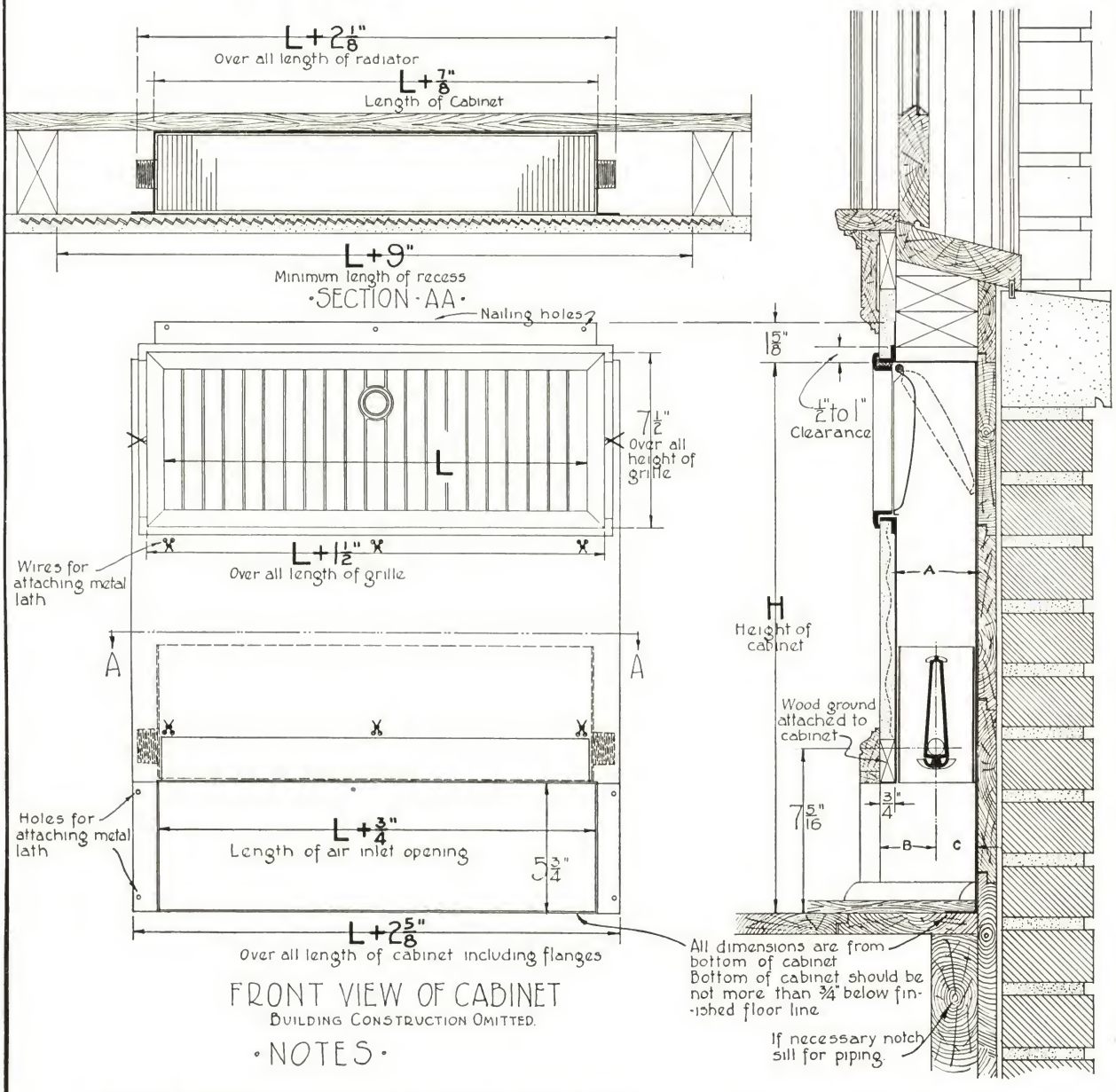
THESE RADIATORS MAY BE USED FOR EITHER STEAM OR HOT WATER. CAPACITIES ARE GIVEN IN SQUARE FEET OF EQUIVALENT STANDARD CAST IRON RADIATION SET EXPOSED IN THE ROOM.

IMMURED TYPE	H 20-3/8"	Number	1511-C	2011-C	2511-C	3011-C	3511-C	4011-C	4511-C	5011-C
		Capacity	10.9	14.5	18.2	21.8	25.4	29.1	32.8	36.4
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
3 5/8"	H 24-3/8"	Number	1521-C	2021-C	2521-C	3021-C	3521-C	4021-C	4521-C	5021-C
		Capacity	11.8	15.8	19.7	23.7	27.6	31.5	35.6	39.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
DEEP	H 30-3/8"	Number	1531-C	2031-C	2531-C	3031-C	3531-C	4031-C	4531-C	5031-C
		Capacity	13.3	17.7	22.0	26.4	30.8	35.3	39.7	44.1
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
IMMURED TYPE	H 20-3/8"	Number	1512-C	2012-C	2512-C	3012-C	3512-C	4012-C	4512-C	5012-C
		Capacity	14.8	19.7	24.7	29.7	34.6	39.5	44.6	49.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
4 7/8"	H 24-3/8"	Number	1522-C	2022-C	2522-C	3022-C	3522-C	4022-C	4522-C	5022-C
		Capacity	16.0	21.4	26.8	32.2	37.5	42.8	48.2	53.6
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
DEEP	H 30-3/8"	Number	1532-C	2032-C	2532-C	3032-C	3532-C	4032-C	4532-C	5032-C
		Capacity	18.0	23.9	29.8	35.8	41.8	47.7	53.8	59.7
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
IMMURED TYPE	H 20-3/8"	Number	1513-C	2013-C	2513-C	3013-C	3513-C	4013-C	4513-C	5013-C
		Capacity	18.6	24.9	31.1	37.3	43.5	49.7	55.9	62.2
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
7 1/2"	H 24-3/8"	Number	1523-C	2023-C	2523-C	3023-C	3523-C	4023-C	4523-C	5023-C
		Capacity	20.3	27.1	33.9	40.6	47.4	54.2	61.0	67.7
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
DEEP	H 30-3/8"	Number	1533-C	2033-C	2533-C	3033-C	3533-C	4033-C	4533-C	5033-C
		Capacity	22.8	30.5	38.1	45.7	53.3	60.9	68.5	76.1
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
PANELED TYPE	H 20-3/8"	Number	1511-D	2011-D	2511-D	3011-D	3511-D	4011-D	4511-D	5011-D
		Capacity	15.5	20.6	25.8	31.0	36.1	41.3	46.5	51.6
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
5 1/2"	H 24-3/8"	Number	1521-D	2021-D	2521-D	3021-D	3521-D	4021-D	4521-D	5021-D
		Capacity	16.9	22.5	28.2	33.8	39.4	45.2	50.8	56.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
DEEP	H 30-3/8"	Number	1531-D	2031-D	2531-D	3031-D	3531-D	4031-D	4531-D	5031-D
		Capacity	18.8	25.0	31.3	37.5	43.8	50.0	56.2	62.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
PANELED TYPE	H 20-3/8"	Number	1512-D	2012-D	2512-D	3012-D	3512-D	4012-D	4512-D	5012-D
		Capacity	17.2	23.0	28.6	34.4	40.0	45.8	51.5	57.3
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
7 1/2"	H 24-3/8"	Number	1522-D	2022-D	2522-D	3022-D	3522-D	4022-D	4522-D	5022-D
		Capacity	18.8	25.0	31.2	37.5	43.7	50.0	56.3	62.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
DEEP	H 30-3/8"	Number	1532-D	2032-D	2532-D	3032-D	3532-D	4032-D	4532-D	5032-D
		Capacity	21.1	28.2	35.2	42.3	49.3	56.4	63.4	70.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"

APPLICATION & DIMENSIONS

THE HERMAN NELSON INVISIBLE RADIATORS

IMMURED TYPE



FRONT VIEW OF CABINET
BUILDING CONSTRUCTION OMITTED.

NOTES

All steam connections should be thoroughly tested before lathing and plastering has been completed.

Metal lath should be placed over entire cabinet and recess, attaching to cabinet by means of wire loops

If there is a plate on rough floor it should be removed in recess.

Dimension A 3 3/8" – 4 7/8" – 7 1/2"

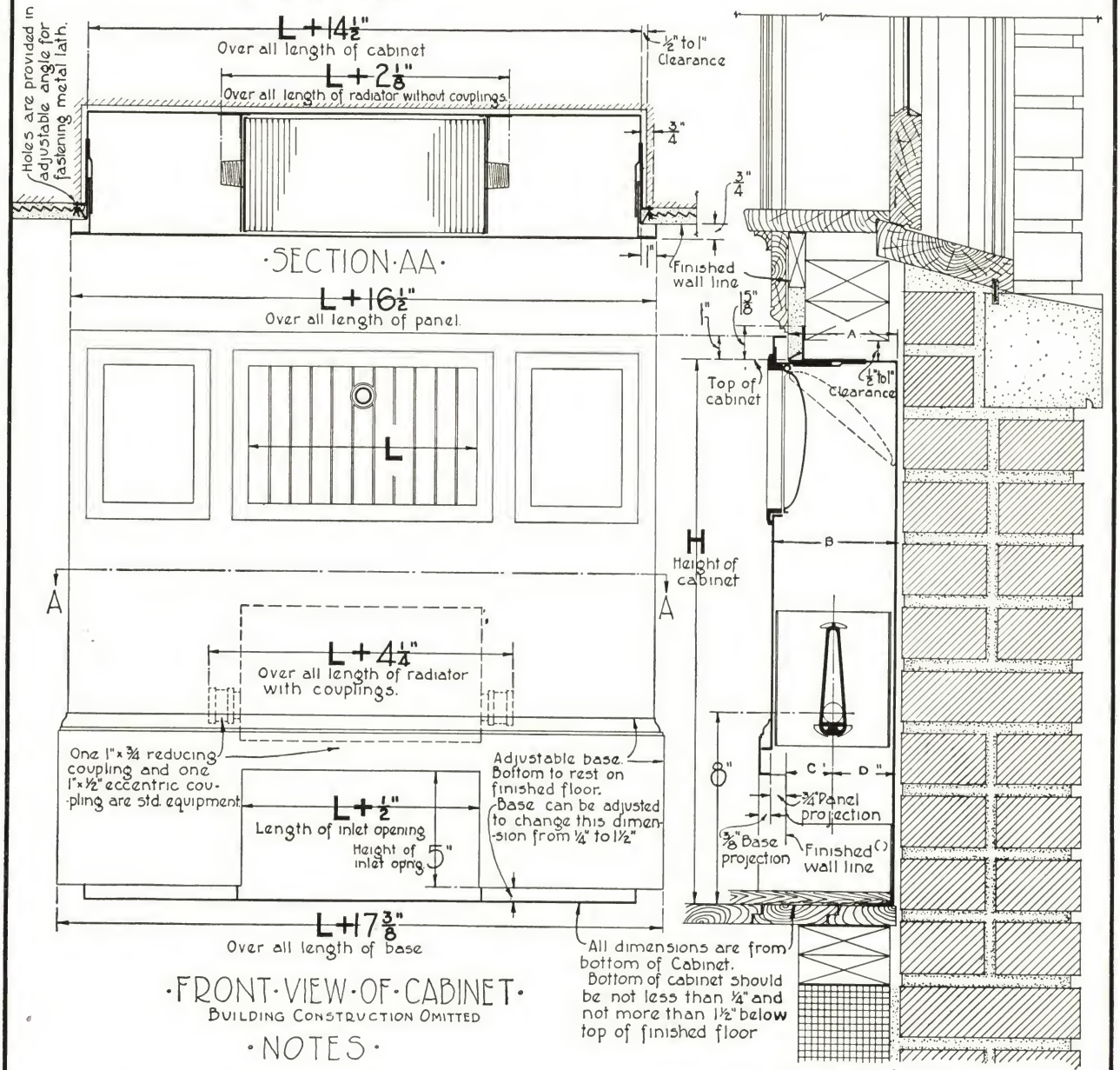
Dimension B 2 9/16" – 3 3/16" – 4 1/2"

Dimension C 1 3/16" – 2 7/16" – 3 3/4"

APPLICATION & DIMENSIONS

THE HERMAN NELSON INVISIBLE RADIATORS

PANELED TYPE



FRONT VIEW OF CABINET

BUILDING CONSTRUCTION OMITTED

NOTES

1. Metal lath should be placed around entire cabinet and recess attaching to cabinet by means of wire loops
2. If there is a plate on rough floor it should be removed in recess.

Dimension A	4¾"	–	6¾"
Dimension B	5½"	–	7½"
Dimension C	2"	–	3"
Dimension D	2¾"	–	3¾"

Suggested Specifications

THE "IMMURED" TYPE INVISIBLE RADIATOR

The heating contractor shall furnish and install, where indicated on plans, or schedule accompanying same, or as directed by the architect, Herman Nelson Invisible Radiators of the "Immured" type, as per the following specifications.

Factory Built Units—All Invisible Radiators shall be furnished as complete units by the manufacturers thereof, including heating elements, steel cabinets, dampers and grilles as selected by the architect, all as shown and described in the manufacturer's latest catalogue. Manufacturers to guarantee capacities to be in accordance with their published ratings.

Installation—These radiators shall be installed by the heating contractor in accordance with manufacturer's printed instructions accompanying same and with proper reference to the wall recesses and wall finish in their respective locations, as shown on plans. Cabinets shall be so set that the bottom of same will not be more than ¾ in. below the top of the finished floor and outlet grille frames are flush with the finished wall.

Recesses—The general contractor will provide the necessary recesses or wall pockets with nailing strips or surfaces at top and bottom as required. The heating contractor shall furnish the general contractor with correct information as to the size and location of all radiator recesses, clearances, and such other information as will enable him to correctly extend the wall finish across the front of the cabinet.

Cabinets—All cabinets shall be substantially built, by the manufacturer, of 16-gauge steel, neatly fabricated and braced. They shall be provided with nailing flanges at top and nail holes in the bottom. Outlet openings shall be provided with heavy welded angle iron frames riveted to cabinets and arranged to act as plaster grounds. In rooms where the wall finish is more than ¾ in. thick, the proper depth angle iron frames for warm air outlet grilles shall be ordered from the manufacturers in order that these frames will extend to the finished wall line.

Front and rear of cabinets shall be provided with galvanized annealed iron wire ties for attaching metal lath. A wood nailing strip shall be provided immediately above the air inlet opening at the base of the cabinet and extending the full length of this opening.

A temporary removable steel shield shall be provided in the grille opening to protect the heating element from plaster and other debris during installation. This shield shall not be removed until the installation is completed and the grille is to be installed.

Painting—The entire cabinet shall be thoroughly sprayed with aluminum paint immediately after fabrication and before shipping. Grilles and dampers shall be finished with one priming coat after fabrication and before shipping, and will be decorated by other contractors to match room decorations. Intake openings shall be painted by others as directed.

Heating Element—The heating element shall be the Herman Nelson Wedge Core Radiator without joints of any kind. The steam or water container shall be a solid one piece aluminum alloy casting. The extended surface shall be in the form of smooth straight aluminum fins securely wedged to the core to afford a tight metal to metal contact without the use of solder. The plates or fins shall be spaced sufficiently far apart to prevent stoppage by the accumulation of lint and dirt and arranged to form straight, smooth, vertical air passages. The assembled sections shall be tested and proved tight under a hydrostatic pressure of not less than 300 lbs. per square inch and shall be guaranteed for a working pressure of 150 lbs. per square inch.

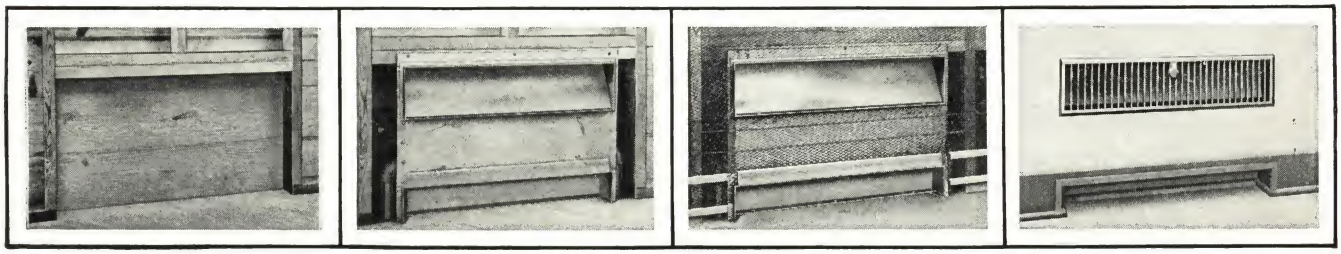
Where hot water is used for heating, this contractor shall install hand operated air valves in the vent tappings in the heating element. Air vents shall be arranged to be operated through the opening at the base of the cabinet.

Grilles and Dampers—All outlet grilles shall be cast of the designs listed in the schedule or as shown on the plans. Design names refer to illustrations in manufacturer's catalogue. A light weight single piece damper shall be provided behind all grilles, with operating mechanism for the operation of dampers. The damper and operating mechanism shall be attached directly to the grille so that the entire assembly may be removed as one piece. The mechanism shall be so arranged that the damper may be held in any position from full open to tightly closed without danger of becoming dislodged.

Alternate Proposals—The contractor shall submit bid on the materials herein specified in order to qualify as a bidder. Alternate proposals on other makes of radiators, as approved by architects, in writing, will be considered. However, alternate proposals shall state the deduction or addition to be made in case of substitution and shall be filed with base bid, clearly made out on a separate form and accompanied by complete alternate schedule, specifications, literature and other essential data.

SCHEDULE OF THE "IMMURED" TYPE

Room name or number	Floor name or number	Type of Invisible Radiator	Number of Invisible Radiators of same size	Capacity of each Invisible Radiator, sq. ft.	Catalogue Number of Invisible Radiators	Catalogue name of grille	With or without control damper	Depth of outlet frame, in.	Overall size of recess, in.		
									Length	Height	Depth
Living room	First	Immured	2	32.2	3022-C	Bud	With	¾	39	25	4⅞
Bath	Second	Immured	1	22.8	1533-C	Standard	With	1½ (tile finish)	24	31	7½



The Recess

Radiator nailed in place at top and bottom and piping installed. Note wire lath ties provided

Metal lath applied ready for plastering. Note the rib lath across front of cabinet

The finished installation. Sides and back of inlet formed by the steel cabinet painted to match the baseboard

Suggested Specifications
THE "PANELED" TYPE INVISIBLE RADIATOR

The heating contractor shall furnish and install, where indicated on plans, or schedule accompanying same, or as directed by the architect, Herman Nelson Invisible Radiators of the "Paneled" type, as per the following specifications:

Factory Built Units—All Invisible Radiators shall be furnished as complete units by the manufacturers thereof, including heating elements, steel cabinets, adjustable angles, removable panels, adjustable bases, dampers, and grilles as selected by the architect, all accessories as shown and described in the manufacturer's latest catalogue.

Installation—These radiators shall be installed by the heating contractor in accordance with manufacturer's printed instructions accompanying same with the bottom of the cabinet as near the finished floor line as possible but not closer than ¼ in. nor farther than 1½ in., and with proper reference to the wall recesses and wall finish in their respective locations, as shown on plans.

Recesses—The general contractor will provide the necessary recesses or wall pockets, with nailing strips or surfaces at top and bottom, as required. The heating contractor shall furnish the general contractor with correct information as to the size, clearances, and location of all radiator recesses and such other information as will enable him to make proper provisions for the installation of the radiators.

Cabinets—All cabinets shall be substantially built, by the manufacturers, of number 16 gauge steel, neatly fabricated and braced. They shall be provided with adjustable nailing flanges at tops and sides with necessary holes for nailing cabinet in place and tying metal lath.

Removable Fronts—All cabinets shall be provided with front panels, having a tongue and grooved joint, which may be instantly removed or replaced without the use of tools of any kind. They shall be provided with spring hooks for quickly fastening to the cabinet to hold them securely in place. Self closing hand access doors shall be provided in cabinet fronts for access to radiator controlling valves.

Adjustable Bases—Front panels shall be furnished with steel bases that may be adjusted up or down to meet the varying finished floor levels. Sufficient adjustment shall be provided to permit the distance from the bottom of the cabinet to the finished floor to vary from ¼ to 1½ in. After plastering is complete and finished floors are laid, the contractor shall so adjust these bases and fit them in place that the panel may be easily slipped out to provide immediate access to the valves, traps and other connections.

Painting—The cabinet shall be thoroughly painted by the manufacturer, immediately after fabrication. The front panel shall be painted with one coat of brown paint immediately after fabrication and before shipping. It will be finished to match room finish by other contractors. Grilles and nigger bronze. All painting as described above shall be done immediately after fabrication and before shipping.

Heating Element—The heating element shall be the Herman Nelson Wedge Core Radiator without joints of any kind. The steam or water container shall be a solid one piece aluminum alloy casting. The extended surface shall be in the form of smooth straight aluminum fins securely wedged to the core to afford a tight metal to metal contact without the use of solder. The plates or fins shall be spaced sufficiently far apart to prevent stoppage by the accumulation of lint and dirt and arranged to form straight, smooth, vertical air passages. The assembled sections shall be tested and proved tight under a hydrostatic pressure of not less than 300 lbs. per square inch and shall be guaranteed for a working pressure of 150 lbs. per square inch.

Where hot water is used for heating, this contractor shall install hand operated air valves in the vent tappings in the heating element. Air vents shall be arranged to be operated through the opening at the base of the cabinet.

A temporary removable steel shield shall be provided over the heating element to protect it from plaster and other debris during installation. This shield shall not be removed by the contractor until the installation is completed including plastering, and the front panel is to be installed.

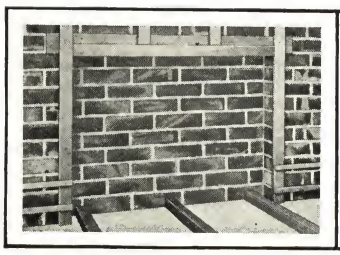
Grilles and Dampers—All outlet grilles shall be cast of the designs listed in the schedule or as shown on the plans. Design names refer to illustrations in manufacturer's catalog. A light weight single piece damper shall be provided behind all grilles, with operating mechanism for the operation of dampers. The damper and operating mechanism shall be attached directly to the grille so that the entire assembly may be removed as one piece. The mechanism shall be so arranged that the damper may be held in any position from full open to tightly closed without danger of becoming dislodged.

Alternate Proposals—The contractor shall submit bid on the materials herein specified in order to qualify as a bidder. Alternate proposals on other makes of radiators, as approved by architects, in writing, will be considered. However, alternate proposals shall state the deduction or addition to be made in case of substitution and shall be filed with base bid, clearly made out on a separate form and accompanied by complete alternate schedule, specifications, literature and other essential data.

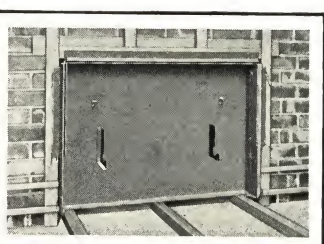
SCHEDULE OF "PANELED" TYPE

Room name or number	Floor name or number	Type of Invisible Radiator	Number of Invisible Radiators of same size	Capacity of each Invisible Radiator, sq. ft.	Catalogue number of Invisible Radiators	Catalogue name of grille	With or without control damper	Type of base	Overall size of recess, in.		
									Length	Height	Depth
Office No. 1	Mezzanine	Paneled	3	20.6	2011-D	Floral	With	Wood	36	21	4¾
Lobby	Main	Paneled	2	70.5	5032-D	Standard	Without	Standard	66	31	6¾

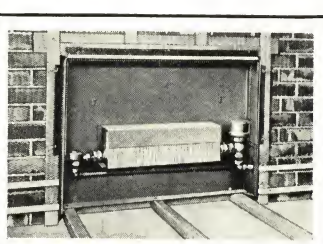
PROGRESSIVE STEPS IN THE INSTALLATION OF THE "PANELED" TYPE



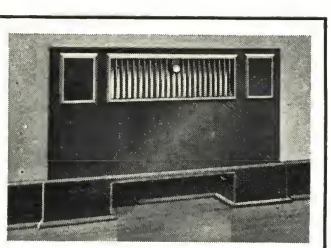
The recess. Note that sleepers have been run into recess



The cabinet nailed in place at top and bottom. Heating element removed



Heating element and piping installed. Metal lath wired in place and ready for plastering



The complete installation with steel back and sides of inlet opening painted to match the panel

THE HERMAN NELSON CORPORATION is constantly striving to improve its products in order that they may better serve the ultimate user. For this reason the manufacturer reserves the right to make any improvements or changes that may be deemed advisable, without notice.

HERMAN NELSON

HEATING AND VENTILATING
EQUIPMENT

THE BUCKEYE BLOWER COMPANY

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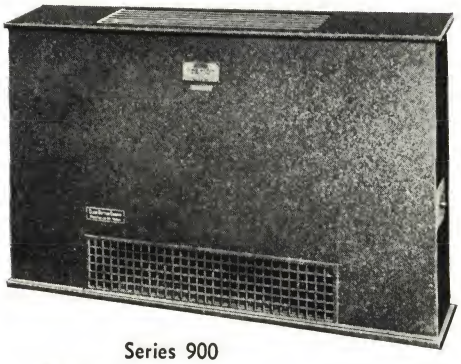
BUCKEYE HEATING AND VENTILATING UNITS



Series 900

Buckeye Heatovent

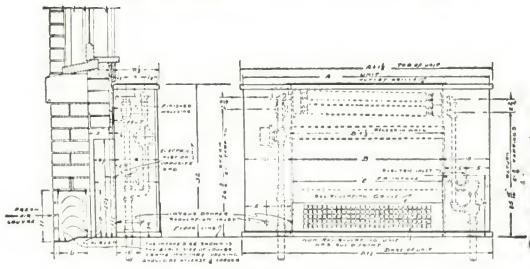
Developed for use in schoolrooms and other places where quiet running, temperature control, quick heating and positive ventilation are requisites. This machine is equipped with the BUCKEYE all-copper radiators which freezing does not harm. Air deliveries from 450 to 1560 c.f.m. Ask for Double Duty 900 Series Data Book. "The Unit that carries the Full Heating Load."

DIMENSIONS OF 900 SERIES RECESSED UNIT

Unit No.	A	B	E	Steam	Return
952-C	52	32	32	2-1″	2-¾″
965-C	65	45	45	2-1″	2-¾″
975-C	75	55	55	2-1″	2-¾″

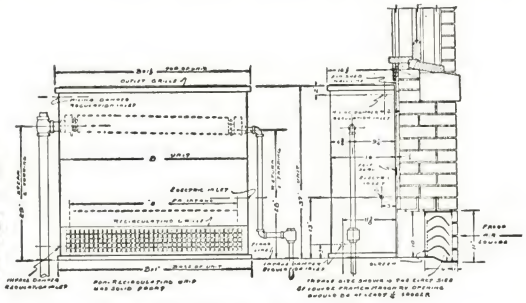
DIMENSIONS OF 100 SERIES UNIT

Unit No.	B	E	Steam	Return
132	32	28	1-2″	1-1″
145	45	41	1-2″	1-1″
155	55	51	1-2″	1-1″



900 Series Installation

BUCKEYE Heatovent (REG · U·S·PAT·OFF·)



Type C, 100 Series Installation

ENGINEERING DATA ON 100 SERIES AND 900 SERIES BUCKEYE HEATOVENTS

ROOM TEMPERATURE 70 F. — STEAM AT 5 LBS GAGE PRESSURE

INLET AIR TEMP.		−20°F			−10°F			0°F			+10°F			+20°F			+30°F			+40°F			+50°F			+60°F			+70°F		
C.F.M.	HEATOVENT NO.	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR	OUTLET TEMP	TOTAL HEAT EDR	SURPLUS HEAT EDR
450	132-1 & 952-1	87	211	34	94	202	46	100	193	58	106	184	70	113	175	81	119	166	92	126	158	103	132	150	114	139	142	124	145	134	134
	132-2 & 952-2	111	247	77	116	236	86	122	226	95	128	216	105	134	206	115	139	197	125	145	187	134	151	178	143	156	168	151	162	159	159
600	132-1 & 952-1	82	271	33	89	259	50	96	247	66	102	235	82	109	224	98	115	213	113	122	202	128	128	191	142	135	180	156	141	170	170
	132-2& 952-2	105	318	89	111	304	103	117	291	116	122	277	129	128	264	142	134	251	155	140	239	167	145	226	179	151	214	191	157	202	202
750	132-1 & 952-1	78	327	26	84	312	48	91	297	69	97	282	89	104	268	109	111	254	128	117	240	147	124	227	166	130	214	184	137	201	201
	132-2& 952-2	99	384	95	105	367	112	111	350	129	117	333	146	123	317	163	128	301	179	134	285	195	140	270	210	146	255	255	152	240	240
1000	145-1 & 965-1	81	446	47	87	426	75	94	406	102	100	387	129	107	368	156	113	349	182	120	331	207	126	313	231	133	295	255	140	278	278
	145-2 & 965-2	103	523	140	109	500	163	114	477	185	120	455	207	126	434	230	132	413	251	138	392	272	143	371	292	149	351	312	155	332	332
1260	145-1 & 965-1	76	539	31	82	514	68	89	488	104	95	464	139	102	441	173	109	418	206	115	395	238	122	373	269	128	352	300	135	331	331
	145-2 & 965-2	97	632	145	103	604	175	108	576	204	114	548	233	120	521	261	126	494	288	132	468	315	138	443	342	144	418	368	150	394	394
1560	155-1 & 975-1	76	670	43	83	638	88	89	608	131	96	578	174	103	548	216	109	519	257	116	492	297	122	465	336	129	438	374	136	412	412
	155-2& 975-2	97	787	183	103	751	220	109	716	256	115	682	292	121	649	327	127	616	361	133	584	395	138	552	427	144	521	459	150	491	491

Type "E" Buckeye Thermovent

A unit ventilator and heater for auditoriums, churches, etc., where quiet operation is essential. Made in fresh air and recirculating styles, in both horizontal and vertical models. 2000 to 4000 c.f.m. Ask for Data Book No. 129.

Type "F" Buckeye Thermovent

For installations requiring larger heating and air capacities, such as public garages, factories, terminal and storage warehouses, horizontal models for ceiling suspension, vertical models for floor installation. Made in both fresh air and recirculating styles, 2000 to 6500 c.f.m. Ask for Data Book No. 127.

Buckeye Giant Unit Heater

Especially designed and developed for airplane hangar and high roof industrial building heating. Capacities up to 20,000 c.f.m. and 2,760,000 B.t.u. Ask for Buckeye Giant Data Broadside.

Multiblade Fans

For heating, ventilating, drying, dust removal and allied uses in all sizes up to 100,000 c.f.m. and up to 6-in. static pressure. Ask for Bulletin 833.

Service

Engineering service available in all branch offices.

ESTABLISHED 1894

JOHN J. NESBITT, INC.

Manufacturers of Universal Heating and Ventilating Unit

State Road and Rhawn Street, Holmesburg, PHILADELPHIA, PA.

BRANCH OFFICE, 11 Park Place, NEW YORK, N. Y.

Nationwide Sales and Service through Offices of American Blower Corp. in Principal Cities—see Telephone Directory

Product

Universal Heating and Ventilating Unit.
For Nesbitt Concealed Radiators, see Manufacturers' Index.

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Services of the engineers of John J. Nesbitt, Inc., are freely available to architects and engineers contemplating installation of the Universal System. Increased efficiency and maximum economy will be accomplished by discussing your problems with these experts.

Descripiton of the Universal Heating and Ventilating Unit System

The Universal Unit is designed to provide a mechanical system of ventilating by taking fresh air directly from outdoors, warming it to the proper etmperature and discharging it into the room without creating drafts.

The Universal Unit

Cabinet—Finished in olive green duco, the same process as used for automobile body work, the Universal Unit is attractive in appearance, in addition to being of excellent design. The recirculating and inlet grilles are in harmony with the cabinet construction, pleasing to the eye and very substantial, and constructed with openings small enough to prevent foreign matter being thrown into the cabinet.

Where manual control of dampers is used the control handles are placed on either side of the cabinet with indexes indicating the direction of operation.

All parts of the Universal Unit are accessible for cleaning, and the one-piece front gives complete access to the elements of the cabinet.

Fans—The fans used in the Universal quiet operating units are of the Sirocco multiblade design and are recognized among fan engineers as the most efficient type of fan known to the art. The fans are mounted on double extended ends of the motor shaft.

Motors—The motors used in the Universal quiet operating units can be mounted for any character of current and are of the condenser, transformer, induction type with three-way switch speed control. These motors have oversize bronze bearings with wool packed oiling system requiring oil only once per heating season.

Three-point Mounting—The motor and fan assembly of the Universal Unit is mounted in the cabinet on three steel ball points. These points rest on lead liners, supported by angles from side of the casing.

This three-point mounting has made possible the use of alternating-current motors with a permanent rigid supporting device.

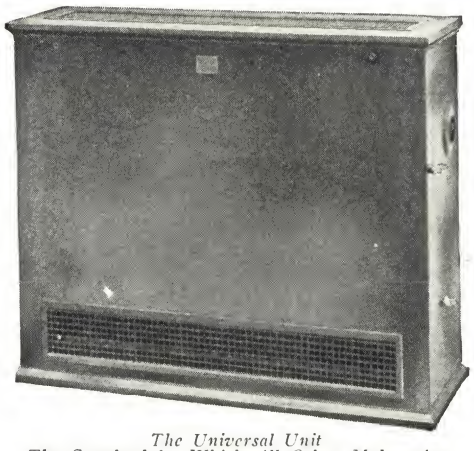
Radiator—Standard Universal Units are supplied with a radiator which consists of horizontal seamless copper tubes, the ends of which are connected to a cast iron header by means of ground union joints. Over these tubes are hydraulically pressed thin copper plates properly spaced. Positive contact between tubes and plates insures absolute heat transfer from tube to plate, making the whole a highly efficient unit. Tested at 125 lbs. per sq. in.

This type is particularly sturdy and rigid and will stand freezing without breaking.

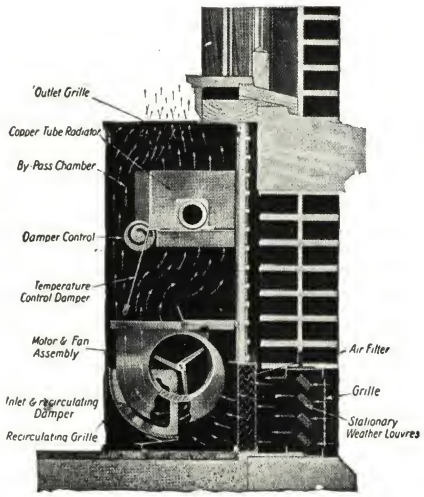
Temperature Control Damper—The Universal Unit is provided with a temperature control damper, which can be manually or thermostatically operated to regulate the temperature of air from Unit.

Inlet and Recirculating Damper—Each Universal Unit is arranged so that air can be brought from outdoors, warmed, if desired, and circulated in the room, or can be recirculated and reheated within the room, as desired. This feature is optional.

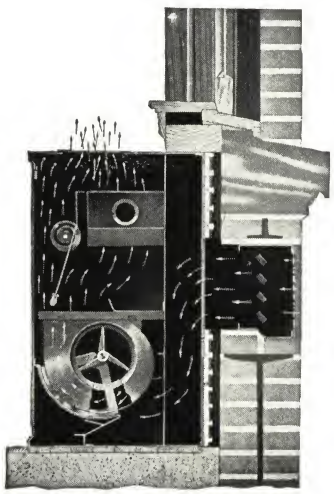
This is accomplished by means of a circular roll damper of aluminum. This damper can be manually controlled at the cabinet, or pneumatically controlled from some remote point.



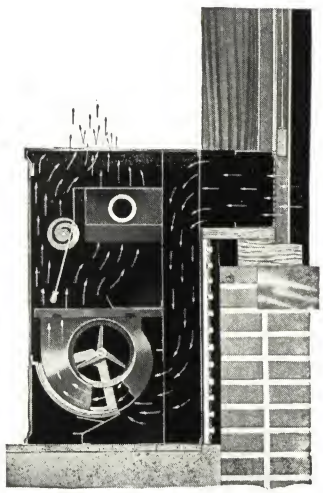
The Universal Unit
The Standard by Which All Other Makes Are Measured
TRADE-MARK
Reg. U. S. Pat. Off.



Wall Box and Grille at Floor Line, Series No. 14



Wall Box and Grille Above Floor Line, Series No. 18



Inlet Over Top of Window Sill Series No. W-18

Wall Box and Grille—All Universal quiet operating units are equipped with the Bronzeline grille of beautiful design and permanent construction. It consists of a 1 in. wide by ¼-in. thick bronze frame, supporting heavy brass rods. The wall box is made of a heavy gauge steel with steel, storm-proof louvres, and is completely galvanized after fabrication. It is securely fastened to the grille with brass screws.

DIMENSIONS—UNIVERSAL COMBINED HEATING AND VENTILATING UNITS

Capacity, c.f.m.	Over-all dimensions, in.		
	Height	Length	Depth
Up to 750	32	34	14
751-1260	32	43	14
1261-1560	32	56	14
1561-2000	48	43	22
2001-3000	48	56	22
3001-4000	48	60	22

Capacities of Universal Heating and Ventilating Units

The Universal units here described are manufactured in eighteen different cabinet sizes with nine different air gauges, as indicated in the table of capacities, and shown by dimensions as listed below. Two different radiator sizes are available for each cabinet size; the figures indicated in table No. 1 are for the Blast system where high outlet temperatures are desired or in cases where no direct radiation is provided in the classroom, while the figures in table No. 2 are for cases where the unit is for use in combination with direct radiation.

Capacities and dimensions series W-18 same as series 18.

Heating capacities of units given in equivalent feet of direct radiation. For B.t.u. capacity multiply figures as given by 240.

The last number in each series of mnemonic symbols indicates the capacities of the unit in cubic feet per minute; for example, series No. 14-32-43-12 is a 14-in. wide cabinet, 32 in. high, 43 in. long with capacity of 1260 cu. ft. of air per minute. All air deliveries are based on heated air measured with standard 4-in. anemometer to be used as described in the code of the American Society of Heating and Ventilating Engineers, with the instrument held 2 in. above the outlet grille, the volume being the product of the average velocity and the gross area of the grille.

Tables are based on steam of 218° F.

CAPACITIES OF UNIVERSAL UNITS

Inlet temp., degrees Fahr.	Delivering 1560 c.f.m.				Delivering 1260 c.f.m.				Delivering 1000 c.f.m.				Delivering 750 c.f.m.				Delivering 600 c.f.m.				Delivering 450 c.f.m.			
	Outlet temp. deg. F.	Series C-3256-15 14-3256-15 18-3256-15			Outlet temp. deg. F.	Series C-3243-12 14-3243-12 18-3243-12			Outlet temp. deg. F.	Series C-3243-10 14-3243-10 18-3243-10			Outlet temp. deg. F.	Series C-3234-7½ 14-3234-7½ 18-3234-7½			Outlet temp. deg. F.	Series C-3234-6 14-3234-6 18-3234-6			Outlet temp. deg. F.	Series C-3234-4½ 14-3234-4½ 18-3234-4½		
		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat
Table No. 1—Blast System or No Direct Radiation																								
—30	90	811	702	109	93	668	567	101	102	560	450	110	92	394	337	57	98	328	270	58	103	253	202	51
—20	95	770	632	138	98	634	510	124	107	534	405	111	97	375	304	71	103	313	243	70	108	241	182	59
—10	100	730	562	168	103	602	454	148	112	509	360	140	102	356	270	86	108	297	216	81	113	230	162	68
0	106	696	491	205	109	575	397	178	119	491	315	176	107	337	236	101	112	280	189	91	120	222	142	80
10	112	664	421	243	115	548	340	208	125	468	270	198	114	324	202	122	118	267	162	105	126	212	121	91
20	119	636	351	215	120	518	283	235	131	448	224	240	120	308	169	139	124	254	135	119	131	201	101	100
30	125	604	281	323	126	491	227	264	137	428	180	248	126	293	135	158	130	242	108	134	137	193	81	112
40	131	572	211	361	132	466	170	296	143	406	135	271	132	278	101	177	136	230	81	149	143	183	61	122
50	137	541	140	401	138	442	113	329	149	388	90	298	138	263	67	196	142	218	54	164	149	175	40	135
60	143	512	70	442	144	417	57	360	155	368	45	323	144	248	34	214	148	207	27	180	155	166	20	146
Table No. 2—For Use in Connection with Direct Radiation																								
—30	68	691	702	—11	70	567	567	0	80	486	450	36	70	337	337	0	73	277	270	7	81	220	202	18
—20	73	649	632	17	76	538	510	28	85	459	405	38	75	318	304	14	79	262	243	19	86	208	182	26
—10	78	609	562	47	81	505	454	51	90	433	360	65	80	298	270	28	84	247	216	31	91	197	162	35
0	84	574	491	83	87	477	397	80	97	416	315	101	85	279	236	43	90	234	189	45	98	188	142	46
10	90	540	421	119	93	440	340	100	103	394	270	124	92	266	202	64	96	221	162	59	104	178	121	57
20	97	514	351	163	98	419	283	136	109	373	224	163	98	250	169	81	102	208	135	73	109	168	101	67
30	103	482	281	201	104	394	227	167	115	352	180	172	104	234	135	99	108	197	108	89	115	158	81	77
40	109	451	211	240	110	368	170	198	121	332	135	197	110	219	101	118	114	185	81	104	121	150	61	89
50	115	420	140	280	116	344	113	231	127	313	90	223	116	205	67	138	120	173	54	119	127	141	40	101
60	121	390	70	320	122	320	57	263	133	293	45	248	122	191	34	157	126	161	27	134	133	132	20	112

Total heat, heat for air and surplus heat figures given in *equivalent sq. ft. of direct radiation.*

For Large Rooms

For rooms other than standard classrooms, specify Universal units series No. 22. This series is constructed in capacities from 2000 to 4000 c.f.m.; temperature rises for various cubic feet minutes are shown in capacities listed. The same high standard quality incorporated into the smaller capacity units is maintained in the construction of the larger units. The Universal condenser, transformer, induction and variable speed motors are also used in these larger units. Motors are provided with three-speed switches. Series No. 22-48-43-20 and C-22-48-43-20 are each equipped with one slow speed motor operating with two fans to provide proper distribution and maintain uniform velocity throughout the cabinet. Series No. 22-48-56 and 66 as well as No. C-22-48-56 and 66 are each equipped with two motors and fan assemblies, each motor holding two fans.

These capacity Universal units are designed especially for use in auditoriums, study halls or other large rooms where quiet operation is essential.

Caution—Where galvanized iron ducts are connected with the inlet or outlet, proper allowance must be made for drop in capacity. Our sales engineers should be consulted for capacities when duct work is added.

CAPACITIES OF LARGER UNIVERSAL UNITS

Inlet temp., deg. Fahr.	Delivering 4000 c.f.m.				Delivering 3000 c.f.m.				Delivering 2000 c.f.m.			
	Outlet temp. deg. F.	Series C-22-4866-40 22-4866-40 30-4866-40			Outlet temp. deg. F.	Series C-22-4856-30 22-4856-30 30-4856-30			Outlet temp. deg. F.	Series C-22-4843-20 22-4843-20 30-4843-20		
		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat
Table No. 1—Blast System or No Direct Radiation												
—30	72	1831	1800	31	72	1371	1350	21	72	914	900	14
—20	78	1738	1620	118	78	1303	1215	88	78	869	810	59
—10	84	1649	1440	209	84	1236	1080	156	84	824	720	104
0	90	1560	1260	300	90	1170	945	225	90	780	630	150
10	96	1476	1080	396	96	1105	810	295	96	737	540	197
20	102	1395	900	495	102	1043	675	368	102	696	450	246
30	108	1310	720	590	108	982	540	442	108	655	360	295
40	114	1231	540	691	114	921	405	516	114	614	270	344
50	120	1151	360	791	120	863	270	593	120	575	180	395
60	126	1074	180	894	126	805	135	670	126	537	90	447
Table No. 2—For Use in Connection with Direct Radiation												
—30	54	1558	1800	—242	54	1169	1350	—181	54	779	900	—221
—20	60	1467	1620	—153	60	1100	1215	—115	60	733	810	— 77
—10	66	1379	1440	— 61	66	1024	1080	— 56	66	689	720	— 31
0	72	1293	1260	33	72	968	945	23	72	645	630	15
10	78	1206	1080	126	78	905	810	95	78	602	540	62
20	84	1123	900	223	84	841	675	166	84	561	450	111
30	90	1040	720	320	90	780	540	240	90	520	360	160
40	96	961	540	421	96	720	405	315	96	480	270	210
50	102	882	360	522	102	662	270	392	102	441	180	261
60	108	806	180	626	108	604	135	469	108	403	90	313

REZNOR MANUFACTURING COMPANY

Automatic Gas Fired Forced Air Heating Equipment
Meeting the Requirements of Practically Any Space or Building

MERCER, PA.

REZNOR GAS FIRED WARM AIR HEATING UNIT—TYPE 1-UR

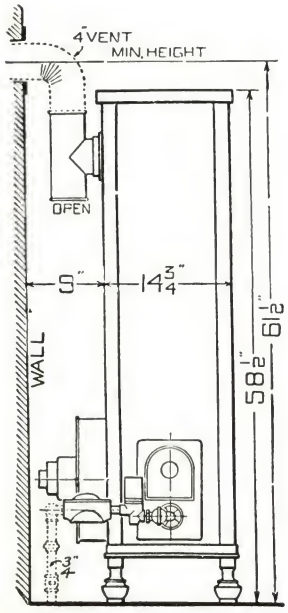
The Reznor Gas Fired Warm Air Heating Unit is a scientifically developed, high grade and permanent appliance for stores, halls, lodge rooms, auditoriums, clubs, hotel and bank lobbies, depots, offices, small churches, schools and theatres, post offices, phone exchanges, restaurants, etc.

Type 1-UR Heating Unit

Application

Installed in the space heated, one or more, as required. In design and finish an ornamental cabinet consistent with any surroundings, handsome and not suggestive of stove or furnace. In new or existing buildings, in expansions, in places without basement, on upper floors, etc., to furnish all required heat or for auxiliary heating in fall and spring, leaving central plant idle except in severe weather. For heating occupied basements of steam heated buildings, eliminating overhead radiation and stuffy headroom conditions, providing thorough air circulation, preventing dampness, furnishing warmth when steam plant is out of service and not required for above-ground spaces due to sun.

This appliance has an unequalled flexibility of application and is installed quickly, with little accessory cost or preparation, is readily relocated if required and removable by tenants wanting clean, automatic, forced circulation heat not provided by building owner.



Elevation of Type 1-UR

Construction

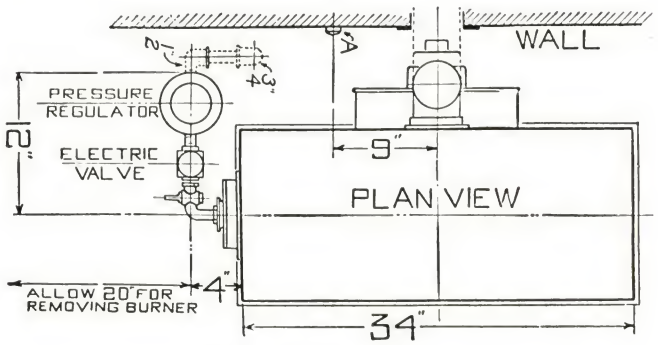
A cast iron base with ornamental legs supports the combustion chamber, the latter an engineering triumph including fire box and extensive heating surface in one single gray iron casting without joints, amply providing for expansion and contraction. Cast iron burner with raised, drilled ports; cast iron Venturi mixing tube and mixer; no sheet metal in combustion elements. Casing of steel plate with double walls and air space, electrically welded. Heavy formed steel corners. Forced circulation by built-in motor fan of heavy duty type, dust-proof, quiet; no brushes or radio interference and requiring no attention beyond monthly oiling. Control by mercoid thermostat and electric-gas-valve; all wiring complete in metal conduit. Motor and control for 110-volt, 60-cycle current. Appliance is shipped knocked down and is readily assembled from complete instructions furnished.

Performance

Operation is entirely automatic, fan and burner started and stopped simultaneously by thermostat set instantly to desired temperature. Removes cool air from floor zone and returns it warmed to the breathing zone. Circulates over 40,000 cu. ft. of room air per hour. Remarkable heat distribution and uniformity regardless of location. No undue warmth near heater; casing is not hot; minimum ceiling temperature; no moisture on walls or windows; no burned gases in room; no steam or water involved; room warming speed four times that of radiators. Summer air circulation (gas off) greatly improves comfort. Economy of operation in a given space is unsurpassed by radiators, elevated heaters or basement heating systems burning gas.

Finish

Standard in maroon lacquer with bronze trim. Available in full grained walnut baked lacquer equal to finest steel furniture at slight extra cost.



Plan View of Type 1-UR

Engineering Data

A.G.A. input rating, 60,000 B.t.u. per hour. Delivery, 50,000 B.t.u. per hour. Equal to 210 sq. ft. of steam radiation.

Gas supply pipe: natural gas, ¾ in.; manufactured gas, 1 in. Flue outlet, 4 in. Flue should be provided in new buildings at heater location, 4x8 in. minimum, tile lined with air space around tile. 4-in. cast soil pipe, asbestos wrapped, or durable sheet metal may be used for flue.

A cold chimney (outside wall) not tile lined should have metal flue within for any gas fired appliance, to avoid condensation.

Shipping weight, about 750 lbs.

Heater Shipped Complete

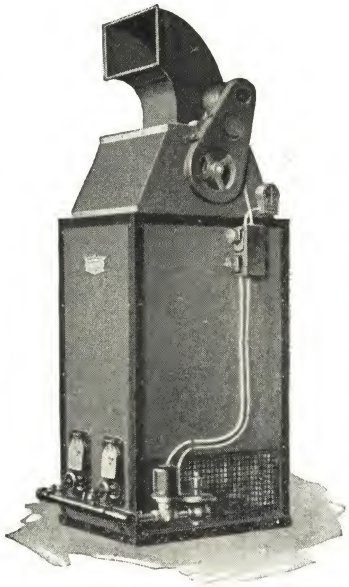
Heater is complete with pilot, pilot connections and cock, main burner brass angle cock, Armco porcelain enameled humidifier tank, gas pressure regulator, motor fan and mountings with 2-speed control switch, electric gas-valve, mercoid thermostat and mountings, all control wiring in metal conduit, down draft diverter flue T, plug-in extension for fan and control, etc.

REZNOR AUTOMATIC GAS FIRED FORCED AIR HEATER—TYPE V

A high grade fully engineered equipment designed for highest permanency and performance in shops, factories, public garages, auditoriums and general large open spaces.

Built with structural steel base, cast iron one-piece combustion and radiating units, electrically welded double-wall steel casing, motor driven top-mounted squirrel cage fan and directional velocity discharge hoods, etc.

Size 2-UV, illustrated, has two combustion units, one fan and discharge hood. 4-UV, 6-UV and 8-UV have 4, 6 and 8 combustion units and 2, 3 and 4 fans on same shaft and discharge hood for each fan, respectively. Delivered capacities, 100,000 B.t.u., 200,000 B.t.u., 300,000 B.t.u., and 400,000 B.t.u. respectively. Normal air delivery, 1500 c.f.m. per fan or 2-unit heater section at 1500 ft. velocity and 140° Fahr. maximum. Depth, all sizes, 35 in.; widths, 27¼ in., 54½ in., 81¾ in. and 109 in., respectively. Height, 99½ in. Normal fan speed, 690 r.p.m., motors ¼ hp., ½ hp., ¾ hp., and 1 hp., respectively.



Type 2-UV Air Heater

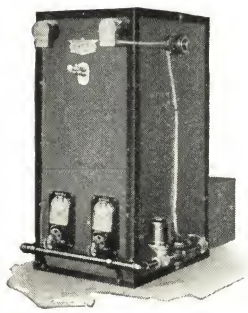
Performance

The Reznor Type V Heater draws the room air into casing through steel grilles at base and directly from the cool floor zone. It is discharged heated, at high velocity well above the head but within the living zone and the heat is quickly absorbed within that zone. The upper air is left quiescent. The result is quick warming up, broad and uniform distribution of warmth, minimum roof loss and high over-all efficiency. Fans are quiet and drive is through high grade V-belt, though direct coupled motor can be furnished. Heater is entirely automatic with mercury switch thermostat and all-mercury switch control of burners and fan motor. Fan controlled to circulate warm air only when heating. Provisions for summer circulation, gas off. Complete with all essential accessories. No abnormal heat is caused near heater. Adapted to trunk piped return and distribution, as for large basement installations. Used with floor-mounted fan for limited headroom. Attractively finished.

REZNOR AUTOMATIC GAS FIRED FORCED AIR FURNACE

Type F

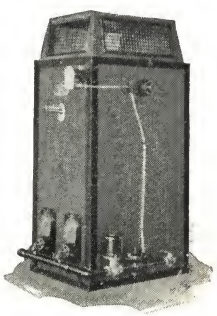
A basement furnace for modern homes, engineered to the most advanced ideas and practice. Identical as to heater proper with Type V, above, but with 3-speed propeller type fan built in at rear. Fully automatic with all-mercury switch control and thermostat. Automatic humidifier. Capacities, up to 1680 sq. ft. steam radiation. Summer circulation. Adapted to and furnished with filters where desired. Design and construction ensures the highest attainable efficiency, durability and performance. Complete with all customary accessories. Attractive in hard baked enamel finish.



Type F Furnace

Type RF

Same as house furnace, except with grilled top for room installation.



Type RF Furnace

Literature and Advisory Service

Complete descriptive literature on each type sent on request. Advisory service gratis on proposed applications.

AEROFIN CORPORATION

850 Frelinghuysen Avenue, NEWARK, N. J.

CHICAGO, ILL., Burnham Building
DETROIT, MICH., United Artists Building
NEW YORK, N. Y., 11 West 42nd Street
PHILADELPHIA, PA., Land Title Building

Aerofin

AEROFIN is a modern Standardized Light-Weight Fan System Heat-Surface developed by *Fan Engineers* to meet the present-day requirements of this highly specialized field, and to afford an adaptability which permits the new and advanced applications of tomorrow.

Low Pressure, Universal and High Pressure Aerofin

AEROFIN is built in three distinct types: LOW PRESSURE AEROFIN (Fig. 1), tube-plate construction, for pressures up to 50 lb. gauge; UNIVERSAL AEROFIN (Fig. 2), continuous, multi-coil, seamless tubes, for pressures from 2½ to 200 lb. gauge; and HIGH PRESSURE AEROFIN (Fig. 3), continuous seamless tubes, for pressures from 25 to 350 lb. gauge (temp. 500° F.).

Design and Construction

The heat-transfer surface in AEROFIN is a plurality of seamless copper tubes about which is wound a helix of copper ribbon, crimped on its inner edge to permit winding and to afford maximum contact between tube and fin. The extended fin surface is applied, and tinned while held in position, by highly developed automatic machines, being accurately crimped and spaced. The tinning of the tube and the extended surface makes them metallicly integral, affording maximum heat transmission and permanent effectiveness. The thickness and width (height) of the extended surface, the crimping and the pitch of the helix were determined by careful experiment, to afford maximum heat transfer, uniform air flow and minimum resistance thereto. The copper tubes and fins of AEROFIN transmit heat eight times as effectively as iron. So scientifically is AEROFIN designed that air is heated more in passage through a single row of its tubes, a travel of 1⅛ in., than in passage through an entire section of cast iron surface, a travel of 9 in.

Low Pressure, Universal, and High Pressure AEROFIN are furnished as completely encased Units, ready for pipe and duct connections. Casings are built of pressed steel and are exceptionally strong and rigid, protecting Unit from all strains of pipe connection and expansion or contraction in service. Casings are flanged on both faces, top and bottom, and template punched for bolting together adjacent units, or for duct connection.

Standard Casings

The casings of all AEROFIN Units, whether comprising one, two or three rows of tubes, are 29 in. wide (except 6-tube Universal which is 21⅞ in.) across tubes, from outer edge one flange to outer edge opposite flange, and 10 in. deep in direction of air flow. Length of casing is nominal tube length plus 8½ in.

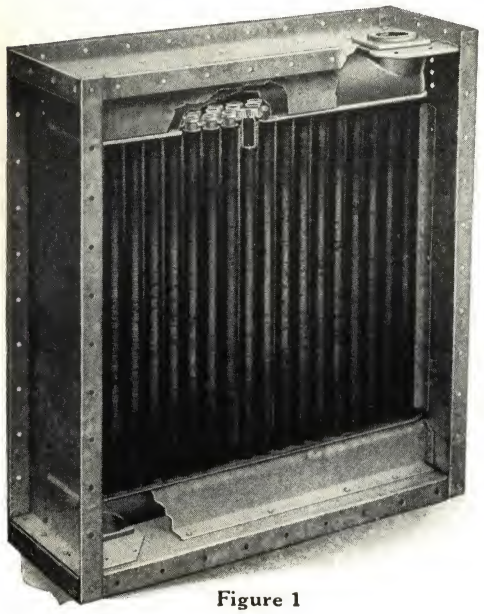


Figure 1

Sales

AEROFIN *is sold only by manufacturers of nationally advertised fan heating apparatus. List upon request.*

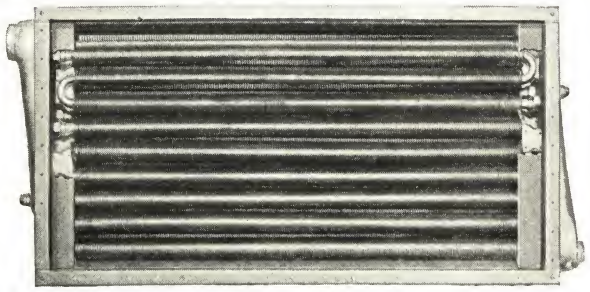


Figure 2

Aerofin Sizes

Low Pressure Aerofin—Made in fifteen standard tube lengths, either one, two or three staggered rows of tubes per unit. There are thus forty-five standard units available, a range which adequately meets all requirements.

Tubes are furnished of any length between 2 ft. and 6 ft., in increments of 6 in., and between 6 ft. and 12 ft. in increments of 1 ft.

Complete tables of sizes and capacities are shown in Bulletin SA-32, mailed gratis upon request. This bulletin also contains 23 proved piping diagrams in four colors.

Universal Aerofin—Available in one-row or two-row units, in seventeen standard tube lengths (distance between end baffle plates, or between 180° bends), between 2 and 10 ft., inclusive, in increments of 6 in. Batteries of double width are easily assembled by setting units end-to-end, leaving space for pipe connections.

Complete information is contained in our Bulletin SA-32, mailed gratis upon request.

High Pressure Aerofin—Made in five standard tube lengths (i. e., length of straight section of tube, between 180° bends), 2 ft., 2 ft. 6 in., 3 ft., 3 ft. 6 in., 4 ft., either one, two or three staggered rows of tubes per unit. There are thus fifteen standard units now available, meeting practically all requirements. Since the supply and drip connections of High Pressure AEROFIN are located on the same end, Figure 3, units may be placed end-to-end, thus affording battery widths of twice the standard tube-length. Complete tables of sizes and capacities are shown in our Bulletin SA-32, mailed gratis upon request.

Aerofin Booster Units—For horizontal or vertical air flow. Five sizes of each type, 170 to 1430 c.f.m., 350 lb. working steam pressure. Complete information upon request to Newark. Ask for bulletin SE-31.

Steel Supporting Legs

Standard steel supporting legs, 18 or 24 in. high, template punched to same bolt hole centers as standard casing, are furnished when ordered. These legs may be attached quickly and obviate necessity of any other foundation.

Advantages

AEROFIN weighs but 9 to 16% as much as equivalent cast iron and occupies but 35% of the space required by equivalent cast iron (3-row units). Two men can easily carry any AEROFIN Unit.

Expensive foundations are unnecessary, building reinforcement is not required and the units may readily be suspended from beams or roof trusses, or installed snugly in any out-of-the-way corner.

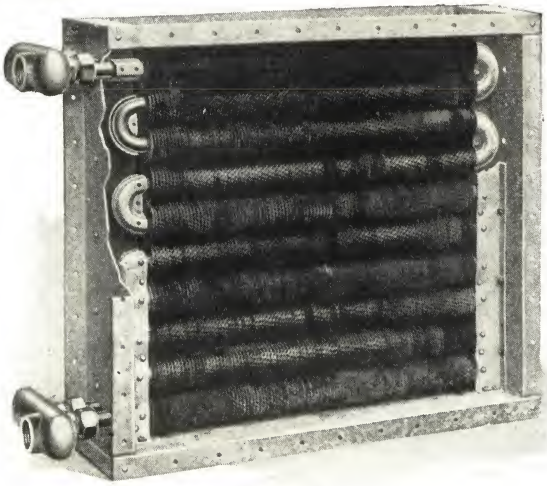


Figure 3

HEINTZ MANUFACTURING COMPANY

Manufacturers of Cabinet and Concealed Radiators

Front Street and Olney Avenue
PHILADELPHIA, PA.

HEINTZ RADIATOR UNIT

The Heintz Radiator Unit is built of tubing, fins and headers.

No part of the core is less than ⅛ in. thick. The end headers are drop forgings having integral ferrules.

The core is welded together by means of the recently developed "automatic hydrogen" process which gives the most homogeneous and ductile weld so far produced.

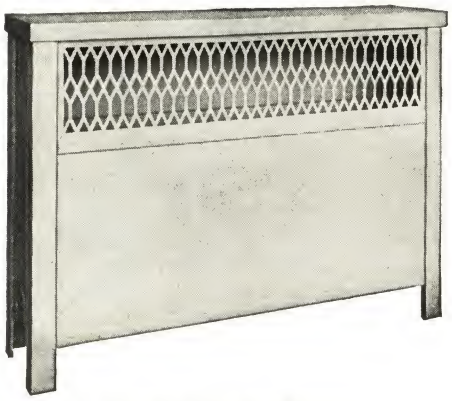
The fins are applied by hydraulic pressure and the whole unit is then hot galvanized inside and out.

The Heintz Radiators, while much lighter than cast iron radiators, are very sturdy, and with ordinary care, the danger of becoming damaged during installation is remote.

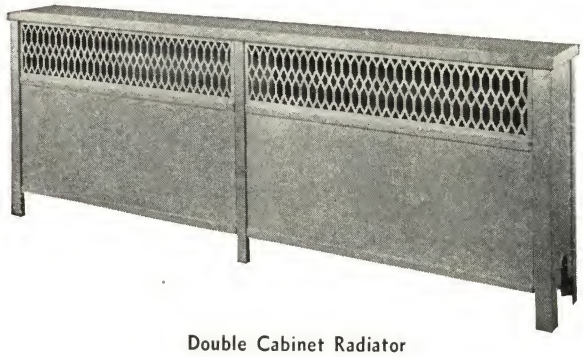
The tappings at the ends are 1½ in., permitting them to be connected exactly the same as is customary with cast iron.

Every radiator is tested before shipment.

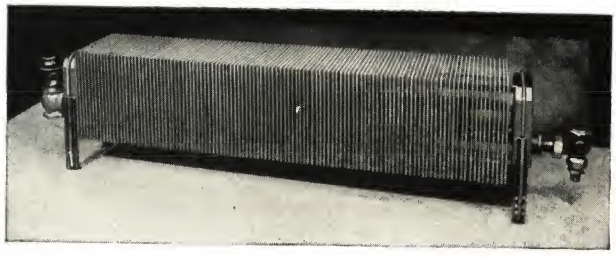
The ratings of radiators shown are conservative condensation ratings. It is deemed advisable to continue to rate Heintz Radiators on this basis until such time as an acceptable method of testing and rating has been determined upon which will include heating effect.



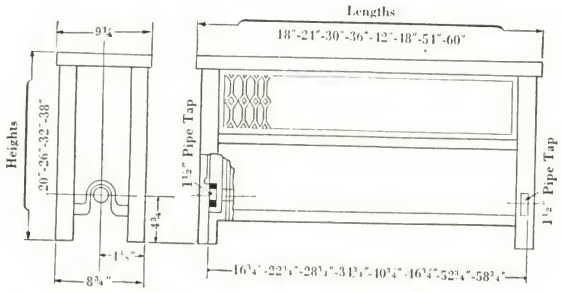
Standard Cabinet Radiator



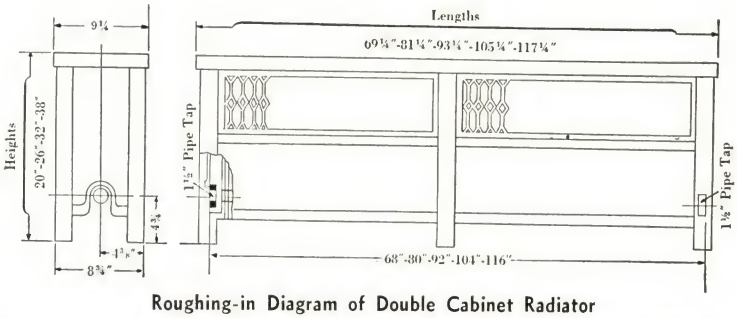
Double Cabinet Radiator



Heintz Radiator Unit for Vapor, Steam or Water



Roughing-in Diagram of Standard Cabinet Radiator



Roughing-in Diagram of Double Cabinet Radiator

RATINGS IN SQUARE FEET FOR STANDARD RADIATORS

Lengths, in.	Heights			
	20 in.	26 in.	32 in.	38 in.
18	17¼	19¼	20½	22
24	23½	27	29¼	31¾
30	29½	34¾	38	41½
36	35½	42¼	46¾	51¼
42	41¾	50	55½	61
48	48	57¾	64¼	71
54	54	65½	73	81
60	60¼	73¼	81¾	90½

RATINGS IN SQUARE FEET FOR DOUBLE CABINET RADIATORS

Lengths, in.	Heights			
	20 in.	26 in.	32 in.	38 in.
69¼	71	84½	93½	102½
81¼	83½	100	111	122
93¼	96	115½	128½	142
105¼	108	131	146	162
117¼	120½	146½	163½	181

Heintz Cabinet and Concealed Radiators are available in three widths and in various types.

ERSKINE COPPER RADIATOR CORPORATION

1 East 42nd Street

NEW YORK, N. Y.

Erskine Copper Radiators and Enclosures

In the design and construction of the Erskine Copper Radiator for concealed heat work, an entirely new and ingenious process of metal fabrication has been evolved. Erskine Copper Radiators are constructed on the principle of forcing, by great stress of power, two separate bodies of copper together to a degree exceeded only by homogeneity itself. This process assures a radiator of high condensation efficiency, of great strength, of exceptional durability, of light weight and one that requires but little space.

Complete units have been subjected to efficiency and breakdown tests of the severest character, and the results of these tests have been most gratifying.

Erskine Copper Radiators

Construction—A plain, rectangular plate of pure copper is, by one machine operation, pierced, flanged and corrugated. (This plate is hereafter referred to as a fin.) The vertical corrugations not only contribute materially to the heat transfer of the fin but to its rigidity as well.

A flange or collar regulates the spacing between the fins. This collar contains a shoulder formation which permits of a wedging contact. As the smaller diameter of the collar wedges into the adjoining fin collar, there are two thicknesses of metal at the shoulder position, and when the tubes hereafter referred to have been threaded through the fins, the combination of metals is triple thick at the collar shoulder.

The formation of the tubes from round to octagon is changed by the drive-bolt as follows: The tool is driven from one end of the tubes to the other, where the fins are located, and with such great stress that not only the tubes themselves but the two thicknesses of metal at the fin collars are forced into octagon formation. (See Fig. 1.)

For permanence in the fin spacing, fin position, rigidity, strength and metallic intimacy, it is hard to conceive of a combination more potent to the essentials of a copper heat radiator than that above described, and we are confident that architects, engineers, heating contractors and others who have to do with refined heat installations, will be quick to comprehend and appreciate the merits of the Erskine Copper Radiator.

Fig. 1. Showing Round Tubes Forced into Octagon Shape

The method of connecting the radiator tubes to the header is illustrated in Figs. 2 and 3. The joint is what is known as the standard compression type which assures strength, tightness and durability, and so thoroughly have these qualities been demonstrated that during the several years the device has been in general use, it has become a favorite among both producers and users.

Sizes—*2 Tubes Fin Assembly and Header Connection*—Depth overall, from front to back, 3½ in. Capable of being installed in the depth of an ordinary studding without the necessity of furring out the wall to accommodate the radiator. Made in 8 lengths, ranging from 14 in. to 59 in.

3-Tube Fin Assembly—Depth, 5½ in. Made in 8 lengths, ranging from 14 in. to 59 in.

4-Tube Fin Assembly—Depth, 7½ in. Made in 8 lengths, ranging from 14 in. to 59 in.

Choosing the Size of a Radiator—Refer to table opposite for the following example. Suppose you have available a recess 6 in. deep (that is, from front to back), 26 to 30 in. high and, say, 36 in. long, and the room calls for a 40 sq. ft. radiator. The second schedule down the table shows the 5½-in. depth radiator capacities. There is a heading at top of the table showing a 26-in. enclosure height. Right under the 26 is the heading square footage of the radiators for that height of enclosure. Follow that column down into the 5½-in. radiator depth group and you will find a 40 sq. ft. radiator. At extreme left column in that line the length of radiator is given as 34 in.

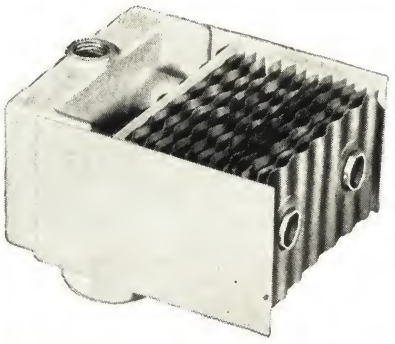


Fig. 2. Showing 2-Tube Fin Assembly and Header Connection

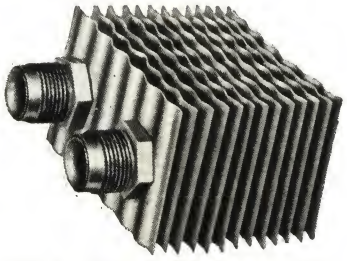


Fig. 3. Showing Compression Connections Between Header and Tubes

Erskine Steel Recess Enclosures

The outlet grille is of the popular bar type and its spindles between the outlet spaces are sufficiently slender to enable 80% free area for the passage of the heated air into the room. The fronts are regularly furnished with a prime coat finish which may be painted at the job in any desired color. If desired, however, a standard or wood grain finish can be applied at the factory at an additional cost.

Choosing the Size of Enclosure—In judging as to the size of recess enclosure necessary to accommodate any given size of radiator, it is simply necessary to allow for depth of recess (front to back) ½ in. more than the depth of the radiator. For instance, the depth of an enclosure for a 3½ in. depth of radiator would be 4 in. The length of the enclosure is 1 in. greater than the length of the radiator. Attention is called to a special feature in this connection, viz.: what is called a "knockout." Sheet steel ends of both enclosure and cabinets are partially perforated to a vertical oval shape at a point where pipe connections come.

Directions for Ordering

State number of radiators or combinations.

Give radiator or combination No. (See designation columns in table opposite.)

State kind of system and tapping sizes.

If ordering radiators only, use the *three* figure numbers under the heading "Designation No. for Rad. only."

If ordering both radiator and enclosure, or cabinet, as the case may be, use the *four* figure numbers under the headings "Designation No. for Combination." There are three of these columns in table opposite, depending upon the height of enclosure or cabinet. These four figure numbers indicate the size of enclosure or cabinet appropriate to the dimensions of the radiator and shipment will be made accordingly unless otherwise directed.

In ordering combinations, state the finish wanted. The usual finish is prime coat only. An extra charge is made for standard colors, walnut or mahogany finish; also for access doors, dampers or special grilles. Complete information as to these features is given in our Quotation Letter.

DATA, ERSKINE COPPER RADIATORS (TOP OUTLET) AND ENCLOSURES

Capacities Expressed in Square Feet of Direct Steam Radiation

Length, In.			UNITS OF STANDARD HEIGHTS						SQ. FT. EQUIVALENT TO DIRECT STEAM RADIATION FOR ENCLOSURES OF SPECIAL HEIGHTS						
			20″ Hgt. of Encl. or Cabinet		23″ Hgt. of Encl. or Cabinet		26″ Hgt. of Encl. or Cabinet		Heights, In.						
Rad.	Encl. or cabinet	Designation No. for rad. only	Sq. ft. equiv. to dir. steam rad.	Designation No. for combination	Sq. ft. equiv. to dir. steam rad.	Designation No. for combination	Sq. ft. equiv. to dir. steam rad.	Designation No. for combination	16	18	30	34	38	44	50
RADIATOR DEPTH 3½ INCHES—2-TUBE ASSEMBLY															
14	15	214	10	2140	11	2143	11	2146	9	10	12	13	13	13	13
19	20	219	13	2190	14	2193	15	2196	11	13	16	17	17	18	18
24	25	224	17	2240	18	2243	19	2246	14	16	20	21	22	22	22
29	30	229	20	2290	22	2293	23	2296	17	19	24	25	26	27	27
34	35	234	23	2340	25	2343	27	2346	20	22	28	29	30	31	31
39	40	239	26	2390	28	2393	30	2396	23	25	32	33	34	35	36
49	50	249	33	2490	34	2493	38	2496	29	32	40	41	43	44	45
59	60	259	40	2590	41	2593	45	2596	34	38	48	50	52	53	54
RADIATOR DEPTH 5½ INCHES—3-TUBE ASSEMBLY															
14	15	314	15	3140	16	3143	17	3146	13	14	18	19	19	20	20
19	20	319	20	3190	22	3193	23	3196	17	19	24	25	26	27	27
24	25	324	25	3240	27	3243	28	3246	22	24	30	31	32	33	34
29	30	329	30	3290	32	3293	34	3296	26	29	36	37	39	40	41
34	35	334	35	3340	38	3343	40	3346	30	33	42	43	45	46	47
39	40	339	40	3390	43	3393	45	3396	34	38	48	50	52	53	54
49	50	349	50	3490	54	3493	57	3496	43	48	60	62	65	66	67
59	60	359	60	3590	65	3593	68	3596	51	57	72	75	78	80	81
RADIATOR DEPTH 7½ INCHES—4-TUBE ASSEMBLY															
14	15	414	19	4140	21	4143	22	4146	16	18	23	24	25	26	26
19	20	419	26	4190	28	4193	29	4196	22	25	31	32	33	34	35
24	25	424	33	4240	36	4243	37	4246	28	31	39	41	42	43	44
29	30	429	39	4290	42	4293	44	4296	34	37	47	49	51	52	53
34	35	434	46	4340	49	4343	52	4346	39	44	55	57	59	61	62
39	40	439	53	4390	56	4393	59	4396	45	50	63	65	68	69	71
49	50	449	66	4490	71	4493	75	4496	57	63	79	82	85	87	89
59	60	459	79	4590	85	4593	90	4596	68	76	95	98	102	105	107

For widths, lengths and capacities not shown in this table, write for information. Headers of brass or aluminum can be furnished extra.

* NOTE—The above capacities are for top outlets. For face outlet capacities, use next lower enclosure capacity.

Example—Capacity for 34 in. face outlet enclosure equals 30 in. top outlet capacity.

Capacities shown in the above table represent the actual test results to the nearest even numbers.

Note—No allowance is being made over test results for heating effect or commercial ratings.

Erskine radiators are guaranteed against mechanical defects to extent that for any found defective in manufacture, new radiators will be furnished f. o. b. Waterbury.

All radiators are tested to 100 lb. cold water pressure before shipment is made, and are for operating purposes to that extent. Should higher pressures be necessary, units made of heavier material than regular can be supplied at a slight additional cost.

All orders are accepted subject to approval of home office and contingencies beyond our reasonable control.

ERSKINE BATHROOM RADIATORS

ERSKINE BATHROOM RADIATORS WITH CABINET—WHITE ENAMEL FINISH

Radiator No.	Length, in.	Width, in.	Height, in.	Footage, ft.
210	10″	3½″	6″	5′
212	12″	3½″	6″	8′
214	14″	3½″	6″	10′
219	19″	3½″	6″	13′
224	24″	3½″	6″	16′
319	19″	5½″	6″	19′
324	24″	5½″	6″	24′

MINIMUM GRILLE DIMENSIONS (FACE OUTLETS)

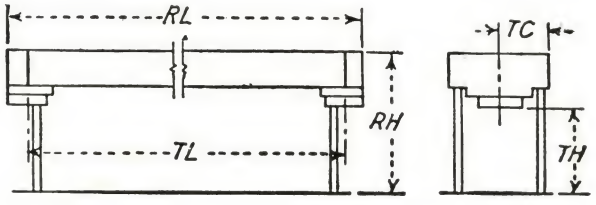
When top outlets are used, the free area should be the same as the length and depth of radiator.

Sizes given are for free area (daylight opening), and do not include grille borders nor mesh.

Length of openings must not be less than length of radiator.

Radiator depth, In	50% free area — Lattice Pattern ¾″ or ½″ Mesh or Metal Lace No. 12		65% free area — Fish Scale T. & B. Bar Grille, and Sliding Damper		80% free area — Any Standard Bar Grille with Narrow Spindles		Minimum height of inlet base slot
	Inlet, In.	Outlet, In.	Inlet, In.	Outlet, In.	Inlet, In.	Outlet, In.	
3 3/16	3¼	4¼	3	3	3	3	3
5 3/16	4¼	5¼	3¼	4	3	3¼	3
7 3/16	5½	6¾	4¼	5¼	3½	4¼	3

ROUGHING DIMENSIONS



Radiator depth, In.	RADIATOR LENGTHS—RL—INCHES: 14	19	24	29	34	39	49	59
	TAPPING LENGTHS—TL—INCHES							
3 3/16	12⅜	17⅜	22⅜	27⅜	32⅜	37⅜	47⅜	57⅜
5 3/16	12⅝	17 5/16	22 5/16	27 5/16	32 5/16	37 5/16	47 5/16	57 5/16
7 3/16	11 13/16	16 13/16	21 13/16	26 13/16	31 13/16	36 13/16	46 13/16	56 13/16
RH	8″ for 3½″ radiator depth; 8¼″ for 5½″, and 8½″ for 7½″							
TH	4 7/16″ for 3½″ radiator depth; 5″ for 5½″, and 5″ for 7½″							
TC	As tappings are on center of radiator, this dimension will be exactly one-half the depth of radiator							
Tapping Inches	¾″ for 3½″ radiator depth; 1″ for 5½″, and 1¼″ for 7½″							

THE HART & HUTCHINSON COMPANY

Manufacturers of Concealed Wall and Cabinet Radiation Units
NEW BRITAIN, CONN.

For Veneer-Steel Toilet Partitions and Shower Stalls and Humidifying Radiators, see Manufacturers' Index

INTRODUCING A NEW DESIGN IN RADIATOR CONSTRUCTION

A new design in Hart & Hutchinson recessed radiator units is here introduced to the trade as embodying *all* the principles and features necessary for the practical and efficient heating of homes, apartments, public buildings and similar structures.

All-copper Construction

Headers, or supply manifolds are of heavy cast copper into which are welded ½ in. diameter 20 gauge supply tubes. Thus the steam passways are in one integral leakproof unit. Such a construction can be safely plastered in and is guaranteed for installation as shown in illustrations.

Fin Radiating Efficiency

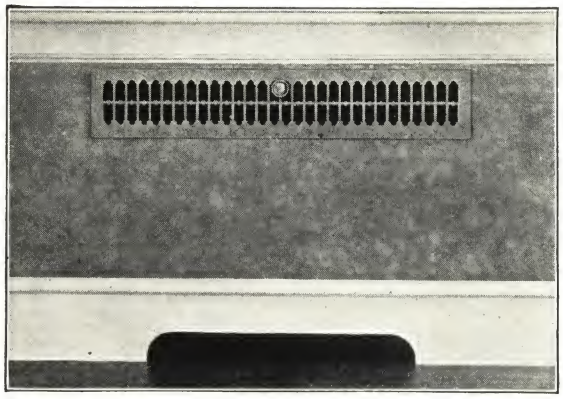
To obtain the maximum diffusion of heat for each fin, supply tubes must be accurately located. For 4-in. studding or chases, the proper size fin is 3½ x 6 ins., and the correct number of supply tubes, rightly spaced, is 6. In a 6-in. deep chase, the fin size is 5½ ins. deep.

Permanent Bond of Tube to Fin

The importance of a constant contact of tube to fin cannot be ignored, and the use of a solder bond for this purpose in Hart & Hutchinson Radiators removes any uncertainty as to loss of heat transfer at these points at any time.

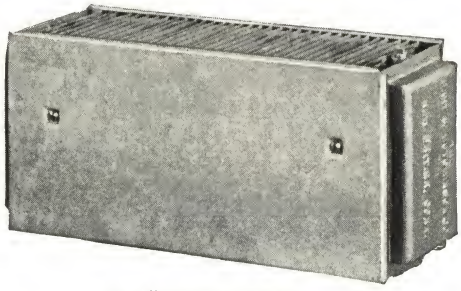
Connections to Headers

Pipe tappings (1, ¾ or ½ in.) are tapped into the solid headers, eliminating gaskets, etc. The bottom edge of tapping being flush with bottom of radiator gives additional room for valves and traps. We advise bottom connections, but end connections can be supplied.



Hart & Hutchinson Recessed Copper Radiator Installed Under Windows

Gives maximun square footage to the space allowed. Various designs in stamped steel grilles available

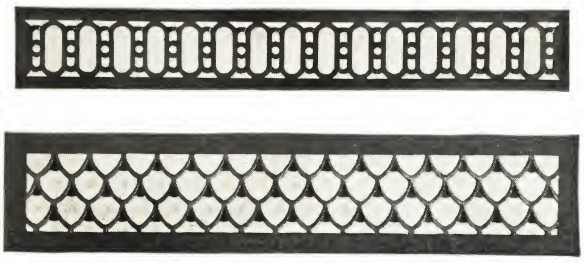


An all-copper Radiator Unit

A highly efficient, compact, durable heating medium. Adjustable legs are supplied where required

Cross Section Through Header Showing All-welded Construction.

Can be reversed for over top connection



Two Sample Grilles of a Wide Variety of Cast Brass or Aluminum Stock Patterns.

Cast grilles can be made to special design

Protective Galvanized Steel Covering

These side plates protect fin edges until radiators are recessed, also make for easier handling.

Easily Installed Recess Linings

Linings are made of 22-gauge galvanized steel in two pieces. The lining proper is pushed into recess and nailed to front edge of studding. The radiator is then installed. Then the front plate is attached, being also nailed to front edge of studding. Front plate is properly reinforced for stiffness and has provision for wiring metal lath to it for plaster. After being plastered in, upper grille and wooden baseboard cut-out are attached. Lower metal grilles can also be supplied.

Modulating Damper

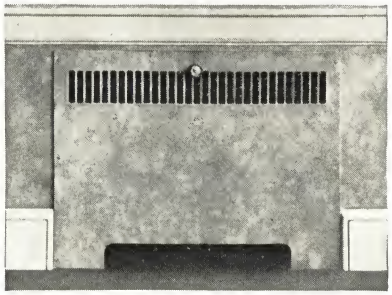
The upper grille can be supplied with curved dampers operated by a small round knob. When open, this damper serves as a deflector, circulating warm air throughout the room. For those radiators requiring a complete shut-off, we recommend standard valves with wheel just inside the base board cut-out.

Pressure Capacity

The round tubes and welded integral construction constitute the best type of assembly for high pressure work.

Finish

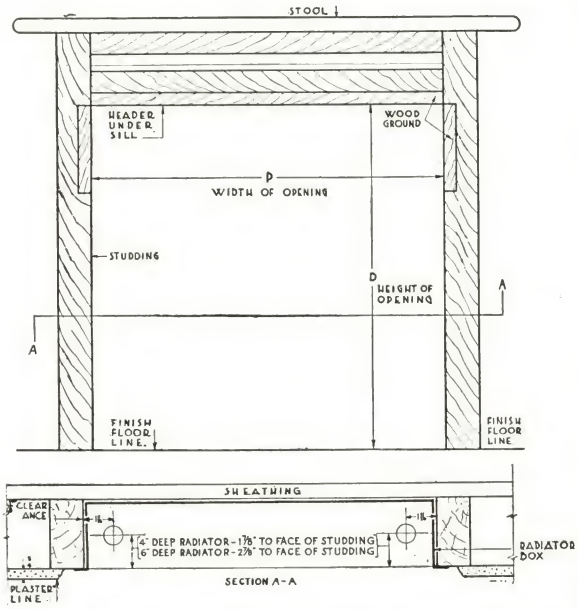
Grilles are usually supplied in prime coat.



Hart & Hutchinson Plate Type Front

Preferred by some to the plastered-in model, for more complete accessibility to radiator or fittings. Uses same radiator and produces same ratings

RATINGS FOR PLASTERED-IN OR PLATE TYPE RADIATORS



Cuts show openings required for ratings in table. Either the square foot of radiation may be secured by referring to width and height of recess, or size of opening found for the capacity of radiator already determined.

Width of recess "P"	Height recess "D"							
	4-in. deep unit				6-in. deep unit			
	20¼ in.	24¼ in.	30¼ in.	36¼ in.	20¼ in.	24¼ in.	30¼ in.	36¼ in.
	Square feet of radiation							
26 in.	19	21	26	30	23	27	31½	36½
28 in.	21	23	29	33	25	29	34½	40
30 in.	23	26	32	36	26	31½	37	43
32 in.	25	28½	35	39	29	34	40	46
34 in.	27	30	37½	42	31	36	42½	49
36 in.	28	32	40	44	33	38½	45	52
38 in.	30	34	42	47	35	41	47	55
42 in.	33	37	46	52	39	45	53½	62
46 in.	36	41	50	57	43	50	59	68
50 in.	40	45	55	62	47	55	65	75

All Hart & Hutchinson radiators are rated on the basis of 240 B.t.u. per sq. ft. of radiation with 2 lbs. of steam at the inlet to the radiator and room temperature of 70° F. Ratings as given are from actual tests and are conservatively rated.

Radiators are pitched toward one end and are reversible, so that the feed may be at either right or left. For one-pipe steam or one-pipe vapor, air relief valve should be applied to higher radiator head. Straight shank relief valves should be used. Radiators are delivered packed in cartons, and linings and grilles are packed separately. Thus each part may be unwrapped as installed, preserving other parts until required. Shipping weight will average about 2 lbs. per sq. ft. of radiation.

Finished floor should be carried into recess.

All radiators are thoroughly tested before leaving plant and are guaranteed against defective workmanship or material.

HART & HUTCHINSON CABINET RADIATOR

H. & H. Cabinet Radiators, shipped complete and including Hart & Hutchinson copper radiators, offer a solution in remodeling residences; in multistoried structures, of where, for various reasons, concealed "in the wall" radiation is not practical. Light in weight, easy to handle and install, they save 15% in floor space when replacing cast iron radiators. The cabinets are of sheet metal, usually finished in prime coat, although they may be completely finished in various shades if desired. Note the ribbed front, an exceptionally durable yet very pleasing design. The tappings are for outside connection, 4½ ins. from center of tapping to floor and from center of tapping to back wall as follows: 3⅜ ins. for 7¼-in. depth, 4⅜ ins. for 9¼-in. depth, and 6⅜ ins. for 13¼-in. depth. Tapping sizes are 1 in. for all cabinets.

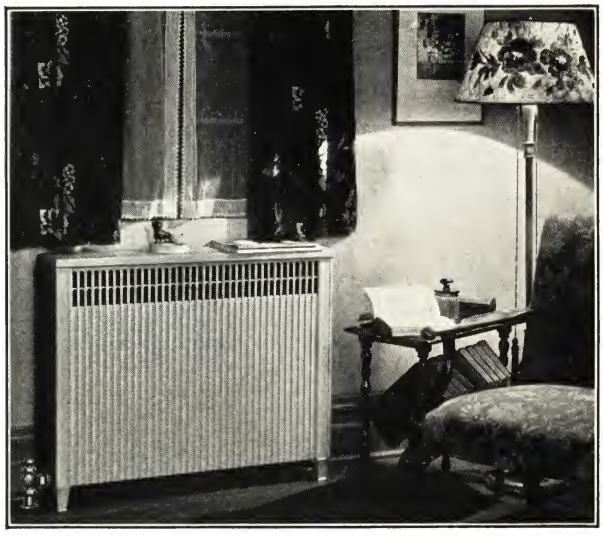
Bathroom Cabinet Radiator

Standard radiator is used in this cabinet.

CAPACITY AND DIMENSIONS OF BATHROOM CABINET RADIATORS

Width, in.	Height, in.	Depth, in.	Sq. ft. rating
14½	13¾	4 7/16	8
14½	22	4 7/16	12
27¾	13¾	4 7/16	16
27¾	22	4 7/16	20

Tappings—¾ in. both ends and 4½ in. off floor.



RATINGS AND SIZES (INCHES) OF H. & H. CABINET RADIATORS

Height	Widths			
	25	31¼	37¼	48¾
7¼-in. depth				
20 in.	24	30	36	48
24 in.	28	35	42	56
30 in.	33	41	49	66
36 in.	37	46	55	74
9¼-in. depth				
20	32	40	48	64
24	37	47	56	74
30	44	55	65	88
36	49	61	73	99
13¼-in. depth				
20	48	60	72	96
24	56	70	84	112
30	66	82	98	132
36	74	92	110	148

ESTABLISHED 1894

JOHN J. NESBITT, INC.

Manufacturers of Nesbitt Concealed Radiators

State Road and Rhawn Street

HOLMESBURG, PHILADELPHIA, PA.

BRANCH OFFICE, 11 Park Place, NEW YORK, N. Y.

For our pages on Heating and Ventilating Units and Unit Heaters, see Manufacturers' Index

NESBITT CONCEALED RADIATORS

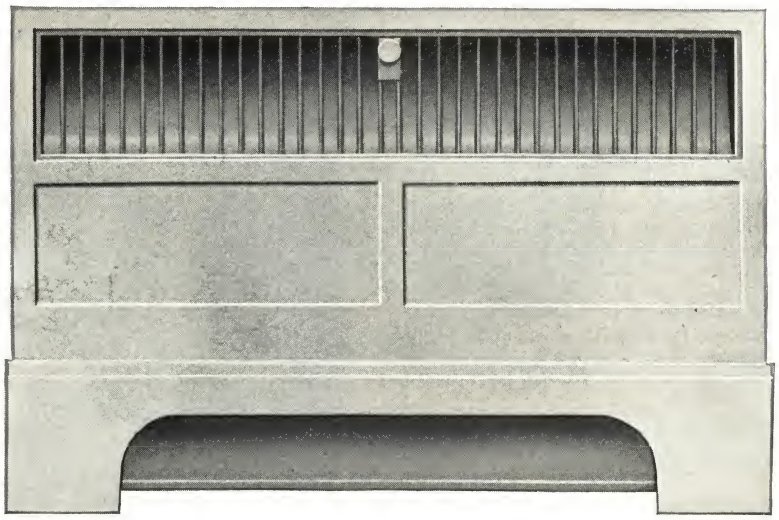
Nesbitt Concealed Radiators are convection heaters comprising a copper radiator within a sheet metal enclosure designed either for recessing in the wall construction or for replacing ordinary radiators standing on floor or hung from walls.

For Steam and Vapor Systems

Designed specially for maximum efficiency as parts of two-pipe steam or vapor systems, they are not recommended for use with systems using hot water as the medium for heating.

Nesbitt Multifin Radiators

The radiator is the widely-used Nesbitt Multifin Radiator of which more than 20,000 have been in service over a long period of years. Copper fins are forced upon the surface of ¾-in. diameter seamless copper tubes at high pressure to produce an efficient thermal contact. The tubes are joined to end headers, for connections to steam piping, by ground-joint unions. There are no soldered, welded, brazed or packed joints in the Nesbitt Multifin Radiator.



Sheet Metal Enclosures

All enclosures are built to high standards of ruggedness, durability, convenience and appearance. The standard types of enclosure are:

Walled-in Radiators (Type 1)—Fully recessed in wall construction. Plaster, tile or other wall finish conceals all parts, except an air inlet opening at wall base and a discharge grille above. May be installed under windows or in inside walls and partitions for vestibules, corridors, etc. See illustration.

Panel Radiators (Type 2)—Fully recessed. Front panels are removable. Usually installed under windows.

Partly Recessed Radiators (Type 3)—For use where available depth of recess in wall construction does not permit complete concealment of sheet metal enclosure. See illustration.

Cabinet Radiators (Type 4)—Not recessed. Legs are provided for floor models. May be obtained without legs for wall-hung installations.

Special—Special designs of enclosures will be furnished to meet unusual conditions.

Face or Top Discharge

All types above mentioned are available with the usual face discharge or with top discharge for heated air, as frequently required for commercial and public buildings.

Construction Details

All Nesbitt Concealed Radiators have these important features leading to easy installation and satisfactory use.

Complete accessibility to interior parts.

Airtight joints to eliminate dirt streaks.

Adjustable grille frames for variations in thickness of wall finish.

Holes for nailing and for fastening insulation.

Wide choice of grille designs.

Dampers are optional.

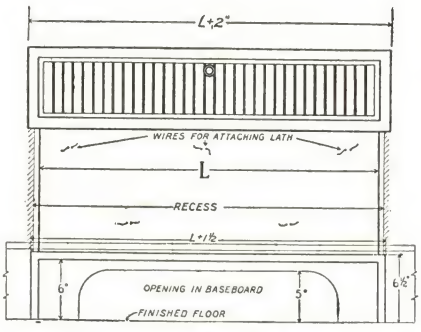
Steam connections at bottom or at ends.

Proper pitch for radiator provided in construction without necessity for adjustments.

All radiators are suitable for use without special changes for orifice types as well as standard systems of steam circulation.

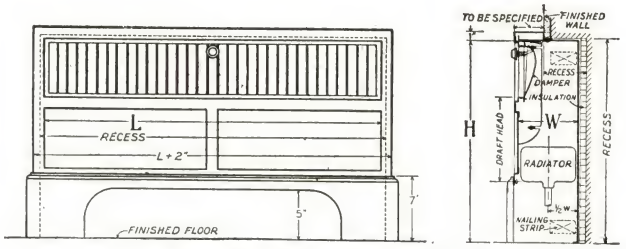
Catalogue

A 16-page publication describing Nesbitt Radiators in detail is available upon request.



Walled-in Radiator—Type 1

Type 1-T Radiators Are Similar Construction Except Top Discharge Instead of Face Discharge Shown



Partly Recessed Radiator—Type 3

Type 3-T Radiators Are Available for Top Discharge in Window Sills

RATINGS FOR ALL TYPES OF NESBITT CONCEALED RADIATORS

All ratings are equivalent square feet of direct exposed cast iron radiators. From tests with 215° F. steam and 70° F. room temperature. Test ratings have been increased by 10%

Face discharge, in.		Length—"L"—inches									Top discharge, in.	
Height "H"	Draft head	16	20	24	30	36	42	48	54	70	Draft head	Height "H"
Width —"W" = 4¼ Inches (Radiator Width 4 Inches)												
20	8	6.0	11.0	14.5	18.0	22.5	27.5	31.5	35.0	45.0	8	14
22	10	6.7	11.9	15.8	19.7	24.7	29.8	34.2	38.0	48.4	10	16
24	12	7.5	12.9	17.1	21.4	26.9	32.1	36.9	41.0	51.8	12	18
26	14	8.2	13.9	18.4	23.1	29.1	34.4	39.6	44.0	55.2	14	20
28	16	8.9	14.9	19.7	24.8	31.3	36.7	42.3	47.0	58.6	16	22
30	18	9.6	15.9	21.0	26.5	33.5	39.0	45.0	50.0	62.0	18	24
36	24	10.7	17.2	22.8	28.8	36.2	43.0	49.8	55.0	70.0	24	30
42	30	11.7	18.3	24.4	30.7	38.1	46.5	54.0	59.5	76.5	30	36
*48	36	12.7	19.3	25.8	32.5	40.7	49.5	57.8	63.8	82.5	36	42
*60	48	13.6	21.4	28.0	34.6	42.5	51.3	60.4	66.7	88.5	48	54
*72	60	14.3	23.1	29.7	36.3	44.0	52.8	62.7	69.3	93.5	60	66
Width—"W" = 6¼ Inches (Radiator Width 6 Inches)												
20	8	8.5	16.5	21.5	27.0	33.0	41.0	46.5	52.0	66.0	8	14
22	10	9.5	18.0	23.1	29.2	35.5	43.8	50.4	56.6	71.0	10	16
24	12	10.5	19.6	24.8	31.5	38.0	46.6	54.3	61.2	76.0	12	18
26	14	11.5	21.2	26.5	33.8	40.6	49.4	58.2	65.8	81.0	14	20
28	16	12.5	22.7	28.1	36.1	43.1	52.2	62.1	70.3	86.0	16	22
30	18	13.5	24.2	29.7	38.4	45.6	55.0	66.0	74.8	90.0	18	24
36	24	14.9	25.5	31.4	40.3	49.1	60.7	73.4	82.2	97.0	24	30
42	30	16.2	26.8	33.1	42.2	52.6	66.4	80.7	89.6	105.0	30	36
*48	36	17.5	28.0	34.7	44.0	56.0	72.0	88.0	97.0	110.0	36	42
*60	48	18.2	29.0	35.4	45.0	58.0	76.0	91.5	102.0	120.0	40	54
*72	60	18.7	30.0	36.0	46.0	60.0	80.0	95.0	105.0	130.0	60	66
Width—"W" = 8¼ Inches (Radiator Width 8 Inches)												
20	8	11.6	20.4	26.4	33.6	40.7	47.3	55.0	59.0	76.6	8	14
22	10	12.8	21.5	27.5	35.5	43.2	50.7	59.0	64.0	82.6	10	16
24	12	14.1	22.6	28.6	37.3	45.8	54.0	63.0	69.0	88.3	12	18
26	14	15.4	23.8	29.8	39.2	48.4	57.4	67.0	74.0	94.1	14	20
28	16	16.7	24.9	30.9	41.1	51.0	60.7	71.0	79.0	100.0	16	22
30	18	18.0	26.0	32.0	43.0	53.5	64.0	75.0	84.0	106.0	18	24
36	24	19.4	29.0	36.7	47.7	64.2	71.3	85.0	96.0	119.0	24	30
42	30	20.7	32.0	41.5	52.5	69.0	78.6	95.0	106.0	131.0	30	36
*48	36	22.0	35.0	46.0	57.2	69.3	85.8	104.0	118.8	143.0	36	42
*60	48	23.0	36.2	47.8	60.5	73.2	91.3	110.9	125.4	151.5	48	54
*72	60	24.0	37.4	50.6	63.8	77.0	96.8	117.7	132.0	160.0	60	66

*Radiators higher than 42 in. made only in Walled-in Type.

ROME RADIATION COMPANY

Division of Revere Copper and Brass Incorporated

ROME, N. Y.

BOSTON, MASS. CHICAGO, ILL. NEW YORK, N. Y. PHILADELPHIA, PA. WASHINGTON, D. C.

REPRESENTATIVES IN PRINCIPAL CITIES

Manufacturers of ROME CONVECTORS

Products

The ROBRAS CONVECTOR—an extended surface heating device designed for low pressure steam, vapor, or hot water heating systems and concealed in wall recesses or cabinets.

The ROCOP CONVECTOR—an extended surface heating device of the tubular type suitable for use on vapor systems or any two-pipe steam system.

Also the ROBRAS Prime Surface or Direct Radiator for use in swimming pools, shower rooms, or wherever a rustproof radiator is required.

ROBRAS Convectors

These convectors are constructed by welding together two heavy brass sheets so as to form chambers for the heating medium and at the same time accommodate internally shouldered nipples to which are attached supply and return connection fittings or fittings for making up two-section units. To the brass core continuous copper fins are attached by a positive metallic bond, thus insuring permanent heat transfer that cannot be affected by the continuous cycles of expansion and contraction taking place when the system is in operation. The design of these fins accounts for the relatively large amount of heating surface in the convector in proportion to its volume.

Typical Installation

The supply and return connection fittings are set at our plant in positions ordered by the customer to suit space conditions.

Because of the wide range of possible assemblies these convectors can be installed in almost any reasonable size wall recess 4 in. or more in depth. They are also often installed under the floor as recirculating units.

Method of Installation

ROBRAS Convectors are always concealed, either in wall recesses, in partially recessed or completely free standing cabinets, under stairs or in other out-of-the-way places. The piping connections are generally made as in the case of cast iron radiators, except that these connections may be into the top or bottom of the convectors, depending on space conditions. It is obvious that the fins should always stand in a vertical position with the long dimension of the convector horizontal.

The wall recesses should be lined with light weight metal, preferably backed by insulation. These linings can easily be made by the heating or sheet metal contractor, or we can furnish linings made up to the requirements of each job.

With the heating element recessed and concealed in the walls the architect is enabled to carry out almost any desired treatment of a room without having large, unsightly radiators occupying valuable wall or floor space. Removable panel fronts for the enclosures are customary, in order to provide access to the convectors or connections if necessary. Valves may be operated through handhole doors in the enclosure fronts or an extension spindle may be used so that the valve handle can be placed on the window stool. Valves can also be set so as to bring the handle through the front of the enclosure or in a position where it can be operated through the opening in the front of the enclosure at the floor.

If valves or traps extend beyond the ends of the convector the space between the end of the convector and the end of the enclosure should be closed off by light weight metal baffles so that the entering air will all pass through the convector without being by-passed.

Selection of Convector Sizes

In selecting convectors of the proper capacity to be installed in available wall recesses reference should be made to the Capacity Tables given herewith. Ordinarily the determining factors are the height and the length of the recess, as the depth may be varied if necessary by furring into the room. When the recess height and the amount of radiation required are known the proper design of the convector of the required capacity can be found in the Capacity Tables. The method of making connections to the convector should be borne in mind as this has a direct bearing on the length of the convector that can be installed in the given space. Often the valve and trap may have to be located under the convector where the length of the recess is limited. If it is desirable to have the valve installed at the end of the convector in order to permit the use of an extension spindle, the trap may be located under the convector in order to save length in this way.

Enclosures

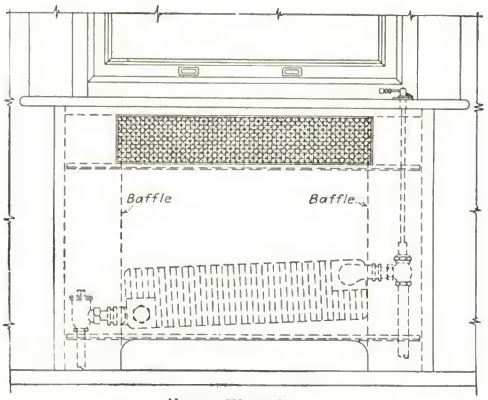
Complete enclosures for ROBRAS Convectors, with or without removable fronts, but including grilles, can be furnished in any reasonable size. These are further described on the fourth page following. In many cases the architect may wish to design his own enclosures or fronts; for example, where the convectors are installed in a tiled wall or in rooms having special woodwork. It is always desirable to provide access to the convectors in case valves or traps need attention.

Robras Bathroom Units

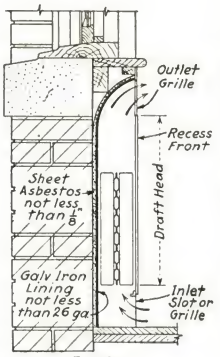
These units have been especially designed for exposed installation under lavatories or in small rooms or booths where only a limited amount of radiation is required. They are furnished complete with a white lacquer steel cabinet 8 in. high in six sizes ranging in capacity from 3½ to 20 sq. ft. Cabinet is easily removable and can be painted to match the decorations of the room. As these units are light in weight they can be supported by the pipe connection alone. These may be either horizontal at the end of the unit or in a vertical position at the bottom.

By running the connection into the wall the floor space under the unit can be kept clear.

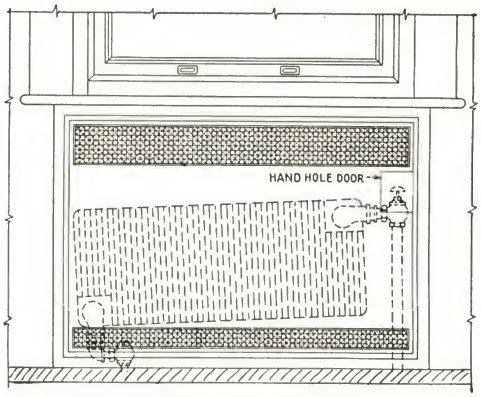
Robras Bathroom Unit Installed Back of Lavatory



Front Elevation



Section



Front Elevation

Typical Installations Low and High Type Convectors

ROBRAS CAPACITY TABLES

In tables below capacities in Square Feet* are shown in bold face type with corresponding Convector designations.

Enclosure height, inches	NOMINAL LENGTH OF CONVECTOR																	
	18 ins.		22 ins.		26 ins.		32 ins.		38 ins.		44 ins.		50 ins.		60 ins.		70 ins.	
	3½-in. Deep Robras Convectors																	
15	18L3	**10**	22L3	**12¼**	26L3	**14½**	32L3	**17¾**	38L3	**20¾**	44L3	**24**	50L3	**27¼**	60L3	**32¾**		
17	18L3	**10½**	22L3	**12¾**	26L3	**15**	32L3	**18¾**	38L3	**22**	44L3	**25½**	50L3	**29**	60L3	**34¾**	70L3	**40¾**
21	18L3 18H3	**11¾** **13¾**	22L3 22H3	**14¼** **17**	26L3 26H3	**16½** **20**	32L3 32H3	**20¼** **24¾**	38L3 38H3	**24** **29¾**	44L3 44H3	**27¾** **35½**	50L3 50H3	**31½** **39¼**	60L3 60H3	**37¾** **47¼**	70L3 70H3	**44** **55¼**
25	18L3 18H3	**12¼** **15½**	22L3 22H3	**15** **19**	26L3 26H3	**17½** **22¼**	32L3 32H3	**21½** **27¼**	38L3 38H3	**25¼** **32½**	44L3 44H3	**29¼** **37½**	50L3 50H3	**33¼** **42½**	60L3 60H3	**39¾** **51¼**	70L3 70H3	**46¼** **59¾**
29	18L3 18H3	**12¾** **16¾**	22L3 22H3	**15½** **20½**	26L3 26H3	**18¼** **24**	32L3 32H3	**22½** **29½**	38L3 38H3	**26½** **35**	44L3 44H3	**30½** **40½**	50L3 50H3	**34¾** **45¾**	60L3 60H3	**41½** **54¾**	70L3 70H3	**48¼** **64**
33	18L3 18H3	**13** **18**	22L3 22H3	**16** **21¾**	26L3 26H3	**18¾** **25½**	32L3 32H3	**23** **31¼**	38L3 38H3	**27¼** **37¼**	44L3 44H3	**31½** **43**	50L3 50H3	**35¾** **48¾**	60L3 60H3	**42¾** **58¼**	70L3 70H3	**50** **68**
	5½-in. Deep Robras Convectors																	
15	18L5	**13¼**	22L5	**16**	26L5	**19**	32L5	**23¼**										
17	18L5	**14**	22L5	**17**	26L5	**20**	32L5	**24½**	38L5	**29**	44L5	**33½**	50L5	**38**	60L5	**45½**	70L5	**53**
21	18L5 18H5	**15** **19¼**	22L5 22H5	**18½** **23¾**	26L5 26H5	**21¾** **28**	32L5 32H5	**26½** **35½**	38L5	**31½**	44L5	**36½**	50L5	**41½**	60L5	**49½**	70L5	**57¾**
25	18L5 18H5	**16** **20½**	22L5 22H5	**19½** **25¼**	26L5 26H5	**23** **30¼**	32L5 32H5	**28¼** **37½**	38L5 38H5	**33¼** **44¾**	44L5 44H5	**38¾** **52**	50L5 50H5	**44¼** **59¼**	60L5 60H5	**52¾** **71¼**	70L5 70H5	**61½** **83½**
29	18L5 18H5	**16¾** **23**	22L5 22H5	**20½** **28**	26L5 26H5	**24** **33¼**	32L5 32H5	**29½** **40¾**	38L5 38H5	**35¼** **48½**	44L5 44H5	**40¼** **56¼**	50L5 50H5	**46¼** **63¾**	60L5 60H5	**55¼** **76¾**	70L5 70H5	**64½** **89½**
33	18L5 18H5	**17¼** **24¾**	22L5 22H5	**21** **30**	26L5 26H5	**25** **35½**	32L5 32H5	**30¾** **43¾**	38L5 38H5	**36½** **52**	44L5 44H5	**42** **60¼**	50L5 50H5	**48** **68½**	60L5 60H5	**57½** **82¼**	70L5 70H5	**67** **96¼**
	7½-in. Deep Robras Convectors																	
17	18L7	**19**	22L7	**23**	26L7	**27**	32L7	**33**										
21	18L7	**20**	22L7	**24¾**	26L7	**29¼**	32L7	**36**	388L7	**43**	44L7	**49¾**	50L7	**56¾**	60L7	**68¼**	70L7	**79¾**
25	18L7 18H7	**21¾** **28¼**	22L7 22H7	**26¾** **34½**	26L7 26H7	**31¾** **41½**	32L7 32H7	**39** **50¾**	3L7 38H7	**45¼** **60½**	44L7 44H7	**53¾** **70¼**	50L7 50H7	**61** **80**	60L7 60H7	**73½** **96¼**	70L7 70H7	**85¾** **112½**
29	18L7 18H7	**23** **31¾**	22L7 22H7	**28¼** **38¾**	26L7 26H7	**33½** **45¾**	32L7 32H7	**41¼** **56¼**	38L7 38H7	**49** **66¾**	44L7 44H7	**57** **77**	50L7 50H7	**64¾** **87¼**	60L7 60H7	**78** **105**	70L7 70H7	**91** **122½**
33	18L7 18H7	**24** **35**	22L7 22H7	**29¼** **42½**	26L7 26H7	**34¾** **49¾**	32L7 32H7	**43** **61**	38L7 38H7	**51** **72**	44L7 44H7	**59¼** **83¼**	50L7 50H7	**67½** **94½**	60L7 60H7	**81** **113¼**	70L7 70H7	**94¾** **131¾**
	9½-in. Deep Robras Convectors																	
21	18L9	**22**	22L9	**27**	26L9	**32**	32L9	**39½**	38L9	**46¾**	44L9	**54¼**	50L9	**61¾**	60L9	**74¼**	70L9	**86¾**
25	18L9 18H9	**23¾** **29½**	22L9 22H9	**29** **36½**	26L9 26H9	**34½** **43¼**	32L9 32H9	**42½** **53½**	38L9	**50½**	44L9	**58½**	50L9	**66¾**	60L9	**80**	70L9	**93½**
29	18L9 18H9	**25¼** **33¼**	22L9 22H9	**31¾** **40¾**	26L9 26H9	**36½** **48**	32L9 32H9	**45** **59¼**	38L9 38H9	**53¼** **70½**	44L9 44H9	**61¾** **81½**	50L9 50H9	**70¼** **92¾**	60L9 60H9	**84¼** **111¼**	70L9 70H9	**98½** **130**
33	18L9 18H9	**26½** **35¾**	22L9 22H9	**32½** **43½**	26L9 26H9	**38½** **51¾**	32L9 32H9	**47¼** **63¾**	38L9 38H9	**56½** **75¾**	44L9 44H9	**65¼** **88**	50L9 50H9	**74¼** **100**	60L9 60H9	**89¼** **120**	70L9 70H9	**104¼** **140¼**

*B.t.u. requirements divided by 240 will equal the corresponding convector capacity in square feet.

ROCOP CONVECTORS

Description

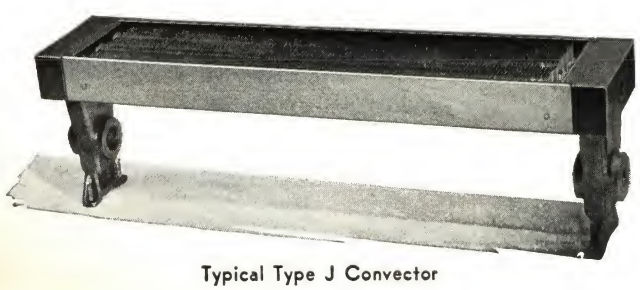
Rocop Convectors are of the tubular type wherein seamless copper tubes are forced through and metallicly bonded to copper fins. The tubes are then connected to headers by compression couplings. These convectors are the result of exhaustive engineering research and careful study of field requirements and conditions. They are furnished in five depths and eight standard lengths with two types of headers, described later, for the three narrower depths. Copper has been selected because of its superior properties and high value as a heat conductor.

This device insures protection against trouble of any kind where the heating units are sealed within the walls.

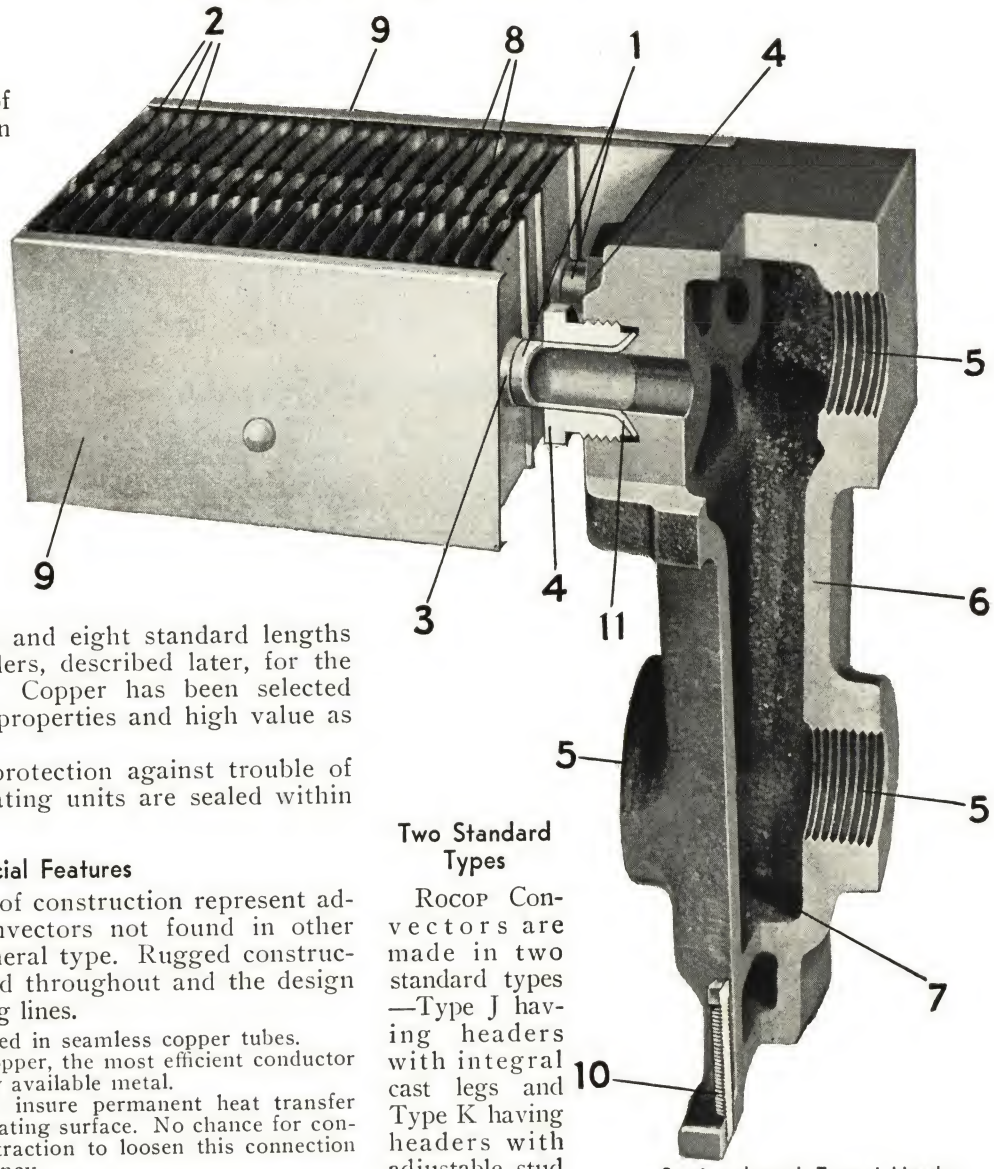
Special Features

The following points of construction represent advantages of Rocop Convectors not found in other devices of the same general type. Rugged construction has been maintained throughout and the design is along sound engineering lines.

(1) Heating fluid contained in seamless copper tubes.
(2) Fins made of pure copper, the most efficient conductor of heat in any commercially available metal.
(3) Metallicly bonded to insure permanent heat transfer from prime to secondary heating surface. No chance for continuous expansion and contraction to loosen this connection with resultant loss in efficiency.
(4) Compression couplings for joining headers to tubes. Headers removable and reconnectable if necessary.
(5) Connections to Type J headers may be made in three places. Type K headers connectable in two locations.
(6) Headers constructed of high test metal.
(7) Built-in dirt pocket in Type J headers to prevent scale or foreign matter from lodging on seats of valves or traps.
(8) Reinforced fins for strength and additional heating surface.
(9) Reinforced side plates strengthen and prevent sagging.
(10) Screws for adjusting pitch. Type K headers are equipped with adjustable stud legs.
(11) Standard compression joint—flared portion of copper tubing firmly gripped between header and compression coupling seats.



Typical Type J Convector

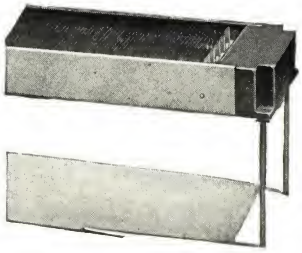


Section through Type J Header

Two Standard Types

Rocop Convectors are made in two standard types—Type J having headers with integral cast legs and Type K having headers with adjustable stud legs. Both types are provided with means for adjusting the pitch of the convector and for equalizing any variation in the floor line. The type used depends very largely on space conditions and on how connections to the convectors are to be made, as well as the type of enclosure used. Convection to the headers of the Type J convectors can be made in one of three places. This header also has the unique built-in dirt pocket feature. In this type the valve and trap may be screwed directly into the headers, thus eliminating an elbow and close nipple.

Connections to the Type K header can be made either horizontally or vertically and one header can be inverted if necessary so as to permit a vertical connection into the top of the header. This type is especially recommended for plaster front installations.



Typical Type K Header

CAPACITY TABLES—ROCOP CONVECTORS

TYPES J AND K

Heating Effect in Equivalent Square Feet (240 B.t.u.)
Steam Temperature 215° Entering Air Temperature 65°

Standard Units, complete with enclosures 1 in. longer than convectors, are furnished in 20, 23 and 26-in. enclosure heights only

Capacities are shown in bold face type with corresponding convector numbers

Enclosure height, inches	OVER-ALL LENGTHS															
	18 ins.		22 ins.		26 ins.		30 ins.		36 ins.		42 ins.		48 ins.		54 ins.	
	3½-in. Deep Rocop Convectors															
16	$18^{J}_{K}3$	8	$22^{J}_{K}3$	10¼	$26^{J}_{K}3$	12¼	$30^{J}_{K}3$	14½	$36^{J}_{K}3$	17¼	$42^{J}_{K}3$	20¼	$48^{J}_{K}3$	23	$54^{J}_{K}3$	26
20	$18^{J}_{K}3$	10¼	$22^{J}_{K}3$	12¾	$26^{J}_{K}3$	15	$30^{J}_{K}3$	17¼	$36^{J}_{K}3$	21	$42^{J}_{K}3$	24¾	$48^{J}_{K}3$	28½	$54^{J}_{K}3$	32¼
23	$18^{J}_{K}3$	11	$22^{J}_{K}3$	13¾	$26^{J}_{K}3$	16½	$30^{J}_{K}3$	19	$36^{J}_{K}3$	23¼	$42^{J}_{K}3$	27¼	$48^{J}_{K}3$	31½	$54^{J}_{K}3$	35¾
26	$18^{J}_{K}3$	12	$22^{J}_{K}3$	15	$26^{J}_{K}3$	17¾	$30^{J}_{K}3$	20½	$36^{J}_{K}3$	25¼	$42^{J}_{K}3$	30	$48^{J}_{K}3$	34½	$54^{J}_{K}3$	39
29	$18^{J}_{K}3$	12½	$22^{J}_{K}3$	16	$26^{J}_{K}3$	19	$30^{J}_{K}3$	22¼	$36^{J}_{K}3$	27	$42^{J}_{K}3$	32	$48^{J}_{K}3$	37	$54^{J}_{K}3$	41¾
32	$18^{J}_{K}3$	13	$22^{J}_{K}3$	16½	$26^{J}_{K}3$	19¾	$30^{J}_{K}3$	23	$36^{J}_{K}3$	28½	$42^{J}_{K}3$	33½	$48^{J}_{K}3$	38½	$54^{J}_{K}3$	43¾
36	$18^{J}_{K}3$	13½	$22^{J}_{K}3$	17¼	$26^{J}_{K}3$	20½	$30^{J}_{K}3$	24¾	$36^{J}_{K}3$	30¼	$42^{J}_{K}3$	35½	$48^{J}_{K}3$	40½	$54^{J}_{K}3$	45¾
40	$18^{J}_{K}3$	14	$22^{J}_{K}3$	17¾	$26^{J}_{K}3$	21½	$30^{J}_{K}3$	25½	$36^{J}_{K}3$	31¼	$42^{J}_{K}3$	37	$48^{J}_{K}3$	42¼	$54^{J}_{K}3$	47¾
45	$18^{J}_{K}3$	14¾	$22^{J}_{K}3$	18¾	$26^{J}_{K}3$	22¾	$30^{J}_{K}3$	26½	$36^{J}_{K}3$	32½	$42^{J}_{K}3$	38½	$48^{J}_{K}3$	44½	$54^{J}_{K}3$	49½
50	$18^{J}_{K}3$	15½	$22^{J}_{K}3$	19½	$26^{J}_{K}3$	23½	$30^{J}_{K}3$	27½	$36^{J}_{K}3$	33½	$42^{J}_{K}3$	39½	$48^{J}_{K}3$	45½	$54^{J}_{K}3$	51¼
	5½-in. Deep Rocop Convectors															
16	$18^{J}_{K}5$	11½	$22^{J}_{K}5$	14½	$26^{J}_{K}5$	17¼	$30^{J}_{K}5$	20	$36^{J}_{K}5$	24¾	$42^{J}_{K}5$	29½	$48^{J}_{K}5$	34	$54^{J}_{K}5$	38½
20	$18^{J}_{K}5$	14	$22^{J}_{K}5$	18	$26^{J}_{K}5$	22	$30^{J}_{K}5$	26	$36^{J}_{K}5$	32	$42^{J}_{K}5$	38	$48^{J}_{K}5$	44	$54^{J}_{K}5$	50
23	$18^{J}_{K}5$	15¼	$22^{J}_{K}5$	19¾	$26^{J}_{K}5$	24¼	$30^{J}_{K}5$	28¾	$36^{J}_{K}5$	35¼	$42^{J}_{K}5$	42	$48^{J}_{K}5$	48½	$54^{J}_{K}5$	55
26	$18^{J}_{K}5$	16¾	$22^{J}_{K}5$	21½	$26^{J}_{K}5$	26¼	$30^{J}_{K}5$	31	$36^{J}_{K}5$	38¼	$42^{J}_{K}5$	45½	$48^{J}_{K}5$	52½	$54^{J}_{K}5$	59½
29	$18^{J}_{K}5$	17¼	$22^{J}_{K}5$	22½	$26^{J}_{K}5$	27¾	$30^{J}_{K}5$	33	$36^{J}_{K}5$	40½	$42^{J}_{K}5$	48	$48^{J}_{K}5$	55¾	$54^{J}_{K}5$	63¼
32	$18^{J}_{K}5$	18	$22^{J}_{K}5$	23½	$26^{J}_{K}5$	29	$30^{J}_{K}5$	34	$36^{J}_{K}5$	41¾	$42^{J}_{K}5$	49¾	$48^{J}_{K}5$	57¾	$54^{J}_{K}5$	65¾
36	$18^{J}_{K}5$	19	$22^{J}_{K}5$	24¾	$26^{J}_{K}5$	30½	$30^{J}_{K}5$	35¾	$36^{J}_{K}5$	44	$42^{J}_{K}5$	52½	$48^{J}_{K}5$	61	$54^{J}_{K}5$	69
40	$18^{J}_{K}5$	20	$22^{J}_{K}5$	25¾	$26^{J}_{K}5$	31½	$30^{J}_{K}5$	37	$36^{J}_{K}5$	45½	$42^{J}_{K}5$	54	$48^{J}_{K}5$	62½	$54^{J}_{K}5$	70¾
45	$18^{J}_{K}5$	21	$22^{J}_{K}5$	26¾	$26^{J}_{K}5$	32¾	$30^{J}_{K}5$	38½	$36^{J}_{K}5$	47½	$42^{J}_{K}5$	56¼	$48^{J}_{K}5$	65	$54^{J}_{K}5$	73¼
50	$18^{J}_{K}5$	22	$22^{J}_{K}5$	28	$26^{J}_{K}5$	34	$30^{J}_{K}5$	40	$36^{J}_{K}5$	49	$42^{J}_{K}5$	58	$48^{J}_{K}5$	67	$54^{J}_{K}5$	76
	7½-in. Deep Rocop Convectors															
16	$18^{J}_{K}7$	14¼	$22^{J}_{K}7$	18¼	$26^{J}_{K}7$	22½	$30^{J}_{K}7$	26½	$36^{J}_{K}7$	32½	$42^{J}_{K}7$	38½	$48^{J}_{K}7$	44¾	$54^{J}_{K}7$	51¼
20	$18^{J}_{K}7$	18¼	$22^{J}_{K}7$	23¾	$26^{J}_{K}7$	29¼	$30^{J}_{K}7$	34¾	$36^{J}_{K}7$	43	$42^{J}_{K}7$	51¼	$48^{J}_{K}7$	59¼	$54^{J}_{K}7$	67¼
23	$18^{J}_{K}7$	20¼	$22^{J}_{K}7$	26	$26^{J}_{K}7$	32	$30^{J}_{K}7$	38	$36^{J}_{K}7$	47	$42^{J}_{K}7$	56	$48^{J}_{K}7$	65	$54^{J}_{K}7$	74
26	$18^{J}_{K}7$	21¾	$22^{J}_{K}7$	28	$26^{J}_{K}7$	34½	$30^{J}_{K}7$	41	$36^{J}_{K}7$	51	$42^{J}_{K}7$	61	$48^{J}_{K}7$	70½	$54^{J}_{K}7$	80½
29	$18^{J}_{K}7$	23	$22^{J}_{K}7$	29¾	$26^{J}_{K}7$	36½	$30^{J}_{K}7$	43	$36^{J}_{K}7$	53	$42^{J}_{K}7$	63	$48^{J}_{K}7$	73	$54^{J}_{K}7$	83
32	$18^{J}_{K}7$	24	$22^{J}_{K}7$	31	$26^{J}_{K}7$	38	$30^{J}_{K}7$	45	$36^{J}_{K}7$	55	$42^{J}_{K}7$	65½	$48^{J}_{K}7$	76	$54^{J}_{K}7$	86½
36	$18^{J}_{K}7$	24¾	$22^{J}_{K}7$	32¼	$26^{J}_{K}7$	39¾	$30^{J}_{K}7$	47	$36^{J}_{K}7$	58¼	$42^{J}_{K}7$	69½	$48^{J}_{K}7$	80¾	$54^{J}_{K}7$	92
40	$18^{J}_{K}7$	25¾	$22^{J}_{K}7$	33½	$26^{J}_{K}7$	41	$30^{J}_{K}7$	48½	$36^{J}_{K}7$	59½	$42^{J}_{K}7$	71	$48^{J}_{K}7$	82½	$54^{J}_{K}7$	93¾
45	$18^{J}_{K}7$	26½	$22^{J}_{K}7$	34½	$26^{J}_{K}7$	42½	$30^{J}_{K}7$	50½	$36^{J}_{K}7$	62	$42^{J}_{K}7$	73½	$48^{J}_{K}7$	85	$54^{J}_{K}7$	97
50	$18^{J}_{K}7$	27½	$22^{J}_{K}7$	35¾	$26^{J}_{K}7$	43¾	$30^{J}_{K}7$	51¾	$36^{J}_{K}7$	63½	$42^{J}_{K}7$	75¼	$48^{J}_{K}7$	87½	$54^{J}_{K}7$	100

ENCLOSURES

Panel Front Type No. 1

Types

Two general types of enclosures can be furnished for use with either ROBRAS or ROCOP Convectors. The Panel Front, Type No. 1, shown above is in most common use as it permits easy access to the convector or connections. Type No. 2, although not illustrated, is similar to Type No. 1, except that a bottom grille is used in place of the grille opening at the floor line.

The Plaster Front, Type No. 3, is used where it is desirable to carry the plaster across the front of the enclosure. This type is furnished with a removable top grille and if Type K ROCOP Convectors are used with these enclosures they can be removed if necessary without breaking into the plaster.

These enclosures are well made of heavy steel and have been designed to meet the varied requirements of concealed radiation. The special features of their construction, such as method of reinforcing, have been approved by leading architects and engineers.

It should be noted that standard enclosures 3¾, 5¾ and 7¾ in. deep by 20, 23 and 26 in. in height, all 1 in. longer than the convector, can be furnished with ROCOP, to comprise complete units which are specifically priced.

Easy to Install

When these enclosures are furnished in exact sizes to meet special conditions it is an easy matter for the heating contractor to install them as they merely have to be nailed to the studding or blocking provided. The Plaster Front type is provided with holes through which metal lath can be wired in place. The front edges of the lining portion of each type of enclosure may be used as a ground up to which the plasterer can work. The resulting joint between the lining and the plaster is covered by the overlapping front, or the top grille in the case of the Plaster Type No. 3.

Framing

As these convectors are rigidly constructed, only simple framing is required. This will ordinarily consist of a vertical stud at either end of the enclosure with a suitable header across the top. In some cases where valves and traps are installed beyond the ends of the convector, suitable framing around them may be required.

Finish

Enclosures for ROME Convectors are furnished in prime factory coat finish, the liners in black and the fronts in a light gray. Wood grain or solid color finish to match samples can be furnished on special order.

Insulation

Enclosures can be furnished, on order, with insulation applied to the back, top or ends of the liners. If insulation is not attached to the liners it is well to line the wall recess with light insulation of approved make.

How to Determine Enclosure Sizes

If available wall recesses are not limited in size the method of making connections to the convectors must be known before exact dimensions of enclosures can be established as the length will generally depend on whether the connections to the convectors are horizontal or vertical. When the wall recess sizes are established the length of the enclosure lining should be ½ in. less than the length of the wall recess and the height of the enclosure ¼ in. less than the height of the wall recess. The depth of the enclosure in the clear should be approximately ¼ in. greater than the depth of the convector. This applies to both types illustrated.

Plaster Front Type No. 3

Suggested Specifications for Enclosures

Furnish or install for each ROME Convector Type No. (1, 2, or 3), steel enclosure furnished by ROME RADIATION COMPANY, Division of Revere Copper and Brass Incorporated, these enclosures to be rigidly constructed of 20-gauge steel for the liners and 18 or 16-gauge steel for the fronts, depending on the size, the heavier gauge metal being used on all enclosures over 39 in. long. Enclosures are to be furnished in prime coat finish, complete with (bar type or ¾-in. square lattice) grilles. Each enclosure shall be made to fit the proper convector and the corresponding wall recess.

Architects' Service

We will gladly cooperate with architects or engineers in laying out ROME Convectors or enclosures, without obligation. Literature on ROME Convectors will be furnished on request and our representatives will be glad to offer suggestions regarding our products either in architects' offices or in the field.

GENERAL INFORMATION AND DATA

Ratings

The Capacity Tables given herewith are based on careful and exhaustive tests conducted in the laboratories of ROME RADIATION COMPANY. These tests are made in accordance with highly approved methods similar to those employed in leading universities and laboratories and agree very closely with the Code for Testing and Rating Concealed Gravity Type Radiation of the American Society of Heating and Ventilating Engineers. The ratings are conservative and dependable.

Steam ratings are based on condensate tests using dry steam at 215° F. (one lb. per square inch pressure) and air at a temperature of 65° F. entering the bottom opening of the convector enclosure. The ratings used in the accompanying Capacity Tables, however, represent the *heating effect* of ROME Convectors and *not* the actual condensate test results. They indicate the *effective heat output* of these convectors in terms of an equivalent amount of exposed radiation. Most heating authorities agree that this type of extended surface concealed radiation produces an increased heating effect over direct exposed radiation. This effect is conservatively held to be at least 10% in excess of test ratings obtained from this type of radiation by the condensate method. The accompanying Capacity Tables have accordingly been increased by this amount.

The selection of a ROME Convector of proper capacity for any particular requirement is arrived at in precisely the same way as in the case of direct exposed radiation. This is done by allowing one sq. ft. of radiation as indicated in the Capacity Tables for each 240 B.t.u. of heat loss in the room.

One-Pipe Steam

ROBRAS Convectors operate successfully on one-pipe steam systems. ROCOP Convectors, however, require a special arrangement for the return of the condensate when used on one-pipe systems. This is described in the ROCOP Catalog.

Hot Water

ROBRAS Convectors may be used on hot water systems of the closed tank or forced circulation type where the operating pressure is not in excess of 15 pounds per square inch and where the entire system consists of ROBRAS Convectors or those of a similar type.

The following table shows the heat output per square foot for average water temperature in the convector. The total heat loss from the room in B.t.u. divided by this number gives the required convector size. The convector may then be selected directly from the preceding Capacity Tables:

Average water temperature, deg. F.	B.t.u. per square ft.
200	195
190	177
180	160
170	143
160	125
150	108
140	91
130	73
120	56

As ROCOP Convectors have been designed especially to meet the requirements of steam and vapor systems they are not generally recommended for use on hot water systems.

Guarantee

The workmanship and material of ROME Convectors is guaranteed and all material found to be defective in manufacture will be replaced by us f.o.b. Rome, N. Y. ROBRAS Convectors are designed to operate on heating systems carrying not over 15 lb. operating pressure and are so guaranteed.

ROCOP Convectors are guaranteed for use on steam systems carrying an operating pressure of not over 50 lbs. per sq. in.

Pressure Tests

ROBRAS Convectors are subjected to a hydrostatic test of 35 lbs. per sq. in. before assembling and a subsequent internal pressure test of 50 lb. of air under water.

ROCOP Convectors are subjected to a searching internal pressure test of 125 lb. of air under water, which insures freedom from leaks under operating conditions.

Inspection

Careful and rigid inspection of all finished convectors is made at our plant prior to shipment.

Suggested Specifications for Robras and Rocop

Furnish and install where shown on plans and called for in the specifications, ROBRAS Convectors manufactured by ROME RADIATION COMPANY, Division of Revere Copper and Brass Incorporated.

All convectors shall be shipped with connection fittings set at the plant in positions to properly meet the available wall (or floor) recesses.

All convectors shall be installed in a horizontal position with fins vertical and pitched in accordance with manufacturer's standards. They may be set on ROBRAS adjustable supports or on standards made of ⅜-in. iron nipples with floor flanges at either end.

Furnish and install where shown on plans and called for in the specifications ROCOP Convectors (or standard ROCOP Units complete with enclosures) manufactured by ROME RADIATION COMPANY, Division of Revere Copper and Brass Incorporated. Headers shall be tapped for supply and return connections in locations best suited to meet available space conditions.

Where commercial enclosures are not furnished all recesses for convectors shall be lined with 26-gauge sheet metal backed with approved insulation. These recesses shall be provided with fronts having face openings above and below the convectors as shown on details. (Note that data as to proper grille sizes or free areas may be obtained from ROME RADIATION COMPANY upon request.)

Furnish and install ROBRAS Bath Room Units where indicated, each being complete with white lacquered metal cabinets 8 in. high. They may be supported by the pipe connections. (Note that for one-pipe steam systems one small angle iron bracket will be required for each unit.)

Literature

Complete literature relating to ROME Convectors will be furnished on request. If engineers or architects require information on engineering phases of our products not shown in our literature, correspondence with us is invited.

Organization

ROME RADIATION COMPANY, Division of Revere Copper and Brass Incorporated, was a pioneer in the development of non-ferrous convectors. Our branch offices and representatives are located in principal cities throughout the country and it is our desire to give the best service possible in connection with our products.

THE TRANE COMPANY

LA CROSSE, WIS.

BRANCHES IN

Consult Telephone Directory for Address of Branches

AKRON, OHIO	CLEVELAND, OHIO	LACROSSE, WIS.	NEWARK, N. J.	SEATTLE, WASH.
ALBANY, N. Y.	COLUMBUS, OHIO	LONDON, ENGLAND	OKLAHOMA CITY, OKLA.	SOUTH BEND, IND.
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	WINNIPEG, MAN., CAN.		ZANESVILLE, OHIO	

The Trane Architectural Service Division

The Architectural Service Division is a group of experienced architects whose duty it is to assist designers in working out any problem which may arise in connection with the use of convection heating equipment.

A letter addressed to THE TRANE COMPANY, Chanin Building, New York City; THE TRANE COMPANY, Palmolive Building, Chicago, or THE TRANE COMPANY, La Crosse, Wis., will put you in touch with a member of this group. This service is rendered without obligation.

Trane Convection Heaters

THE TRANE COMPANY have designed a complete line of Concealed Heaters to meet the requirements of the architect for every type of building. There are four general types: (1) Completely concealed types with metal panel fronts or plaster fronts. (2) Wall hung cabinet types. (3) Floor cabinet types. (4) Partially recessed types.

Complete specification data and literature on any or all of these types is available upon request.

Trane Heating Specialties

The Trane Unit Heater line has been developed to meet architectural requirements. Careful study has brought forth the 22 sizes and styles with the proper capacities which best meet the architect's requirements for industrial buildings and special applications in commercial buildings. Capacities range from 55 to 1560 sq. ft. equivalent direct radiation at 5 lbs. steam pressure.

Unit heaters can be furnished with recirculating boxes to meet certain heating conditions. Provision is also made for connecting outside air ducts to meet the ventilation requirements of the various State codes.

Trane Unit Heaters are built with non-ferrous fins and copper tubes. Same type of construction as concealed heater element. No soldered or welded joints. Guaranteed pressure range up to 150 lbs., steam pressure.

Complete information on capacities, sizes and types in Unit Heater Bulletin.

Trane Blast Heaters

Trane Blast Heater elements are constructed in exactly the same manner as the unit heater and concealed heater elements. Pressure range up to 150 lbs. Units for higher pressure also available.

Architects will find that this type of heating surface has many advantages over the bulkier cast iron units for ventilation, tempering and cooling and drying work as well as for straight blast heating jobs.

Trane Air-O-Lizer

The Trane Air-O-Lizer is primarily a room-ventilating machine for schools and public buildings. The unit is installed on a regular two-pipe steam, vapor or vacuum heating system in connection with one or more convection heaters of sufficient capacity to maintain the room at the desired temperature when the Air-O-Lizers are not in operation. Write for special Air-O-Lizer catalogue which gives all technical data.

Trane Temperature Control Valves

The Trane Temperature Control Valve is a unitary structure which simply replaces the standard inlet valve on a radiator or convection heater. This valve can be turned on and off just as before; but, attached to this valve is a small capillary tube which is run out of sight to the floor under the radiator. One end of this tube is made in bulb form so that it can be attached to the floor. The temperature of the bulb is what opens and closes the plunger in the valve body and automatically maintains the room temperature. This is a new principle.

The action of the valve is entirely unaffected by conditions local to the valve or radiator, as the bulb is placed beyond the reach of direct steam effects—conduction, radiation and convected heat passing up alongside of the radiator and the steam inlet pipe. It is actuated solely by the temperature of the unheated air.

Trane Heating Specialities

Included in the Trane line of heating specialties for Vapor and Vacuum Systems are:

(1) Trane Bellows Traps.
(2) Trane Packless Valves.
(3) Trane Vent Valves.
(4) Trane Boiler Specialties.
(5) Trane Drip Traps.
(6) Trane Thermostatic-float Traps, etc.

All of these specialties are fully described in our Heating Specialty Catalogue, copy of which will be supplied on request.

ESTABLISHED 1894

THE BEATON & CADWELL MFG. CO.

Heating and Plumbing Specialties

NEW BRITAIN, CONN.

NEW YORK OFFICE: 234 Water Street—Telephone, BEekman 3-3967-68

Products

The original genuine NUMBER 10 PERFECTION FLOOR and CEILING PLATES, also various other styles for all purposes; ADJUSTABLE FLOOR SLEEVES; AIR VALVES, automatic and non-adjustable styles; PIPE HANGERS.

Also Pipe Rolls, Towel Bars, Wood Wheel and Key Radiator Air Valves.

For our page on Simplex Flush Valves, see Manufacturers' Index.

No. 1

Sectional Floor and Ceiling Plates, Cast Iron

No. 2

No. 3

Hinged Floor and Ceiling Plates, Cast Iron or Brass

No. 3A

No. 3S

Solid Floor and Ceiling Plates, Cast Iron or Brass

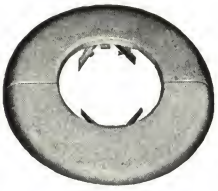
(If required for ceiling use specify with set screws)

No. 6A

No. 6

Sectional Floor and Ceiling Plates, Cast Iron or Brass

No. 9
2 in. wide flange



No. 10

Hinged Floor and Ceiling Plate

Reinforced, cold rolled steel or brass

No. 12

Solid Floor Plate Steel or Brass

No. 16

Ceiling Plate for 30° to 60° Angle or Circular Moulding

Jumbo Pipe Hangers, Malleable Iron

Sizes ¾ to 8 in., inclusive

Galvanized Floor Sleeve, for Fireproof Buildings

Made in 6 different styles, and for pipe from ½ to 6 in.

Floor and Ceiling Plates (Trade-name "Perfection")

"Perfection" plates are made of cast iron or brass, sheet steel or brass (according to design) and plain or nickelplated. Furnished in a variety of types and sizes.

Brass or bronze plates made to architects' specifications.

Important—We recommend brass plates for all modern buildings, especially for all risers in bathrooms, kitchens, vestibules and tile floors. We finish plates to match any hardware used and a style for every known requirement.

LIST PRICES, STANDARD FLOOR AND CEILING PLATES*

Cast Metal

Size, in.		⅛	¼	⅜	½	¾	1	1¼	1½	2	2½
No. 1	Black	$ .14	$ .14	$ .15	$ .16	$ .17	$ .20	$ .22	$ .25	$ .30	$ .50
	N. P.	.25	.25	.26	.27	.28	.32	.35	.38	.45	.65
	C. B.	1.00	1.00	1.00	1.00	1.20	1.30	1.60	1.80	2.00	2.50

Size, in.		3	3½	4	4½	5	5½	6	7	8	9	10	12
No. 1	Black	$ .65	$ .80	$1.00	$1.25	$1.50	$1.65	$1.75	$2.00	$2.25	$2.50	$2.75	$ 3.25
	N. P.	.80	1.00	1.25	1.50	1.75	1.85	2.00	2.25	2.50	2.75	3.00	3.50
	C. B.	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	12.00	14.00	16.00	18.00

The following numbers are available in the same choice of finishes as No. 1, and the same list prices apply for the respective sizes:

No. 2, same range of sizes as No. 1. No. 3, sizes ⅜ to 4 in. No. 3S, sizes ⅛ to 7 in. No. 3A, sizes ¼ to 4 in. No. 6, sizes ½ to 4 in. No. 6A, sizes ¼ to 5 in. No. 9, sizes ½ to 4 in.

Sheet Metal

Size, in.		¼	⅜	½	¾	1	1¼	1½	2
No. 10	Black	$ .14	$ .15	$ .16	$ .17	$ .20	$ .22	$ .25	$ .30
	N. P.	.25	.26	.27	.28	.32	.35	.38	.45
	S. B.	.60	.60	.62	.65	.72	.80	.85	1.00

Size, in.		2½	3	3½	4	4½	5	6
No. 10	Black	$ .50	$ .65	$ .80	$1.00	$1.25	$1.50	$1.75
	N. P.	.65	.80	1.00	1.25	1.50	1.75	2.00
	S. B.	1.50	1.80	2.25	2.75	3.25	3.75	4.25

The following numbers are available in the same choice of finishes as No. 10, and the same list prices apply for the respective sizes:

No. 10A, sizes ½ to 2 in. No. 11 (with set screw), sizes ¼ to 6 in. No. 14, sizes ⅜ to 4 in.

Size, in.		¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
No. 12	Black	$ .07	$ .07	$ .08	$ .09	$ .10	$ .11	$ .12	$ .13	$ .20	$ .25	$ .30	$ .40
	Nickel	.11	.11	.12	.13	.14	.15	.16	.17	.30	.35	.42	.50
	N. P. or Pol. brass	.16	.16	.17	.18	.20	.23	.25	.30	.37	.45	.55	.65

The following numbers are available in the same choice of finishes as No. 12, and the same list prices apply for the respective sizes:

No. 13 (with set screw), same range of sizes as No. 12. No. 15, sizes ½ to 2 in.

Size, in.		½	¾	1	1¼	1½	2	2½
No. 16	Sheet Brass Only, N. P. or Pol. brass	$ .62	$ .65	$ .72	$ .80	$ .85	$1.00	$1.50

*Discounts on application. N. P.—Nickelplated; C. B.—Cast brass; S. B.—Sheet brass.

All cast brass plates made up after receipt of order not subject to return.

Bottom Outlet ⅛ and ¼-in. sizes List price each, $1.25

Angle Type List price each, $1.00

No. 10 Non-adjustable Thermostatic Valves

Bottom Outlet ¼-in. size List price each, $3.50

Angle Type List price each, $3.00

No. 20 Non-adjustable Thermostatic Vacuum Valves

Valves guaranteed for five years. All parts that would otherwise be subject to corrosion are made of nickel silver which prevents corrosion.

Valve clamps, which prevent removal of valves from radiator, can be furnished at $0.50 each list

HEALY-RUFF COMPANY

Manufacturers of E-Z Radiator Hangers, Lavatory Hangers and Concrete Inserts

776 Hampden Avenue
ST. PAUL, MINN.

Products

E-Z ONE-BOLT RADIATOR HANGER or BRACKET, for hanging all makes of wall and tube radiation.

E-Z LAVATORY HANGER or BRACKET, for hanging lavatories and kitchen sinks.

E-Z CONCRETE INSERT, for all pipe hangers.

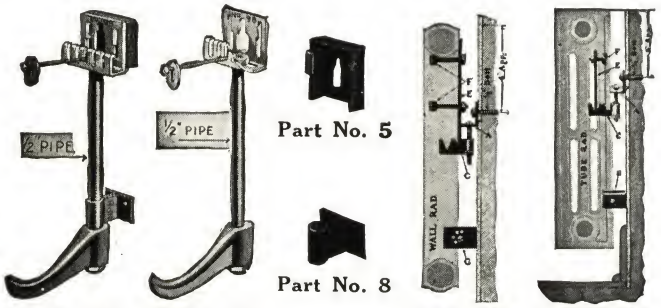
E-Z Radiator Hangers

Style "H" places radiator 2½ in. from wall and provides for baseboard adjustment.

Style "R" places radiator 1½ in. from wall, but is not adjustable for baseboard. All Style "R" hangers are convertible, with parts No. 5 and No. 8, into Style "H."

Both Styles "H" and "R" can be used for wall, column or tube radiators. All column and tube radiators are held in at the top with an invisible washer. All parts made of pressed steel, except bottom hook supports.

Style "C" will hang wall, tube and the new "Fantom and Mural" radiation. Fully adjustable horizontally and vertically, and has adjustment for irregular walls. Can be furnished for hanging either 1½ or 2½ in. from wall. Hanger is complete, no nipples required.



Style "R" with Baseboard Adjustment — **Style "H" without Baseboard Adjustment** — **Style "C" with Wall Radiator** — **Style "C" with Tube Radiator**

Typical Specifications—*General*—All radiation, unless otherwise noted, shall be supported from the wall on Style "——" E-Z Radiator Hangers, placing the radiator —— inches from the wall, as manufactured by the HEALY-RUFF COMPANY, St. Paul, Minn., or equal, and approved in writing by the architect or engineer. The heating contractor shall furnish and install for each hanger the proper type of suspension bolt. The number of hangers to be used for each radiator shall be as recommended by the manufacturer.

Advantages—Anchor bolts can be placed in walls during construction. No accurate measurements required since hangers have both horizontal and vertical adjustments. (Vertical adjustments on Styles "H" and "R" made with ½-in. pipe.)

Only one bolt is required in wall for each hanger. Expansion cannot affect anchor bolts in wall.

Entire hanger invisible when installed.

Adjustable for any height of baseboard.

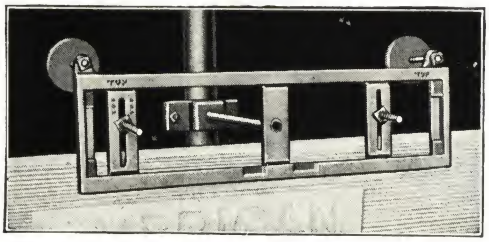
Saves time and labor installing.

Applicable to walls of wood, brick, tile, or walls of any other material.

Easy to clean under radiators.

E-Z Lavatory Hanger

E-Z Lavatory Hanger offers the practical means for hanging all lavatories and kitchen sinks. Hanger is made of malleable iron and furnished complete as shown, except ⅜-in. pipe.



E-Z Lavatory Hanger

Advantages—Easy, quick and economical to install. Can be fastened securely to form rigid hanger either with or without clamping to vent pipe.

Gives firm, substantial support permanently—cannot slip or come loose from wall. No lavatory pedestal, legs or other support necessary.

Installed in wall without extra frame of wood or other material. Can be built into wall during construction or after, as desired. It is not absolutely necessary to attach to vent pipe, but preferable when possible.

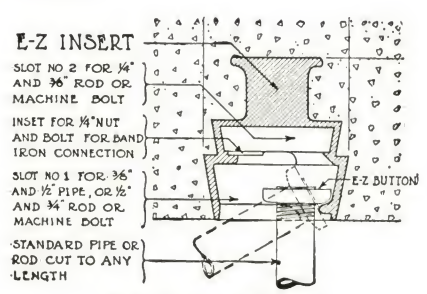
E-Z Lavatory Hanger fits all size lavatories and meets all conditions. It is fully adjustable both horizontally and vertically. Exact position need not be figured when setting.

E-Z Concrete Insert (7 in 1)

An insert with special features making it adaptable to all sizes of pipe hangers, whether supported by pipe, bolt, rod, or band iron.

Advantages—Made in just one size, and this one size accommodates ¼, ⅜ and ½-in. pipe, and ¼, ⅜, ½, ⅝ and ¾-in. rod or bolt.

Has ball and socket connection between insert and hanger.



E-Z Concrete Insert

Fully adjustable—allows play to compensate for expansion and inaccurate alignment of inserts. E-Z Button turns in the insert—no couplings or turnbuckles needed.

"Makes Pipe Hanging Easy."

THE LITTLE GIANT MFG. CO.

Manufacturer of Radiator Brackets and Hangers

1401 3rd Avenue South, MINNEAPOLIS, MINN.

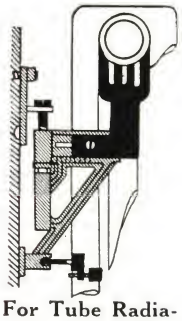
Products distributed by United States Radiator Corporation—All Leading Jobbers

Products

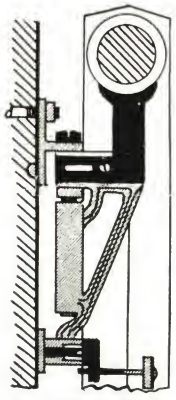
TU-BU-LUR RADIATOR BRACKETS; LITTLE GIANT RADIATOR HANGERS; LITTLE GIANT CONCRETE INSERTS.

Also Little Giant Temporary Radiator Legs.

For Sentinel Safety Sewer Valves, see Manufacturers' Index.



For Tube Radiators



For Wall Radiators

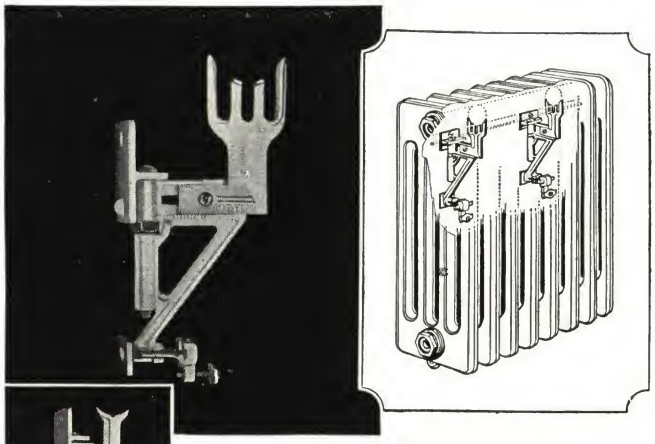
The Tu-bu-lur Radiator Bracket

The new Tu-bu-lur Radiator Bracket fits all tube type radiators, whether rod, slip, nipple, or screw nipple, regardless of make, size or pattern. In one style and with but two sizes, the Tu-bu-lur meets all requirements.

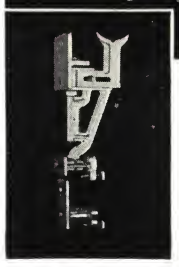
The Tu-bu-lur is a bracket permitting complete adjustments in any direction, level or plane. It provides for adjustment in and out from wall; for vertical alignment; for adjustment laterally in either direction; for raising or lowering radiator; for setting radiator in exact plumb. The Tu-bu-lur requires but one anchor bolt in the wall and requires no tie bolts.

Made of certified malleable iron, painted navy gray. The Tu-bu-lur is sold completely assembled, ready to install. It is designed to match the appearance of the new tube type radiators, though the bracket itself is not visible when installed.

Wall Radiator Bracket—A special Tu-bu-lur bracket has been designed for wall radiators. The principle of operation, style and manufacture is the same as with the other sizes. Where desired to hang all radiators more than one tier high, the wall spacer is furnished, which makes a rigid installation without danger of buckling or swinging and allows for fine adjustments and alignment. This bracket also fits the new style Arco radiator.



Tu-bu-lur Radiator Bracket



Left
Tu-bu-lur Wall Bracket

Fantom and Mural Radiator Brackets

A special Tu-bu-lar one-bolt bracket, with adjustments laterally, vertically and for plumbing with wall, is supplied for Fantom, Mural and all similar types of radiators.

Details and specifications sent on request.

Little Giant Radiator Hangers

Little Giant Radiator Hangers are used for supporting column radiation, wall and double wall radiation, and all makes of tube radiators. They are one-bolt hangers, having both vertical and lateral adjustments and providing for expansion and contraction.

Style L

The hanger plates are made of boiler plate steel. The foot pieces are of certified malleable iron and the lock nuts of steel.

Styles—Little Giant is made in three styles, L, P, and C. The L style holds the radiator 1⅞ in. from the wall, and has pipe slot and tie bolt notches below the anchor bolt.

The P style holds the radiator 2½ in. from the wall and has the pipe slot and tie bolt notches above the anchor bolt.

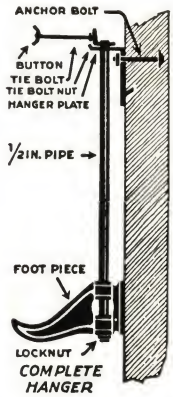
The C style hanger is a combination of P style hanger plate and L style foot piece and is furnished on installations where the foot piece rests on the baseboard.

All parts are furnished by us, except ½-in. hanger pipe and anchor bolt.

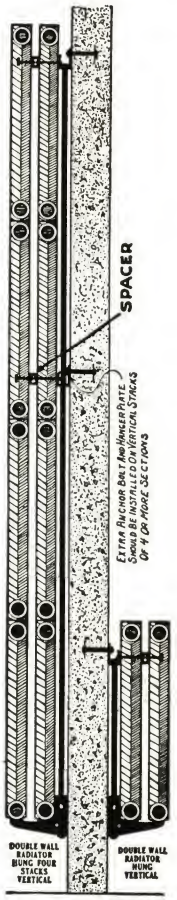
Double Wall Radiator Hangers—The adaptability of Little Giant Hangers for supporting double wall radiation is shown in the accompanying illustration.

On installations one, two, or three stacks high the wall hanger is used the same way as with the single wall installation with only one anchor bolt.

Where the installation is four or more stacks high, it is necessary to place an additional hanger plate with anchor bolt and wall spacer.



Style P



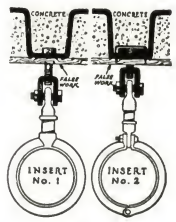
Double Wall Installation

Little Giant Concrete Inserts

Little Giant Concrete Inserts are made entirely of steel. They are extremely simple to install and are unusually practical.

They are all-purpose inserts, with which rods, band iron or pipe may be used as filler pieces. They are so designed that it is not necessary to nail them to the false work.

Little Giant Inserts come in two styles, No. 1 and No. 2.



Little Giant Concrete Inserts

W. H. JOHNSON & SON CO.

330 East St. Joe Street, INDIANAPOLIS, IND.

Sales Offices in Practically All the Larger Cities Throughout the Country

ACME RADIATOR ENCLOSURES AND SHIELDS

Acme Radiator Enclosure Models

These models have always been different, have always combined the finest materials and workmanship. They were designed by a foremost designer of fine furniture to harmonize in perfect taste with interior decorations. They are custom-built and custom-finished, in twelve models, seven of which are period models—Classic, Puritan, Grecian, Gothic, Early American, Colonial and Queen Anne. Five other models, designated by number, are of simpler design. It is advisable that the architect select the design of enclosure at the time the general motif of the rooms is being planned.

Acme Radiator Furniture should be of special interest to the architect who is looking for something genuinely *exclusive* in this line for the *better class interior.*

Manufactured in accordance with approved tests that have been made for the A. S. H. & V. E.

Construction of Enclosure Models

Top panel is made of special 14-gauge furniture steel and has a 1½-in. flange on all four sides. Rounded front corners if so desired. Equipped with humidifier—or underside of top panel lined with "celotex," a genuine insulating material. All panel joints lock-seamed, filled and rubbed to a perfectly smooth surface. Corner joints firmly locked and fitted close. Entire absence of rivets and lap joints gives the perfect finish of finest cabinet work. All types of enclosures provided with adjustable foot-pieces. Convenient flush type door for operating radiator valve placed in exactly the right location in each enclosure. Door for filling humidifier is the inconspicuous flush type and is placed in top panel.

Sizes and Finishes

Custom-built to fit any size radiator. Finishes to match color or wood finish selected by architect. Choice of grille: Standard Cane, Metalace, Arabesque, Wiscane, Moorish and Bar may be had with different models.

Finish of cabinet is accomplished by a multiple application of the finest quality lacquer—both in graining and enameling. Fastness of color is guaranteed. Also that it will not blister or crack. Graining is done by a photographic process, is not a hand imitation, and is accomplished in various shades of walnut, mahogany, oak and gum. Plain or stipple enamels may also be had in a wide assortment of colors.

For Recessed Radiation

Excepting the Puritan, Grecian, Colonial and early American models, grille fronts for standard models are furnished custom-built and finished, or, where desired, in baked prime coat only.

Acme
TRADE-MARK
U. S. REGISTERED

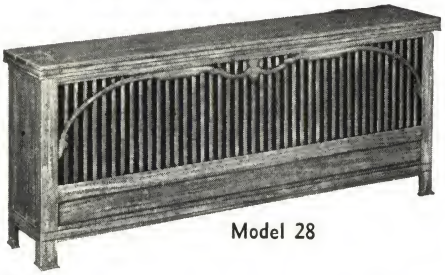
Model 30

Gothic Model

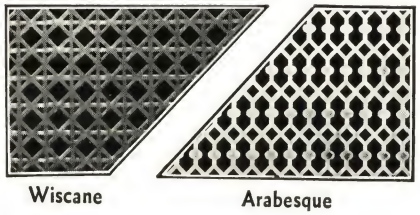
No. 5 Shield

Note:
Where a complete enclosure is not required, we can furnish the open type shields in three different designs: No. 4, No. 5 and No. 10.

Grecian Model

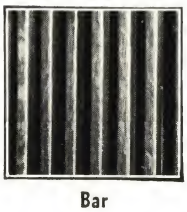


Model 28

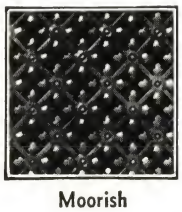


Wiscane

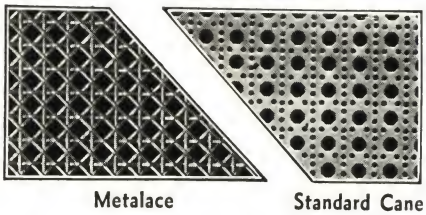
Arabesque



Bar



Moorish



Metalace

Standard Cane

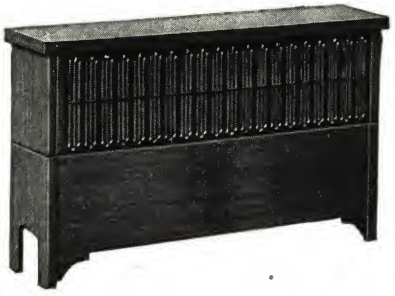
MULLINS MANUFACTURING CORPORATION

Manufacturers of Radiator Enclosures and Shields

1170 South Ellsworth Avenue
SALEM, OHIO

MULLINS RADIATOR ENCLOSURES

With a high standing in the radiator furniture field Mullins extensive activities have gained recognition in all sections of the country. Exceptional facilities in sheet metal stamping, combined with the artistry of master craftsmen (for which Mullins has long been renowned) has made it possible to design, manufacture and sell quality-built radiator furniture at



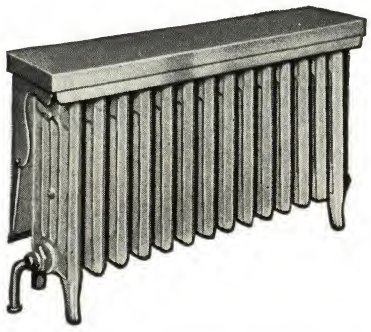
production prices, which, in smartness, beauty, style, performance and economy, stands unsurpassed.

Correctly designed to promote proper circulation of warmed, humidified air. Mullins Enclosures are healthful, a comfort and an economy —for they save walls from *"radiator smudge,"* etc., as well as showing an actual saving on fuel consumed.

MULLINS RADIATOR SHIELDS

Gracefully designed and thoroughly practical, beautifully finished and with circulatory principles correctly applied.

The adjustable lower swing panel, an exclusive Mullins feature, allows the felt retaining strip to firmly contact the wall thus preventing any secondary circulation of air from rising between the back of the shield and the wall. In the home, Mullins Shields are used in bathrooms, hallways, bedrooms and wherever the radiator is not a prominent fixture.



The commercial type of Mullins Shield, which is similar in design and construction to the standard product, offers unusually low cost protection against radiator smudge and is adaptable without special cutting or fitting to wall hung radiators, commonly used in office buildings, hospitals, hotels, apartments and other institutions.

CONSTRUCTION DETAILS

Mullins Radiator Shields

Top—No. 1 Grade "A" Furniture Steel, 14 gauge. Corners acetylene welded and finished smooth. Top is hinged so as to allow it to be lifted whenever the Water Pan needs filling.

Back Panel—25 gauge steel. Adjustable bottom flap with felt strip along lower edge. This flap swings back against the wall to prevent heated air from rising upward to soil wall paper or draperies.

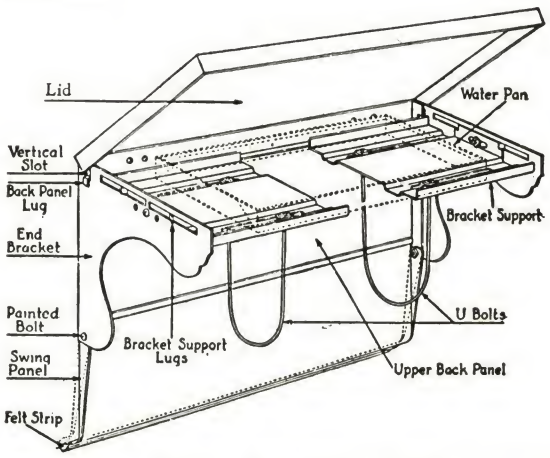
Water Pan (Humidifier)—24 gauge armco galvanized iron 1¼ in. deep.

End Supports—Heavy pressed steel brackets at each end.

Adjustable Bracket—Adjustable to locate the shield in any desired position in relation to the radiator.

Fasteners—The shield is secured to the radiator by two yokes, one at each end, which pass under the joints connecting the radiator sections.

Finish—Two coats oil-base primer baked into metal with multi-coat lacquer finish. Walnut and Mahogany enclosures reproduce wood grain by the most highly perfected process known. Finish and appearance is that of finest furniture.

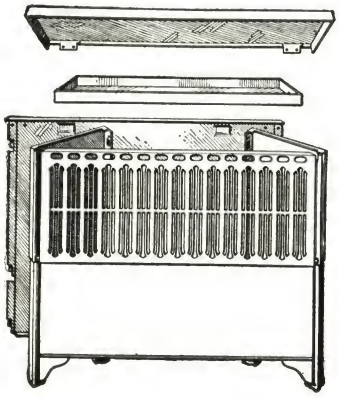


Mullins Radiator Enclosures

Top—No. 1 Grade "A" Furniture Steel, 14 gauge. Corners acetylene welded and finished smooth. Top hinged to body. Will support the weight of a heavy man without bending.

Body Panels—Front and side panels, 20 gauge. Back panel is of 24-gauge steel. Heavy reinforcements give an additional factor of strength. Special embossed shoes are spot-welded to the legs to prevent scratching floor.

Assembly—Spot-welded throughout, excepting hinge screws for attaching top. Ends attached to front panel by means of full length piano hinges.



Water Pan (Humidifier)—24-gauge armco galvanized iron 1¼ in. deep.

Construction—Both ends of the Mullins Radiator Enclosure swing inward on concealed piano hinges, and lie flat against the front panel.

Even the largest size enclosure folds and packs in a package approximately 5 in. in thickness.

There are but four bolts—these on the hinges operating the covers. The entire construction is simplicity itself.

Finish—Two coats oil-base primer baked into metal with multi-coat lacquer finish. Walnut and Mahogany enclosures reproduce wood grain by the most highly perfected process known. Finish and appearance is that of finest furniture.

SUN RADIATOR COVER, INC.

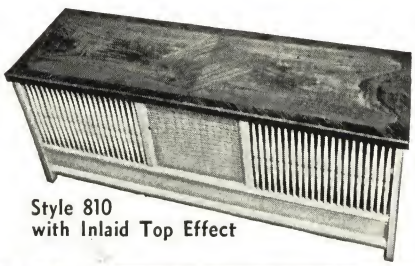
7802 Carnegie Avenue, CLEVELAND, OHIO

CUSTOM BUILT RADIATOR ENCLOSURES, SHIELDS AND GRILLES

Flexibility of Style—Custom built to any requirement. Any special perforated grille may be specified. Height of enclosure governs use of horizontal panel at base of cabinet. Number of front panels varies with length. Mouldings, graceline and adjustable legs, corner ornaments, monograms, etc., are available for Styles 310 and 810. Style 710 offers a combination of two or more grille designs, as well as use of wrought iron grilles. Grille fronts of any style may be had for recessed radiators; radiators partly recessed between wall offsets under windows, may be neatly enclosed with the built-in window seat effect. Sample equipment or drawings gladly submitted on request.

Utility—Afford protection to walls, ceilings, decorations and hangings. Serve as handsome consoles for books, vases, etc. Low type enclosure provides substantial and beautiful window seat. Humidifier serves twofold purpose of relieving excessive dryness and of extracting dust from warm air. Hinged top facilitates quick and easy cleaning. Better heating effects are accomplished by deflecting heat to floor.

Modern Construction—Tops 16-gage furniture steel (long, low enclosures, 14-gage) with 1¼-in. flange turned under at front. End panels 20-gage furniture steel. Backs 22-gage pickled steel. Legs of tubing 1x1 in. standard—1¼x1¼ or 1½x1½ in. may be specified. Cross bars and mouldings securely welded to legs, eliminating use of nuts and bolts and attendant care. Water pans 20-gage armco galvanized 1½ in. deep, also porcelain enamel, copper, or brass.

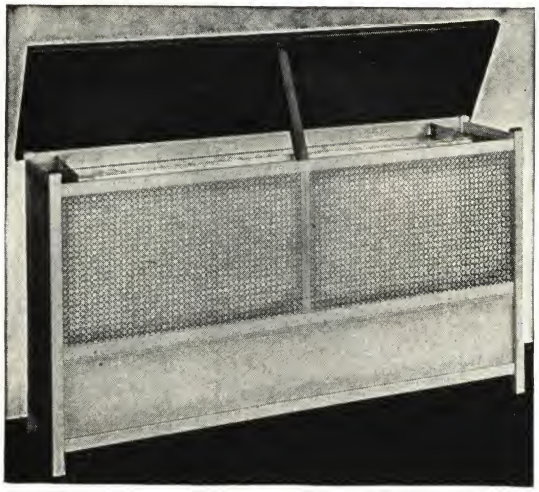


Style 810
with Inlaid Top Effect

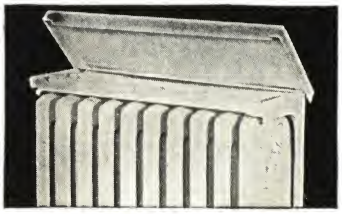
Finest Finishes—Baked-on enamel in any color or combinations of color. Each coat hand-rubbed—dull or glazed effects. Wood grain, inlaid, or marble effects matched closely.

Choice of Tops—Steel with regular finish; foreign or domestic marble; genuine wood tops; glass; porcelain enamel; vitrolite; asbestos marble. Inside of tops lined with asbestos if desired.

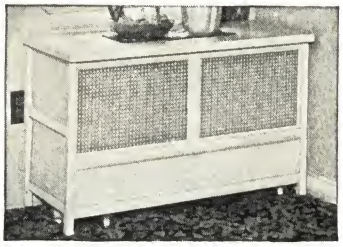
Services Offered—Detailed specifications on request for any type of radiator concealment. Photographs of typical installations in schools, hospitals, churches, apartments, hotels, and private residences furnished. Factory service available on installations.



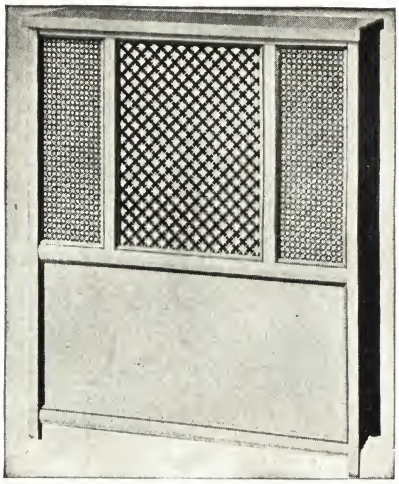
Style 210



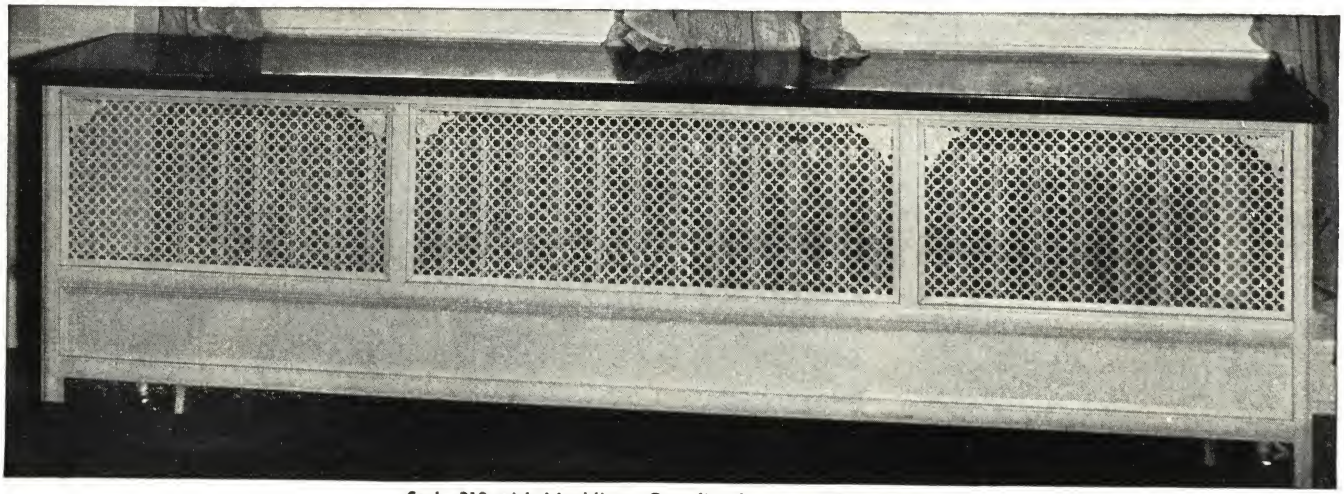
Style 1000



Style 210 with Mouldings



Style 710



Style 310 with Mouldings, Graceline Legs, and Ornaments

ESTABLISHED 1846

TUTTLE & BAILEY MFG. CO.

Manufacturers of Radiator Enclosures Since 1875

155 East 44th Street, NEW YORK, N. Y.

BRANCHES

BOSTON, MASS., 36 Portland Street
CHICAGO, ILL., 407 South Dearborn Street
KANSAS CITY, MO., 704 East 18th Street
LOS ANGELES, CALIF., 3437 West First Street

Representatives in all Principal Cities of the United States

Products

RADIATOR CABINETS, FRONTS and SHIELDS.

For Registers, Grilles, Ventilators and Tel Boxes, see Manufacturers' Index.

···NEW ARTISTRY IN··· RADIATOR CONCEALMENT

New Artistry in Radiator Concealment

Concealing radiators is nothing new—Tuttle & Bailey have been doing it since 1875. Only in its application and popularity today, do we find something modern, and present the resulting "New Artistry in Radiator Concealment" as the "cover-all" for current-day needs.

For the radiator or new type heating unit completely recessed (in the wall), New Artistry in Radiator Concealment offers the classics of Ferrocraft Grilles or a choice from a variety of fronts, including the vertical sliding damper front with a diversity of construction meeting any condition.

For the semirecessed radiator (partly in wall), "The Coverton" with improved and patented installation features eliminates guesswork and saves time and labor.

Where radiators are suspended beneath window sills, "The Undersill" is most practical, for no special construction or preparation need be made for it. The "Undersill" requires no cutting or drilling when installed.

For the "out of wall" radiators, sturdy cabinets, as fine as fine furniture. Custom built in 73 standard variations to meet 53 different problems of radiator construction. Equipped with humidifying pans for health, with hinged tops for easy access to pan or valves, and with adjustable legs (except in very low priced models) to overcome teetering on uneven floors.

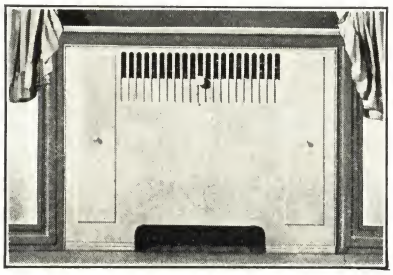
The products of "New Artistry in Radiator Concealment" can be ordered in gray prime coat, hand grained finishes to match woodwork or in plain colors sprayed evenly and permanently. Also in special finishes to simulate marble, etc.

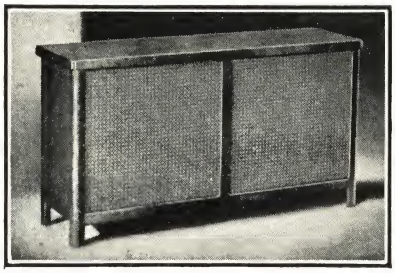
All cabinets made by Tuttle & Bailey workmen are sold with a guarantee of efficiency.

Trade names, slogans and features of products illustrated below are fully covered by patents and copyrights.

Radiator Fronts (In the Wall)

The new vertical sliding damper front meets satisfactorily any condition or requirement for concealment of completely recessed radiators or heating units. "Grilles" Supplement No. 5 contains complete description



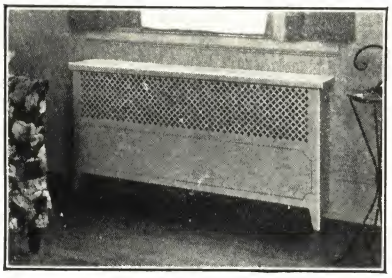


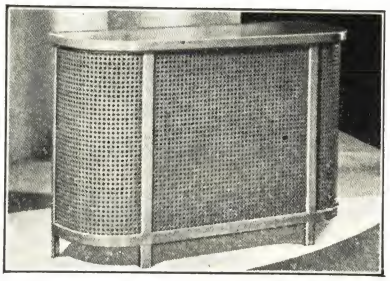
The Franklin (Out of the Wall)

An economical cabinet suited to equipping apartment buildings, schools, hotels, etc. Has full solid back and ends, hinged top and spot-welded throughout. Sturdy enough to stand abuse

"The Coverton" (Partly in the Wall)

For a tight fitting installation where radiator is but partly recessed. Easily installed and easily removed for radiator repairs and cleaning. "Grilles" Supplement No. 5 shows method of installing and details of construction



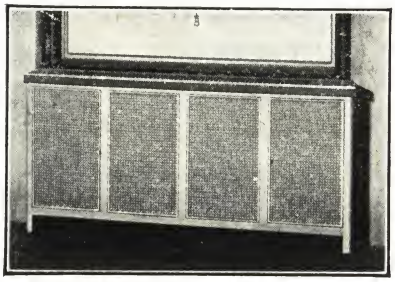


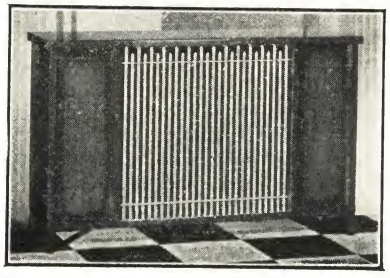
The Raleigh (Out of the Wall)

Lifetime construction. Hinged top, full solid back and spot-welded throughout. No rivets, bolts or nuts to work loose; no joints or seams to open from jarring

"The Undersill" (Under Window Sill)

Where radiators are suspended beneath window sills. Construction features eliminate cutting or drilling when installing. Side grille panels are hinged to give access to valves





The New Beaux Arts (Out of the Wall)

Illustrated with rod type grille, but furnished also in a choice of other grilles. Has full solid back and ends, hinged top and indestructible tubular construction, spot-welded throughout

AMERICAN CHIMNEY CORPORATION

147 Fourth Avenue, NEW YORK, N. Y.

BRANCHES

PHILADELPHIA, PA., Stephen Girard Building
BOSTON, MASS., 141 Milk Street
CLEVELAND, OHIO, Penton Building
DETROIT, MICH., General Motors Building
COLUMBUS, OHIO, 243 No. High Street

American Preserve Co., Philadelphia, Pa.
Chimney 150 ft. x 5 ft.

Construction and Repair Service

The services of the AMERICAN CHIMNEY CORPORATION cover every phase of chimney construction and repair, and include:

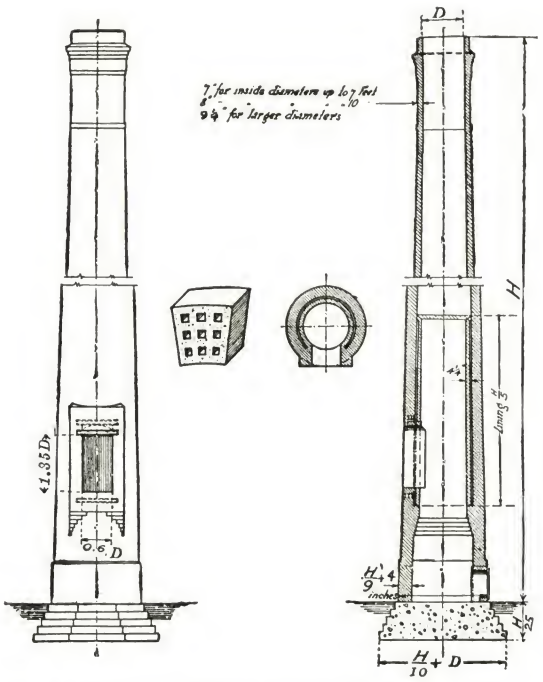
Radial Brick Chimneys
Ornamental Chimneys
Lightning Rods
Boiler Settings
Oil Stills

Necessary Information for Estimates

When asking for information or estimates on new construction, or repair or extension of existing chimneys, kindly advise on the following points:

(1) Intended use of chimney (boiler furnace, smelter, chemical plant, incinerator).
(2) Height above foundation and diameter or boiler horsepower or number and dimensions of boilers.
(3) If a bid is desired on foundation, give character of soil.
(4) Does chimney stand independent of building? If it is a part of the building, state for what height.
(5) Give hauling distance from purchaser's railroad siding or nearest railroad freight yard.
(6) If possible, give approximate prices of building materials and wage scale of local common labor.

Estimates furnished on inspection and repair of lightning rods, refractory linings for steel stacks, boiler brickwork and construction and repair of industrial furnaces.



Design Data—Chimney for Boiler Operation

Determining Chimney Dimensions

The principal dimensions of a chimney can be determined on the basis of our line drawing. To determine the bottom outside diameter of chimney use the following:

H/D = 15; increase outside diameter of chimney by 2 ft. 3 in. for 100 ft. in height.
H/D = 20; increase outside diameter of chimney by 4 ft. for 100 ft. in height.
H/D = 30; increase outside diameter of chimney by 4 ft. 6 in. for 100 ft. in height.

Lining—A refractory lining should be provided in every instance. It should be equal to at least one-fifth of the height of the chimney in case of boiler plants; one-half height of the chimney for stacks carrying temperatures of 800° to 1200°, and a high grade fire brick lining for the entire height is necessary in case temperature exceeds 1500°.

House of Good Shepherd, Albany, N. Y.
Chimney 100 ft. x 5 ft.

CONTINENTAL CHIMNEY COMPANY, INC.

Engineers and Contractors

TELEPHONE
Dearborn 6607

127 North Dearborn Street
CHICAGO, ILL.

BRANCH OFFICES
CLEVELAND, OHIO, Hunkin-Conkey Building
KANSAS CITY, MO., 2517 Jefferson Street
LOUISVILLE, KY., 420 Baxter Avenue

Chimney 250 Ft. High by 12-ft. Top Inside Diameter, for Ford Motor Co., St. Paul, Minn.

Products and Services

Designers and builders of PERFORATED RADIAL BRICK CHIMNEYS and FACE and COMMON BRICK CHIMNEYS, with foundations, for boilers, furnaces, smelters, ovens, etc., for all types of buildings.

We specialize in Lining and Relining Steel Stacks with brick for large power and industrial plants.

Specifications, plans, designs and other information furnished free on request.

Perforated Radial Brick Chimneys

The purest materials only are used in making the radial blocks and are chosen for their great refractory qualities and high crushing strength.

These materials are so combined in the proper proportions as to insure a chimney with the maximum resistance to strains of every nature to which it may be subjected.

Radial bricks can be furnished in red or light buff color as desired.

Chimney Repairing

We repair brick and concrete chimneys. Old chimneys repaired, straightened, heightened, pointed and banded while in operation. Lightning rods installed and repaired.

We also make inspections of chimneys and furnish reports on their condition.

Information Required for Estimates

Name of place where chimney is to be erected.
Railroad siding on which it is located.
Distance from siding delivery to chimney site.
If for boiler draft, give total horsepower.
Kind of fuel or coal to be used.
Dimensions of chimney required—diameter; height.
Nature of soil where chimney will stand.
Estimated safe load per square foot.
Depth of excavation necessary to reach good soil.
Local prices—common brick, lime, cement and sand.

Chimney 175 Ft. High by 8-ft. Top Inside Diameter, for Atwater Kent Mfg. Co., Philadelphia, Pa.

ALPHONS CUSTODIS CHIMNEY CONSTRUCTION CO.

TELEPHONE
COrtlandt 7-8427

95 Nassau Street, NEW YORK, N. Y.
CHICAGO, ILL., Marquette Building

CABLE ADDRESS
"Custos, New York"

AMERICAN BRANCH OFFICES

ATLANTA, GA., Forsyth Building
BOSTON, MASS., 51 Ellery Street
CLEVELAND, OHIO, 406 Caxton Building
CINCINNATI, OHIO, 18 E. 4th Street
DETROIT, MICH., 414 Curtis Building
INDIANAPOLIS, IND., 909 Roosevelt Building
LOS ANGELES, CAL., 804 Central Building
MILWAUKEE, WIS., 1107 Knapp Street
MINNEAPOLIS, MINN., 459 N. W. National Life Insurance Building
PHILADELPHIA, PA., Land Title Building
PITTSBURGH, PA., 524 Bessemer Building
PORTLAND, ORE., 1119 Failing Building
RICHMOND, VA., 301 American National Bank Building
ST. LOUIS, MO., Syndicate Trust Building
SAN FRANCISCO, CAL., Sheldon Building
SEATTLE, WASH., L. C. Smith Building

CUSTODIS CANADIAN CHIMNEY COMPANY, LTD.

HALIFAX, N. S., 172-74 Lower Water Street
QUEBEC, QUE., 140 St. John Street
MONTREAL, QUE., 215 New Birks Building
TORONTO 2, ONT., 250 Confederation Life Building
BRITISH COLUMBIA: C. C. Moore & Co., Standard Bank Building, VANCOUVER, B. C.

Products

Designers and Builders of PERFORATED RADIAL BRICK CHIMNEYS and REINFORCED CONCRETE CHIMNEYS of all sizes with FOUNDATIONS; ACIDPROOF CHIMNEYS; HIGH TEMPERATURE CHIMNEYS; BOILER SETTINGS and REFRACTORY BRICKWORK; REPAIRING and HEIGHTENING OLD CHIMNEYS; LIGHTNING RODS INSTALLED and REPAIRED.

Tallest and Largest Radial Brick Chimney in the World, Anaconda Copper Mining Company, Anaconda, Mont.

Height above grade, 585 ft. Inside diameter at top, 60 ft. Built in 1918

Engineering Service

Specifications, plans, designs and data furnished free on request.

This company with nearly 70 years of experience, is equipped to give expert advice as to the size of any kind of a chimney, for any purpose.

State conditions and results desired and our engineers will furnish the correct, efficient and economical size and design for that particular purpose.

The fact that there are over 12,000 Custodis radial brick chimneys in successful operation today is conclusive proof of their permanency, economy and efficiency.

Perforated Radial Brick Chimneys

The perforated radial blocks are made only from purest clays, selected for high refractory powers and high crushing strength. The radial blocks are formed to suit the circular and radial lines of each part of the chimney, so they can be laid with thin, even joints and produce a regular smooth surface. Moulded with vertical perforations, the radial blocks are most thoroughly and uniformly burned, materially increasing their density and strength.

Reinforced Concrete Chimneys

A monolithic tapering structure built of concrete reinforced vertically and horizontally with deformed steel rods and electrically welded rectangular wire mesh. This reinforcing is accurately determined and distributed in the walls to properly take all the stresses due to weight, wind and temperature. Forms both inside and out are made of steel. They can be adjusted to insure an accurate taper and any desired wall thickness.

Boiler Settings and Refractory Brickwork

We maintain a department for the setting of new boilers; overhauling of old boiler settings; the construction of oil stills, industrial furnaces and similar installations.

Repairing and Heightening

We repair brick chimneys, concrete chimneys and steel chimneys. Work done while in operation, if necessary.

We heighten old chimneys without interruption to the plant.

We demolish old brick, concrete and steel chimneys without danger.

We inspect all kinds of chimneys and make reports and recommendations on their condition.

Lightning Rods

Lightning rods installed and repaired.

Information Required for Estimates

Name of place where chimney is to be erected.
On what railroad siding is same located.
Distance from siding delivery to chimney site.
Is chimney to be used for boiler drafts or other purposes.
Give probable temperatures of the flue gases.
If for boiler draft, what is total horsepower.
Kind of fuel or coal to be used.
Dimensions of chimney required—diameter; height.
What is nature of soil where chimney will stand.
What is estimated safe load per square foot.
What depth of excavation is necessary to reach good soil.
Local prices—common brick, lime, cement, sand and concrete stone.

Text Book

Send for the free set of Custodis Text Books, S. A. 9, a technical treatise on the design and static calculations of chimneys and the determination of their proper sizes for particular installations.

This publication is replete with valuable and heretofore unpublished information.

Reinforced Concrete Chimney, Northern Pacific Railway, St. Paul, Minn.

Height, 208 ft. Inside diameter at top, 8 ft.

THE RUST ENGINEERING COMPANY

Engineers and Constructors

Koppers Building, PITTSBURGH, PA. | Martin Building, BIRMINGHAM, ALA. | 30 Church Street, NEW YORK, N. Y. | District Bank Building, WASHINGTON, D. C. | 205 No. Wacker Drive, CHICAGO, ILL.

SALES OFFICES

CHICAGO, ILL. | PHILADELPHIA, PA. | SEATTLE, WASH. | INDIANAPOLIS, IND. | TORONTO, ONT.
LOS ANGELES, CAL. | DETROIT, MICH. | PORTLAND, ORE. | MONTREAL, QUE. | WINNIPEG, MAN.

Service

COMPLETE DESIGN and CONSTRUCTION of: Power Plants, Boiler Settings, Cement Gun Work, Radial Brick Chimneys, Reinforced Concrete Chimneys, Factories, Industrial and Material Handling Plants, Silos and Storage Bins, Warehouses, Bridges.

Radial Brick Chimneys, Inland Steel Co., Indiana Harbor, Indiana
1—250 ft. x 11 ft. 6 in.
1—70 ft. x 16 ft.

Representative Installations

American Sheet & Tin Plate Co.
American Tar Products Co.
Atlantic Refining Co.
Alabama Power Co.
American Smelting & Refining Co.
American Can Co.
American Metal Co.
Armstrong Cork Co.
American Writing Paper Co.
American Gas & Electric Co.
American Rolling Mills
Aluminum Company of America
Bethlehem Steel Corporation
Baltimore & Ohio R.R.
Brooklyn Edison Co.
British American Nickel Co.
Babcock & Wilcox Co.
Consolidated Gas Co.
Canadian Steel Corporation
Cleveland Electric & Illuminating Co.
Carnegie Steel Co.
Consolidated Mining & Smelting Co.
Celanese Corporation of America
Commercial Solvents Corporation
Chesapeake Corporation
DuPont Co.
Duquesne Light Co.
Diamond Alkali Co.
Delaware & Hudson Co.
Davison Coke & Iron Co.
Erie Railroad
Electric Bond & Share Co.
Firestone Rubber Co.
Ford Motor Co.
General Motors Corporation
B. F. Goodrich Rubber Co.
Grand Trunk Railway
Gulf Refining Co.
General Electric Co.
H. J. Heinz Co.
Hercules Powder Co.
Hudson Motor Co.
Harbison-Walker Co.
Hubbard & Co.
Heppenstall Knife & Forge Co.
International Cement Corporation
International Paper Co.
Jones & Laughlin Steel Corporation
Koppers Co.
Keystone Portland Cement Co.
Long-Bell Lumber Co.
Lehigh Portland Cement Co.
Metropolitan Edison Co.
Morris & Co.
Morton Salt Co.
National Tube Co.
Norfolk & Western Ry. Co.
New York Central R.R. Co.
Owens Bottle Co.
Pennsylvania R.R. Co.
Peoples Drug Stores
Packard Motor Co.
Procter & Gamble Co.
Phoenix Utilities Co.
Pennzoil Co.
Pressed Steel Car Co.
Pittsburgh & Lake Erie R. R. Co.
Pittsburgh Plate Glass Co.
Raritan Copper Co.
Republic Iron & Steel Co.
Southern Ry. Co.
Standard Oil Co.
Standard Sanitary Manufacturing Co.
Shell Petroleum Co.
Swift & Co.
Steel Company of Canada
Tennessee Iron & Railroad Co.
Timken Roller Bearing Co.
Tennessee-Eastman Corporation
Universal Atlas Portland Cement Co.
Union Gas & Electric Co.
Viscose Co.
Virginia Power Co.
Ward Baking Co.
Wheeling Steel Co.
Westinghouse Electric & Mfg. Co.
Weirton Steel Co.
Youngstown Sheet & Tube Co.

Reinforced Concrete Chimney, National Paper Products Co., Port Townsend, Washington
250 ft. 6 in. x 16 ft.

THE M. W. KELLOGG COMPANY

Manufacturers of Perforated Radial Brick Chimneys

225 Broadway
NEW YORK, N. Y.

BRANCH OFFICES

BIRMINGHAM, ALA. BOSTON, MASS. CHICAGO, ILL. PITTSBURGH, PA.
LOS ANGELES, CAL.

CANADIAN KELLOGG CO., LTD., MONTREAL, TORONTO, WINNIPEG, CAN.

Products

PERFORATED RADIAL BRICK CHIMNEYS.

Also Common Brick and Reinforced Concrete Chimneys; Chimney Repairing and Remodeling; Ignisite Refractory Cement.

Service

THE M. W. KELLOGG COMPANY has erected some of the finest chimneys in the United States during the last thirty years, and is ready to share the results of that experience with engineers and architects who are engaged in problems where chimney construction is required.

This company's engineers will be glad to advise on types, sizes, shapes, etc., of chimneys for any conditions that may arise.

Kellogg Perforated Radial Brick Chimneys

No artificially produced material for the construction of the modern factory chimney compares with refractory clay. This raw material is put through a variety of scientific treatments by skilled hands and especially designed machines before it comes from the kilns in the form of perforated radial brick ready for shipment, and for use in chimney construction.

Each brick is formed to occupy a certain position in the circular and radial lines of the chimney, as shown by the drawing on this page, and is sound ringing, hard, well burned and free from checks.

Bricks are made to conform closely with the circular and radial lines of the shaft and are weatherproof and acidproof.

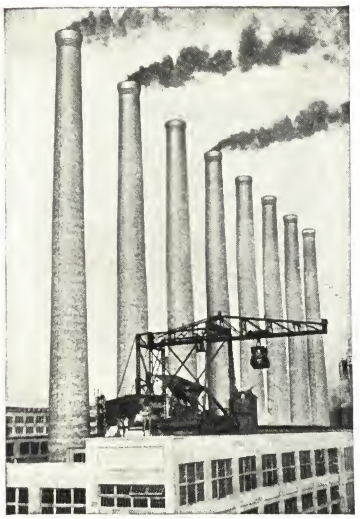
The total amount of perforations does not exceed one-fourth of the cross area of the brick, which are tested to a crushing strength of not less than 6000 lbs. per sq. in.

The perforations in the radial bricks form a dead air space about the core of the chimney. This has a marked effect in reducing amount of fuel used, in preventing sudden changes of temperature within the chimney, and in reducing radiation. Thus a uniformly maximum draft is maintained in any kind of weather.

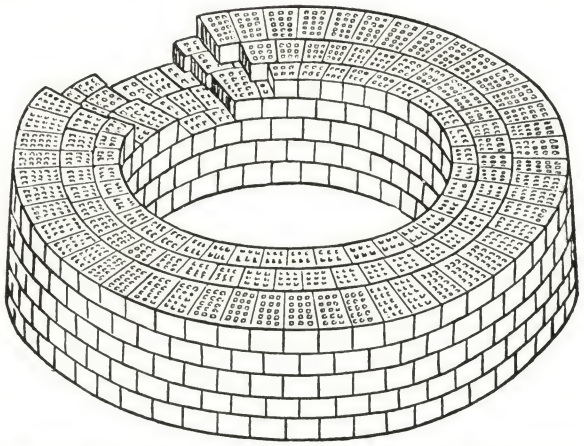
A trained superintendent of construction, familiar with all the details of the plans and specifications of the chimney, accompanies each shipment of radial brick, to supervise unloading and stacking in the order of their use. Throughout the entire construction the bricks of each tier reach their final place under his direction.

An expert mortar man supervises the preparation and use of all of the mortar. The tensile strength of the chimney, its ability to withstand heat and cold and to defy all sorts of weather from without and all sorts of gases from within, depend largely upon this mortar. Each brick is laid in so full a bed of mortar that the latter enters the perforations of the brick from 1 to 1½ in. The joints are struck both inside and out.

Queen Lane Filter Plant, Philadelphia, Pa.



Corn Products Refining Co., Argo, Ill.



Method of Using M. W. Kellogg's Perforated Radial Brick in Chimney Construction

A crew of trained men in scientific chimney construction carry forward the erection of the chimney from start to finish, insuring careful construction and the proper grading and matching of brick throughout.

Standard Specifications for Perforated Radial Brick Chimneys

Scope—The work included under this contract is to consist of all labor and material necessary for the erection complete of one radial brick chimney in accordance with this specification, which shall become a part of the contract. The proposal shall include all scaffolding, cartage, unloading of material and removal of rubbish necessary to leave the chimney in a first class condition ready for operation.

Delivery—The chimney will be built at.....
.....located on the.....
.....railroad.

Material may be unloaded on owner's siding, which is within.....of the chimney site.

Space—Sufficient storage room for chimney contractor's materials will be provided adjacent to chimney as well as unobstructed access from transportation delivery to the site of chimney for delivery and removal of materials and tools. At least one side of chimney will be left free and open by the owners for hoisting and working space until the chimney is completed.

Water—The owners will provide the chimney contractor with necessary water within 50 ft. of the site of the chimney free of expense to the chimney contractor. From this point the chimney contractor will make his own hose connections, if required.

Workmanship and Materials—All workmanship and materials shall be first class.

The chimney contractor shall furnish a competent foreman under whose supervision the chimney will be built. Chimney must be built in a thorough, complete and workmanlike manner.

Time of Completion—The chimney contractor shall state in bid the guaranteed number of working days in which he will finish the chimney after receipt of signed contract and approved drawings.

Foundation—Proper foundation will be built by the owner from plans and specifications to be furnished by the chimney contractor, who will, on completion, give in writing his approval of the foundation as being sufficient to sustain the chimney and fulfill the guarantee.

Note: In case, however, it is desired to have chimney contractor build the foundation, the following may be used:

The chimney contractor shall furnish a concrete foundation of proper depth and spread to safely sustain the chimney. The foundation shall not be loaded to more than.....tons per sq. ft., which is the safe bearing value as determined for this work.

Excavating shall be done by contractor for foundation.

The concrete shall be composed of cement, sand, stone or gravel in the proportion of 1 part cement to 2½ parts sand and 5 parts of stone or gravel. It shall be deposited in the forms in layers not to exceed 6 in. in thickness and thoroughly rammed into place. Concrete shall be a wet mixture.

Design—The design of the chimney shall conform to the following dimensions as shown on drawing attached:

Height above top of foundation.....ft. .....in.
Minimum internal diameter.....ft. .....in.

The wall of the column shall have one straight and true batter from top to bottom. The wall thickness and section lengths to be as shown on drawing. In case the contractor's standard wall thickness should not be exactly as shown, a variation of 3% will be allowed in either direction.

The chimney shall be built of perforated radial brick for the entire height, as hereinafter specified.

Base—If chimney is to be built with base and column construction, use the following:

The base of the chimney shall be built [here fill in shape of base] in shape.....ft. high, of the dimensions shown on drawing, of straight, hard, well burned, well shaped common building brick laid in full bed of cement lime mortar as herein specified.

Radial Brick—All radial brick shall be best quality, moulded from refractory clay, sound ringing, hard, well burned, well shaped, of reasonably even color and free from checks; made to closely conform with the circular and radial lines of the shaft, and shall be weatherproof and acidproof. They shall have a water absorption of not less than 5% nor more than 12% of their dry weight after immersion for a period of 24 hr.; and shall have a crushing strength of not less than 6000 lb. per sq. in. The total amount of perforations shall not exceed one-fourth of the cross area of the brick. One cu. ft. of radial brickwork shall weigh not less than 120 lb.

The outside faces of the brick shall be of regular size, so that the general appearance of the brickwork will be neat and uniform.

Lining—The chimney shall have an expansion lining built of perforated radial fire brick 4¼ in. thick,.....ft. high from a point 2 ft. below the bottom of the flue opening. The lining prevents flue gases from coming in contact with the solid masonry of which the shell is built, and shall be separated from same by an air space of not less than 2 in.

The lining shall be built after the chimney is finished, and exceptional care must be taken to keep the air space clear and free of loose mortar and other dirt.

Rack out the shell of the chimney approximately 2 in. above lining, to form a ledge for the purpose of diverting the falling soot when the chimney is in operation.

Mortar—All brickwork shall be laid in cement lime mortar, as hereinafter specified, with courses level and with regular joints throughout. Face brickwork and backing to be laid up at the same time with joints of reasonably even thickness, not exceeding ½ in. The mortar to be used in the chimney shall consist of 1 part portland cement, 2 parts fresh burnt lump lime mortar and 5 parts clean, sharp sand. The cement to be added to the sand and lime mortar as the mortar is required, and no mortar having taken an initial set is to be used. The cement must not be added until the lime is cool. The sand shall be clean and sharp, free from loam, vegetable matter and large pebbles. If necessary, it must be both screened and washed.

Bond—All common brickwork shall have every fourth course a header course.

Radial brickwork shall be bonded every three courses.

Breeching Opening—One opening shall be provided in chimney. The opening to be lined on the reveals with refractory material. The masonry above the opening to be supported by heavy I-beams set on steel plates, with air spaces at each end for expansion. Under these I-beams a flat masonry arch shall be built to properly protect the beams from the effect of the gases. The flue opening shall be reinforced laterally by heavy tie rods and plates over the top and at the bottom.

Steel bands, ⅜x3 in., to be placed in the masonry above and below opening.

The opening shall be.....wide by.....high, the bottom of which shall be approximately.....above foundation.

Reinforcing Rings—The chimney contractor shall place in the brickwork at every change in wall thickness steel bands ⅜ in. thick by 3 in. wide.

If the contractor should furnish perforated radial brick having corrugated sides, these bands may be omitted.

Head—The head of the chimney shall be neatly corbeled out and fitted with a heavy annular retaining ring set in full bed of cement mortar.

Clean-out Door—Provide and place in base of chimney where directed by owner a cast iron clean-out door and frame properly hinged and fitted with latch. Said door to be approximately 24 in. wide by 36 in. high.

Ladder—Build on the interior of the chimney a ladder to consist of ¾-in. galvanized iron rungs, spaced approximately 15 in. center to center and securely anchored to the masonry from top to bottom. These ladder irons to be in the shape of a "U" with hooked ends.

Lightning Conductor—The lightning conductor is to consist of.....copper points, ¾ in. in diameter by 8 ft. long, with 1½-in. platinum tips. The points to be anchored to the top of the column and extend from the bottom of the corbeling upward. The lower ends of the points to be connected by a loop of copper cable encircling the chimney. From this loop there is to be 1½-in. 7-strand No. 10 Stubbs' wire gauge copper cable, carried down the side of the chimney and connected to copper ground plate of the 3-winged type as best for the proper distribution of charge. The points to be securely fastened to the top of the chimney and the cable to be anchored every 7 ft. in height with brass anchors, so designed that they will support the weight of the cable. The ground plate shall be buried by the contractor for the foundation when it is built.

Lettering (When Desired)—Work into the column on [one or two] sides as directed the letters [here insert the desired legend] to be made in permanently colored kiln burnt brick. Letters to be true to size and shape and to be in a true vertical line.

Trimmings (If Any)—All necessary stone or terra cotta shown on drawing will be furnished without charge by the building contractor to the chimney contractor, who will set same. No one piece should weigh over 200 lb.

Insurance—The chimney contractor shall carry at his own expense, during the entire period of construction, liability insurance, insuring the men in his employ and the public in general, in case of damage due to accidents.

Guarantee—The chimney contractor shall guarantee the chimney for a period of one year from date of completion. The guarantee shall cover any defects that may arise within this period due to faulty design, construction, material, weather, and the products of combustion up to 800° F.; and shall further guarantee to make good at his own expense all defects that may arise from any of the above conditions within the specified period.

The chimney shall be designed for a wind velocity of not less than 100 miles per hour.

Note: The chimney shall be built according to THE M. W. KELLOGG COMPANY [or equal] system of construction.

WM. SUMMERHAYS SONS CORPORATION

Designers and Builders of Radial Brick Chimneys and Brick Boiler Settings

620 Clinton Avenue South
ROCHESTER, N. Y.

BUFFALO, N. Y., Ellicott Square

Products

Brick Boiler Settings.

Design and construction of Radial Brick Chimneys and Common Brick Stacks.

Chimney Repairing, Steel Stack Linings and Flue Linings. Installation and repair of Lightning Arrestors.

Also Special Furnaces and Ovens.

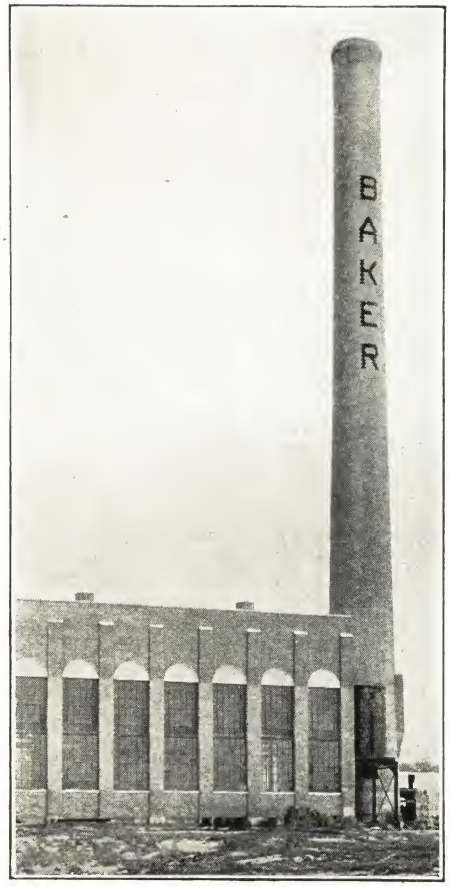
Service

The services of a competent engineering staff are at the disposal of engineers and architects without obligation.

Boiler Settings

Recent advances made in the methods of burning coal under boilers have brought into existence various types of furnace construction and equipment which necessarily require expert knowledge in both design and construction.

Boiler setting designs or engineering assistance for the solution of coal burning problems, preliminary layouts, and estimates are available upon request.



Chimney for C. F. Baker & Son, Utica, N. Y.

Estimates for Chimneys

The following information will assist in the preparation of a chimney estimate:

Nearest railroad delivery and the distance to the chimney site.

Purpose for which chimney is to be used.

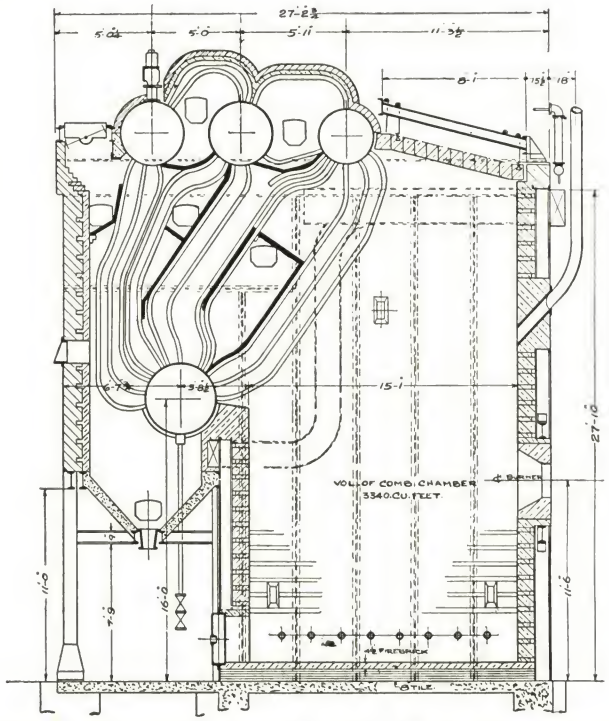
Maximum temperature likely to be encountered.

Dimensions of chimney required or total horsepower of boilers.

Type of fuel to be used.

General arrangement of chimney and boiler layout together with data as to location of flue opening.

Local prices of sand, cement and red (common) brick.



Powdered Coal Furnace Adapted to Firing Wood Refuse at Rudolph Wurlitzer Co., North Tonawanda, N. Y.

B-Line
Shortest Way to Heating Efficiency
GAS
BOILERS
Hot Water
Vapor
Steam
B-Line Boiler Co.
Cleveland, Ohio
Catalogue No. 604

B-LINE BOILER CO.

CLEVELAND, OHIO

For B-Line Gas-fired Water Heaters, see Manufacturers' Index

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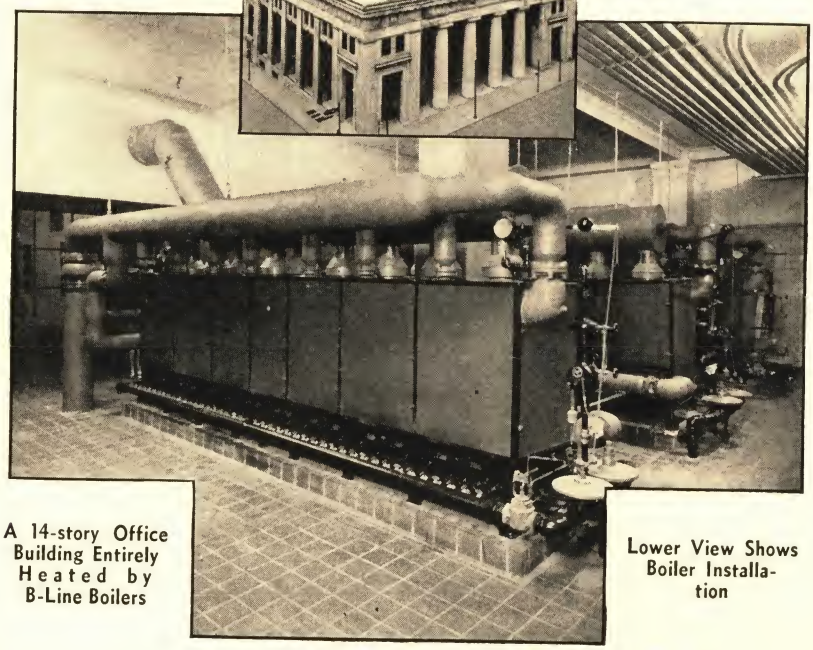
WHY GAS FOR HEATING

Each year witnesses a tremendous increase in all sections of the country in the use of gas for heating. The tremendous growth of the gas distribution systems gives an idea of the rapidly increasing popularity of gas as a fuel, a popularity which is fully deserved in the light of its many advantages—advantages which make gas ideal as a modern fuel.

Advantages of Gas Heating

What are the advantages of gas heating, and who are the beneficiaries of these advantages? First of all the use of a gas boiler simplifies the design of any building. Basement space ordinarily devoted (with solid or liquid fuels) to the storage of fuels or waste matter left from burning these fuels, may be used for other purposes. In residences, the absolute cleanliness of gas boiler heating allows the basement quarters to be used for laundry and recreation purposes without special precautions for separating the boiler room. With larger buildings, advantageous use can always be made of the space liberated from fuel storage. While these points indicate the advantages of gas boiler heating from the standpoint of building design, the tenants of the building undoubtedly benefit most from the use of gas boiler equipment, because it is in actual use that such heating equipment shows at its best.

A 14-story Office Building Entirely Heated by B-Line Boilers



Lower View Shows Boiler Installation

Importance of Automatic Control

Perhaps the greatest advantage of gas heating is that of fully automatic control. Constant furnace tending becomes a nuisance, and negligence sooner or later becomes inevitable, with the result that fires are not kept at proper level, room temperatures drop, and the rooms become chill. At the other extreme, firing is too rapid and the rooms become greatly overheated. Automatic control, as used on B-Line boilers, removes from human hands the responsibility of constant attendance on the furnace, and places it in instruments which constantly and reliably maintain temperatures at the proper point. For commercial buildings this means lack of complaints from tenants; to the home owner it means a vacation from petty cares, and comfort without worry.

B-Line gas boilers are provided with automatic con-

trols which not only regulate the temperature to the desired point, but also keep watch over the temperature of water in the radiators, the pressure of steam, and level of water in the boilers. Thermostatic pilots are provided to insure the turning off of gas whenever the automatic ignition pilots are turned off, and to prevent turning on the gas before the pilots are lighted. Gas pressure is kept at the proper point for maximum efficiency of operation regardless of variation which may occur in the gas mains. With all of these automatic features, a B-Line boiler installation will heat any building with practically no attention—in short, it brings to heating the service which the telephone, electric light, mechanical refrigerator, and radio have given in other directions.

Uniform Heating

The advantages of gas heating are not confined to the mere saving of time and labor. Gas heating makes the maintenance of uniform temperatures in home or office an easy matter, and thus does much to offset the unhealthful conditions to which we are accustomed in the winter. It eliminates the advance investment in fuel, because gas is not paid for until it has been used. Constant fuel quality is assured because it is insured by governmental agencies. High efficiency is also obtained with B-Line gas boilers because the elimination of the uncertainties of hand firing and the manufacture of the complete equipment permit a design which will utilize to a maximum the heat which the gas contains.

Commercial Heating

While the heating of buildings with gas presents a tremendous number of advantages, it is not the only field for gas boilers. An increasing number of commercial and industrial organizations are turning to B-Line boilers because of their ease of control, flexibility, speed, and lack of supervision required for many uses, such as large volume of hot water supply, plating baths, swimming pools, sprinkler tanks, drying kilns, and other work requiring low pressure steam or hot water.

An Ideal Fuel

Gas is without doubt ideal as a fuel—it satisfies every requirement of ease of control, cleanliness, easy handling, high efficiency, and constant quality, but its most satisfactory use depends upon the equipment in which it is burned. This makes the choice of gas heating equipment of paramount importance to the architect, engineer, and building owner.

In the following pages we present a series of B-Line gas boilers which are the result of many years' experience in the development of gas heating equipment. They offer important advantages in ease of operation, heating efficiency, and fuel economy. The B-Line boiler sections, efficiently designed burners, an effective system of automatic air regulation, thorough insulation and dependable control systems make possible with B-Line gas boilers a guarantee of exceptionally satisfactory heating service.

From Cottages to Skyscrapers There Are B-Lines to Fit

RATINGS AND BOILER SELECTION FACTORS

Boiler Ratings

Gas boilers for space heating are most commonly rated according to their output in terms of direct cast iron radiation. B-Line boilers are rated in accordance with the test procedure of the American Gas Association Testing Laboratory, in which the actual hourly Btu output is divided by 240 for square feet of steam rating, and by 150 for square feet of water rating, these figures being taken as the average heat emission for direct cast iron radiation.

Selecting the Boiler Size

In determining the proper size of boiler it is necessary to make an allowance for piping losses and for heating the system quickly from a cold start. The proper allowance is variable, depending upon the size and layout of the system, and can be most correctly made by the engineer supervising the installation of the boiler. For convenience the selection factors recommended for gas boilers by the American Gas Association, and recognized as correct for the average system, have been applied to obtain the direct cast iron radiation loads listed below.

Indirect Radiation and Unit Heaters

Before determining the size of boiler with indirect radiation or unit heater systems the load should be reduced to the equivalent direct cast iron radiation or listed in Btu per hour from manufacturer's tables. With these systems the average selection factors can be discarded as each system must be figured separately. Piping loads for unit heater systems seldom exceed 20 per cent, while central blast systems have very little piping load and a starting load depending upon the proportion of outside and recirculated air. Where steam pressure is maintained constantly on unit heaters, the temperature control being centered in the fans, no starting allowance need be made.

Boiler Horsepower

For industrial uses the hourly Btu output divided by 33,500 is listed as Boiler Horsepower.

B-LINE BOILER RATINGS

Boiler No.	Btu output per hour	Boiler Hp.	A. G. A. Rating		Radiation Load	
			Steam	Water	Steam	Water
Model "M" Boilers						
22	38,400	1.1	160	260	105	165
23	76,800	2.3	320	510	210	325
24	115,200	3.4	480	770	310	495
25	153,600	4.6	640	1020	415	655
26	192,000	5.7	800	1280	520	820
27	230,400	6.9	960	1540	630	1010
Models "K" and "DK" Boilers						
43	158,400	4.7	660	1060	425	680
54	211,200	6.3	880	1410	575	920
65	264,000	7.9	1100	1760	730	1170
76	316,800	9.5	1320	2110	885	1420
87	369,600	11.0	1540	2460	1040	1665
98	422,400	12.6	1760	2820	1195	1915
109	475,200	14.2	1980	3170	1350	2160
1110	528,000	15.8	2200	3520	1505	2410
1211	580,800	17.3	2420	3870	1660	2660
1312	633,600	18.9	2640	4220	1815	2905
1413	686,400	20.5	2860	4580	1970	3155
1514	739,200	22.1	3080	4930	2130	3410
1615	792,000	23.6	3300	5280	2295	3675
1716	844,800	25.2	3520	5630	2455	3930
1918	950,400	28.4	3960	6340	2780	4450
2019	1,003,200	30.0	4180	6690	2950	4720
2120	1,056,000	31.5	4400	7040	3110	4980
2322	1,161,600	34.7	4840	7740	3440	5505
2524	1,267,200	37.8	5280	8450	3770	6035
2726	1,372,800	41.0	5720	9150	4090	6545
2928	1,478,400	44.1	6160	9860	4400	7040
3130	1,584,000	47.3	6600	10560	4710	7540
3332	1,689,600	50.4	7040	11260	5030	8050
3534	1,795,200	53.6	7480	11970	5340	8545
3736	1,900,800	56.7	7920	12670	5660	9060
3938	2,006,400	59.9	8360	13380	5970	9555
4140	2,112,000	63.0	8800	14080	6290	10065

STANDARD EQUIPMENT ON B-LINE BOILERS

A wide variety of controls may be furnished with B-Line boilers, according to their application. The standard controls and trimmings for the various types of boilers are listed below.

Type "S"

Gas pressure regulator
Snap action gas control valve
Labeled non-throttling hand control valve
Steam pressure control
Compound retard steam gauge
Pop safety valve, set 15 or 5 lbs. per sq. in.
Water gauge and try cocks
Drain cock
Metal jacketed covering
Draft hoods
Pilots, cock and piping

Type "SA"

Gas pressure regulator
Snap action gas control valve
Labeled non-throttling hand control valve
Combination steam pressure and low water control
Thermostatic pilots, cock and piping
Solenoid valve with hand control gas valve and transformer
Compound retard steam gauge
Pop safety valve, set 15 or 5 lbs. per sq. in.
Water gauge and try cocks
Drain cock
Metal jacketed covering
Draft hoods

Type "W"

Gas pressure regulator
Quick acting lever control valve
Labeled non-throttling hand control valve
Altitude gauge
Thermometer
Drain cock
Metal jacketed covering
Draft hoods
Pilots, cock and piping

Type "WA"

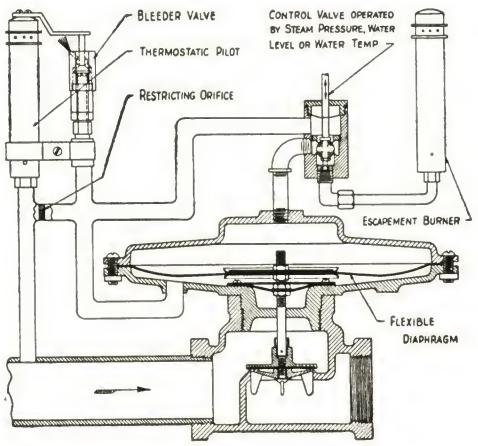
Gas pressure regulator
Snap action gas control valve
Labeled non-throttling hand control valve
Thermostatic pilots, cock and piping
Water temperature thermostat
Solenoid valve with hand control gas valve and transformer
Altitude gauge
Thermometer
Drain cock
Metal jacketed covering
Draft hoods

(For Types "AA" and "SIA" for storage water heating, see our water heating section on page 12.)

B-Line automatic controls are operated by gas pressure, except Type "W," which is operated manually or by electric motor. Electricity is used only for operating room temperature control. Standard electrical equipment operates only on 60-cycle, 110-volt a-c. current. Equipment for other types of current can be supplied on special order.

SNAP ACTION VALVE AND THERMOSTATIC PILOT SYSTEM

In B-Line boilers equipped with complete automatic controls, the snap action gas control valve operates in the main gas line to turn the gas on or off under the action of the various control units. The valve disc is moved to or from the seat by gas pressure acting on a flexible diaphragm. When there is no gas pressure above the diaphragm, it is lifted by the pressure beneath, carrying the valve disc to the open position. If gas is admitted to the top of the diaphragm, the pressure above and below is equalized and the valve disc is carried by gravity to the closed position. Gas for operating the diaphragm is taken from the supply line and directed to the proper chamber by small control valves operated by steam pressure, water level, water temperature, or room temperature. These control valves are large enough to change the diaphragm pressures quickly, while the diaphragm travel necessary for full opening or closing of the main valve is very small, so that an essentially snap control of the gas supply results. To insure positive closure of the valve, the disc is faced with soft leather and is guided to its seat by metal guides.

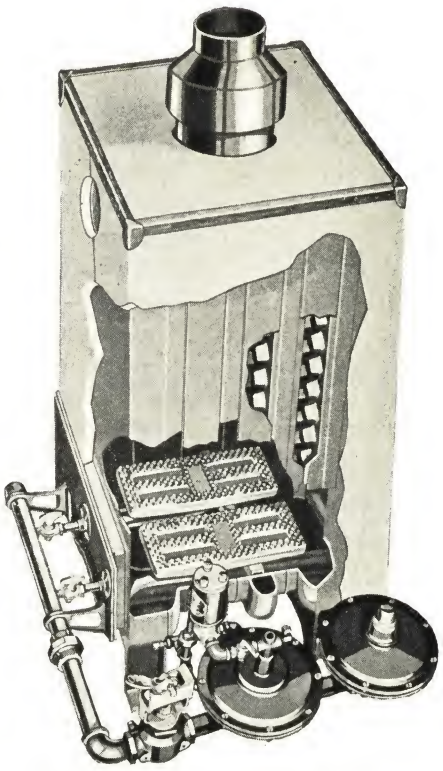


Thermostatic pilots operating on B-Line diaphragm valves cut off the gas by starving the lower diaphragm chamber of gas pressure. This is done by a small bleeder valve, open when the pilot is cold. Bleed gas is discharged directly at ignition pilot, making pilots easily inspected for correct functioning, and readily accessible in case adjustment should be necessary.

B-LINE MODEL "M" BOILERS

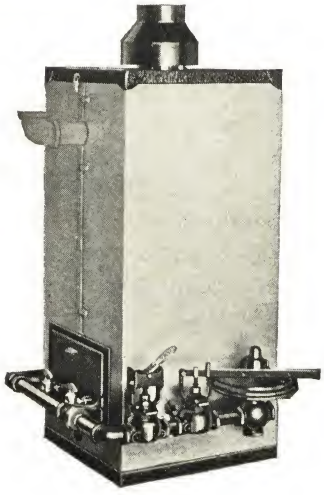
Model "M" B-Line boilers are designed especially for small and moderate sized heating systems and for industrial processes requiring low pressure steam or hot water. Due to the small range of sizes involved they have been designed with constructional features which make their installation exceptionally economical for duplex residences, small apartment houses, office and store blocks, as well as single residences requiring up to 630 sq. ft. of steam radiation or its equivalent in hot water radiation. As hot water supply units the various sizes will be found exceedingly well adapted to the small and medium size apartment buildings, office buildings, dormitories, or similar applications where relatively large volumes of hot water are required.

The general construction of Model "M" boilers is shown in the accompanying illustration. High efficiency is secured by the diamond shaped projections extending outward from the sides of adjacent sections in a staggered relationship, insuring complete scrubbing of heat from the combustion gases by a two-plane flue gas travel. These projections are hollow, making all of the heating surface direct and water-backed, resulting in a continued rapid action and maintained efficiency. Water tubes extend downward from the heating surfaces, enclosing both sides and bottom of the combustion chamber, and preventing heat loss to the floor and atmosphere. At the top of the sections the flue gases are collected in a cast iron hood which prevents corrosive action of flue gases on the jacket top. The boiler is fitted with an insulated metal jacket, attractively enameled.



Phantom View of Model "M" Boiler

An important feature of these boilers is the ease of erection on the job. The sections are shipped assembled, as well as the complete gas regulation system. Gas manifold, pilot and escapement burners are assembled to the door frame which is attached to the sections as a unit. An exclusive three piece jacket is used, which is attached to the boiler by spring clips, no bolts or screws being required.

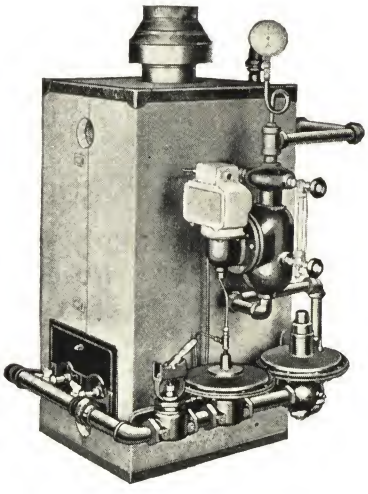


At Left:

Model "M" Water Boiler

At Right:

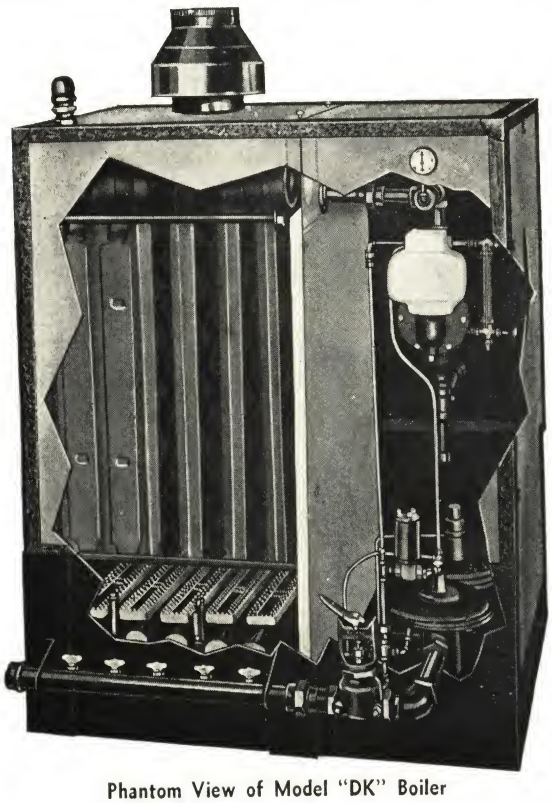
Model "M" Steam Boiler



B-LINE MODELS "K" AND "DK" BOILERS

Models "K" and "DK" B-Line boilers are available for heating systems ranging from the average seven-room residence to the largest commercial and industrial applications. The size of the section, volume of water content, and steaming space above the water line make them especially well adapted to industrial applications of low pressure steam, as well as for large volume water heating and space heating.

In these boilers an unusually large cast iron section is used. Its water passages form a construction which provides an inclined upward circulation of heated water and rapid release of steam as it is formed at any point in the section. At the same time the convolutions of adjacent sectional surfaces present a staggered flue passage to insure long effective flue gas travel and produce a high thermal efficiency, an effect which is heightened by the all direct and water-backed heating surface. The flue spaces between the sections are closed by cast iron cleanout panels, easily removable for inspection and cleaning of the heating surfaces, and are closed at the top by a cast iron hood or flue gas collector which is connected to the chimney through a draft hood for the nullification of adverse chimney drafts.



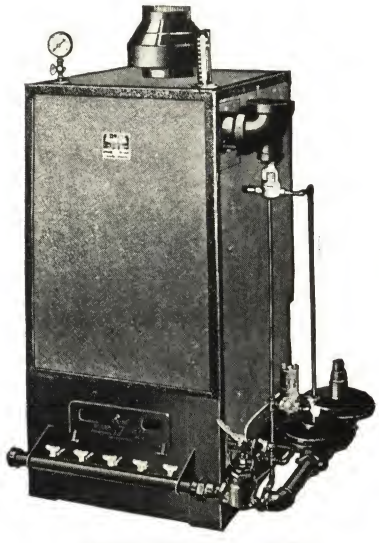
Phantom View of Model "DK" Boiler

The sections are mounted on a strong cast iron base, providing maximum ease of assembly and reducing the labor involved in case of repairs. Burners and pilots are assembled in the base which forms the bottom and sides of the combustion chamber. All gas controls are assembled before shipment and are connected on the job by unions, thus further facilitating the erection of the boiler.

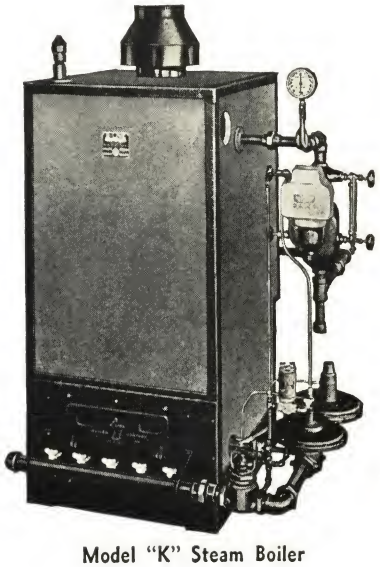
Jackets are of insulated metal attractively finished in enduring enamels. They are assembled on the boiler by spring clips, without the use of tools.

An exclusive feature of Models "K" and "DK" B-Lines is the air control. This consists of an air damper, automatically operated by gas pressure, which closes whenever the gas is turned off. Since all of the air for combustion is taken from the firebox, the closing of the door completely stops the flow of air through the boiler when the gas is cut off and eliminates the loss of heat which would occur if air were passing over the heated sections to the chimney. Automatically controlled gas boilers operate only about one-fourth of the full time per heating season, and this feature therefore represents a material saving in fuel bills.

Models "K" and "DK" are similar in all points of design which affect efficiency and economy of operation. In Model "DK" extra jacket panels are provided to cover the gas regulation and controls for use in basement recreation rooms where a separate enclosure for the boiler is not provided. Burner cocks and manual gas cut-off, however, are accessible for quick control of the boiler without removal of doors or jacket panels.

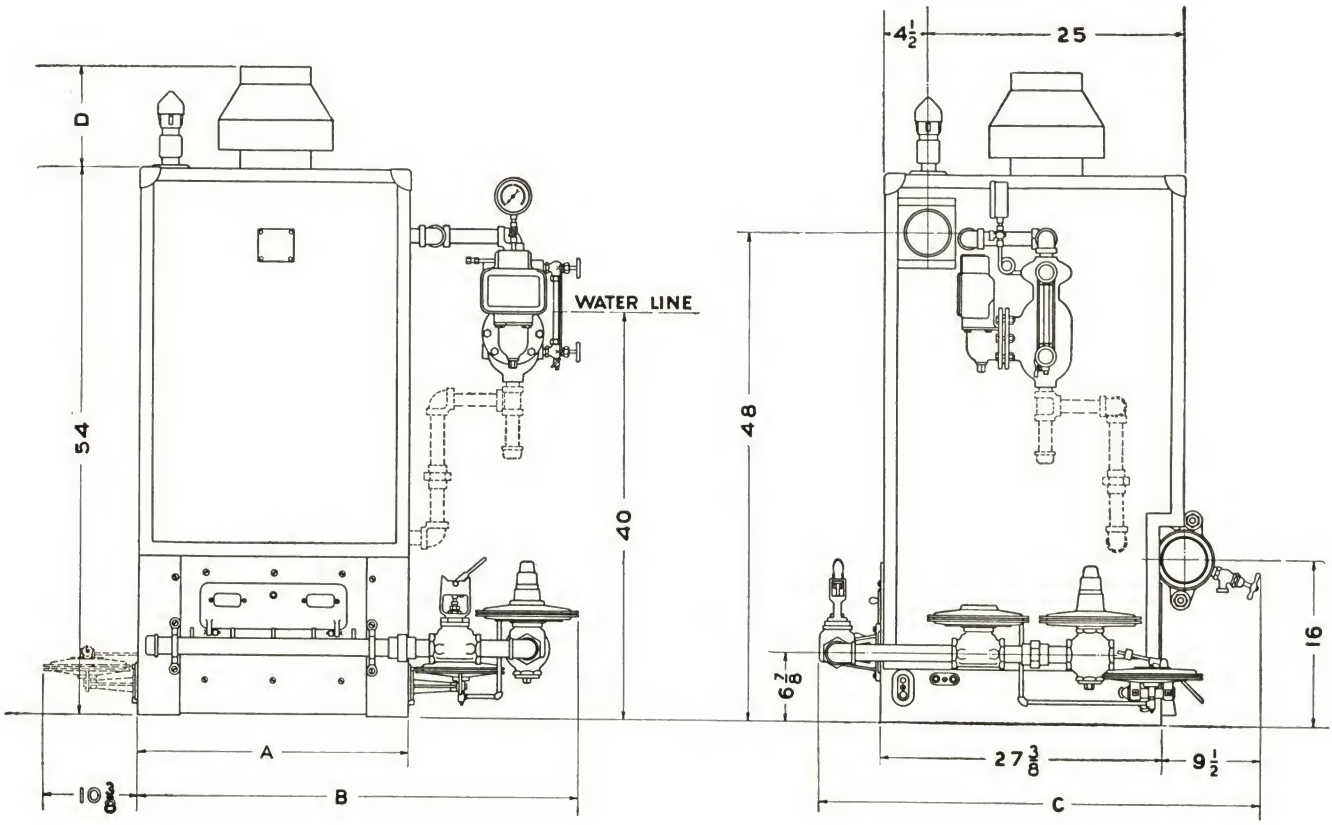


Model "K" Water Boiler

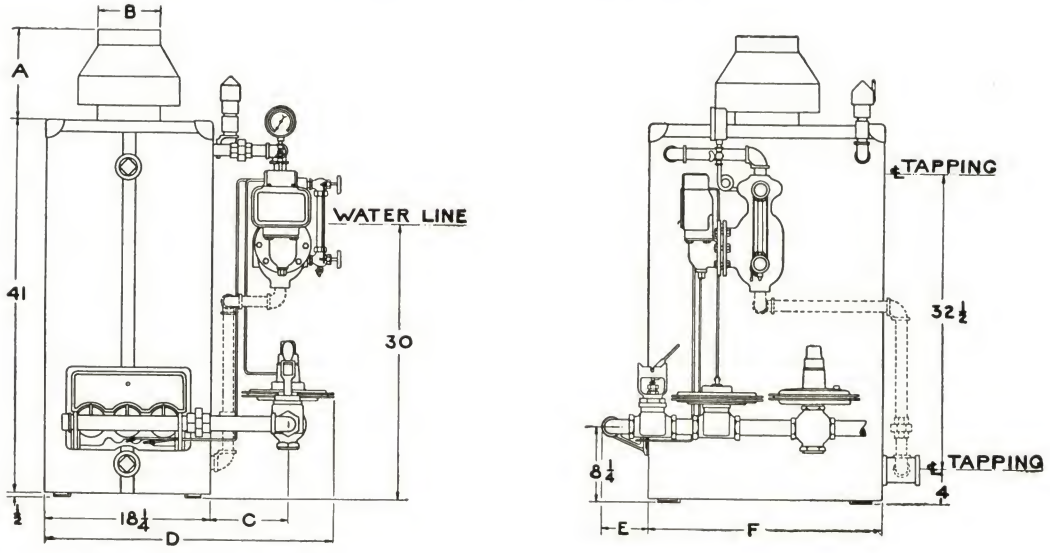


Model "K" Steam Boiler

DIMENSIONAL DIAGRAM
MODELS "K" AND "DK" BOILERS



DIMENSIONAL DIAGRAM
MODEL "M" BOILER



PRINCIPAL DIMENSIONS OF MODELS "K" AND "DK" BOILERS

All Dimensions in Inches

Boiler No.	Length face to face end tappings	A	B	C	Flanged flow openings		Flanged return openings		Gas regulation I.P.S.	Flue openings		Flue pipe to chimney	Shipping weight, lbs.
					No.	Size	No.	Size		No.	Size		
43	16 3/8	18 1/2	32	42	.....	.....	.....	.....	1	1	6	6	1260
54	20 1/2	22 1/2	39	43	.....	.....	.....	.....	1 1/4	1	7	7	1510
65	24 9/16	26 3/4	43	43	.....	.....	.....	.....	1 1/4	1	8	8	1758
76	28 5/8	30 3/4	47	43	.....	.....	.....	.....	1 1/2	2	6	8	1978
87	32 3/4	35	51	43	.....	.....	.....	.....	1 1/2	2	7	10	2268
98	36 13/16	39	56	44	.....	.....	.....	.....	2	2	7	10	2549
109	40 15/16	43	61	44	.....	.....	.....	.....	2	2	8	12	2792
1110	45	47 1/4	65	44	.....	.....	.....	.....	2	2	8	12	3068
1211	49 1/8	51 3/4	69	44	.....	.....	.....	.....	2	3	7	12	3340
1312	53 3/16	55 1/2	73	44	1	3	1	3	2	3	7	12	3690
1413	57 5/16	59 1/2	77	44	1	3	1	3	2	3	8	14	3935
1514	61 3/8	63 1/2	81	44	2	3	2	3	2	3	8	14	4267
1615	65 1/2	67 3/4	85	44	2	3	2	3	2	4	7	14	4543
1716	69 5/8	71 3/4	90	44	2	3	2	3	2	4	7	14	4775
1918	77 3/4	80	98	44	2	3	2	3	2	4	8	14	5344
2019	81 7/8	84	102	44	3	3	3	3	2 1/2	4	8	16	5510
2120	86	88 1/4	106	44	3	3	3	3	2 1/2	5	7	16	5910
2322	94 3/16	96 3/4	115	45	3	3	3	3	3	5	8	16	6400
2524	102 5/16	104 1/2	123	45	3	3	3	3	3	5	8	16	6941
2726	110 1/2	112 3/4	131	45	3	3	3	3	3	6	8	18	7784
2928	118 5/8	120 3/4	139	45	3	3	3	3	3	6	8	18	8146
3130	126 7/8	129	147	45	4	3	4	3	3	6	8	18	8715
3332	135 1/16	137 1/4	156	45	4	3	4	3	3	7	8	18	9261
3534	143 1/4	145 1/2	164	45	4	3	4	3	3	7	8	20	9703
3736	151 7/16	153 1/2	189	44	5	3	5	3	2–2	8	8	20	10373
3938	159 5/8	161 3/4	197	44	5	3	5	3	2–2 1/2	8	8	20	10680
4140	167 7/8	170	205	44	5	3	5	3	2–2 1/2	8	8	20	11387

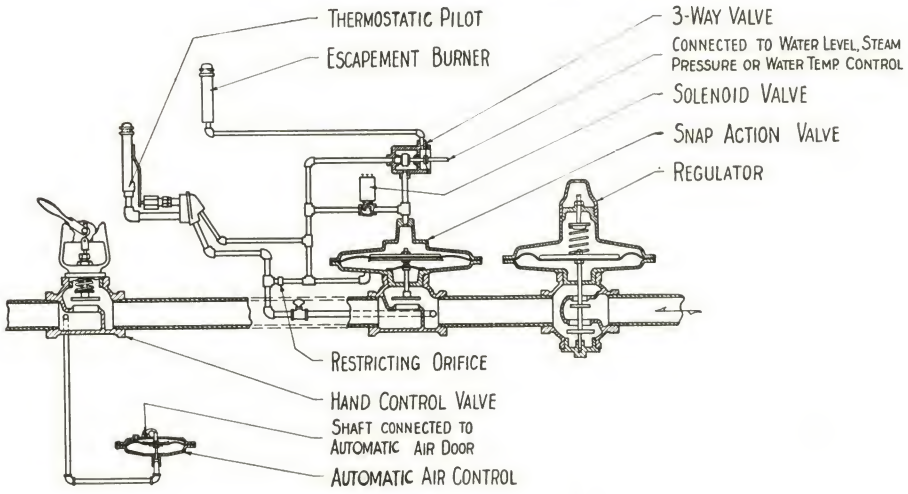
(1) End sections tapped 4 in. flow and return.
(2) Flanged return connection on intermediate section furnished only on water boilers.
(3) Dual gas lines to boilers 3736 and larger.
(4) Left-hand gas regulation can be furnished.
(5) Two automatic air valves on all boilers larger than 1716.

PRINCIPAL DIMENSIONS OF MODEL "M" BOILERS

All Dimensions in Inches

Boiler No.	Length face to face end tappings	A	B	C	D	E	F	Gas regulation I.P.S.	Flue pipe to chimney	Shipping weight, lbs.
22	9 3/8	7	4	7 1/2	30 1/2	4 3/4	10 3/4	1	4	400
23	13 1/16	7	5	7 1/2	30 1/2	4 3/4	14 1/2	1	5	500
24	16 3/4	8	6	7 1/2	30 1/2	4 3/4	18	1	6	630
25	20 7/16	10	7	7 1/2	33	5	22	1 1/4	7	770
26	24 1/8	11	8	10	33	5	25 1/2	1 1/4	8	920
27	27 13/16	11	8	10	33	5	29	1 1/4	8	1050

B-LINE GAS CONTROLS



General Diagram of B-Line Control System

A fully automatic B-Line control system is shown in the drawing, automatic air control valve as used on Models "K" and "DK" being included. The snap action gas valve and thermostatic pilot system are described on page 4.

Gas Pressure Regulator

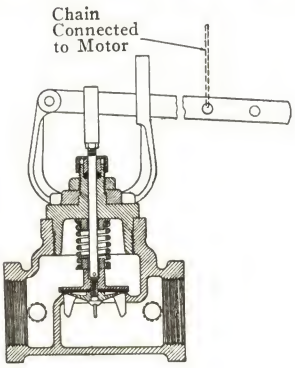
The regulator is a double balanced seat type, the balanced seats giving accurate regulation regardless of variations of the inlet pressure. Large valve openings permit flow of gas up to the full capacity of the pipe. Soft seats are used to insure good regulation when the flow is reduced to a very low point. Pressure adjustment is made by removing the screwed cap at the top and turning the adjustment screw.

Hand Control Valve

An exclusive feature of B-Line hand control valves is the non-throttling device. The valve is closed by a spring against the action of a toggle, and is thrown from fully open to fully closed position by a quick movement of the labeled lever, making it impossible to leave a small amount of gas flowing. A soft guided seat is used to insure positive closure of the valve.

Lever Cut-off Valve

For remote manual or motor control directly on the main gas line, the B-Line quick acting lever valve is readily adaptable. It is closed by a spring using a soft seat for tightness. A by-pass for low flame can be provided. Thermostatic pilots of the electrically operated type may be used when this valve is operated by a motor.

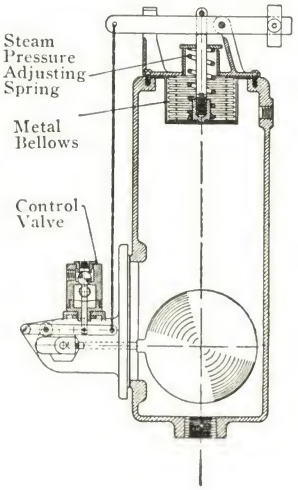


At Left:
Lever Cut-off Valve

Steam Pressure and Low Water Control

For control by steam pressure or low water a small secondary valve is connected to the snap valve in the main gas line. An increase in steam pressure above the desired amount expands a metal bellows, and the movement of the bellows carries the small control valve to a position which cuts off the gas. When the steam pressure drops the control valve is returned to the open position. The steam pressure cut-off may be set at any desired point, from a few ounces to 15 lbs. per sq. in.

If the water level in the boiler becomes too low the float drops and through a cam moves the control valve to the closed position. When the water is returned to the proper level the control valve automatically returns to the open position. Steam pressure and low water actions are independent, and the setting of one does not affect the sensitivity of the other.



At Right:
Steam Pressure and Low Water Control

SPECIFICATIONS FOR B-LINE BOILERS

Boiler

Boiler shall be furnished and set in basement, in accordance with instructions furnished by manufacturer, No. .... B-Line Gas Boiler, as manufactured by the B-LINE BOILER Co. with Type .... equipment including (copy from page 4), having a rated capacity of .... square feet.

Gas Connection

Gas supply line shall be .... inch (see page 8). Use standard make .... inch valve in vertical drop to gas pressure regulator.

Water Connection

Furnish and install water connection to boiler from building supply and install cock close to boiler.

Flue Pipe

Boiler to be connected to chimney with heavy galvanized iron flue pipe, of full size (see page 8), as required by outlet on boiler.

Supply and Return Mains

Install supply and return mains, of sizes as indicated on plans. To be installed in such a manner as to circulate freely. All supply and return mains to be supported by neat adjustable hangers, arranged to suit expansion and contraction of piping. All piping shall be best grade .... (iron or steel), with cast iron fittings.

Risers

Install all supply and return risers, of sizes shown, and at locations indicated on plans.

Radiators

Furnish and install radiators, of the .... type, of heights and capacities as shown on the plans.

Radiator Valves

Each radiator to be equipped with a nickelplated quick opening union radiator valve; also a nickel No. .... air valve.

Floor and Ceiling Plates

At all points where pipes pass through ceilings or floors, the openings to be protected with nickelplated plates, properly secured in place.

Guarantee

The contractor must guarantee to heat all rooms in which radiators are placed to .... degrees Fahrenheit, with .... degrees temperature outside.

Painting

All radiators and exposed pipe work above basement to be bronzed or painted in colors as directed.

B-LINE
BOILER CO.

CRANE CO.

Basmor Gas-fired Boilers for Water, Steam or Vapor

836 South Michigan Avenue
CHICAGO, ILL.

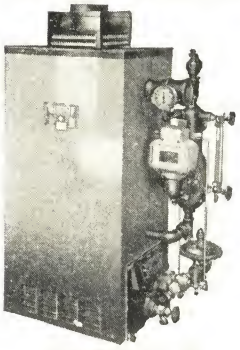
For Branch Offices, see our Plumbing Section
For our pages on Water Heaters, Water Softeners, Water Systems, and Plumbing Fixtures, see Manufacturers' Index

BASMOR GAS FIRED BOILER

The Basmor Gas-fired Boiler for House Heating, Series 25 and Series 40

Basmor Gas-fired Boilers for house heating are available in two types: the new Series 25 for average homes and Series 40 for larger homes, apartments, commercial and all other installations. Each is made for steam, vapor, or hot water house heating. Both are fully automatic. They have been improved in every detail for efficient, trouble-free, safe operation. Controls are all gas operated and not dependent on electric current. Boilers are always under control of safety features, even when manually operated.

Sections are of cast gray iron of special composition, strengthened by lugs cast crosswise. Lugs or fins cast on the side of each section are so staggered that heat travel between sections is forward, backward, and sidewise, setting up a "whirlpool" action and maximum utilization of heat.



Basmor Series 25

The Series 40 is available in sizes from six to thirty-five sections. For still greater capacity, tandem installations are made. Series 25 is available with from two to eleven sections for hot water and three to eleven for steam or vapor.

For Steam or Vapor House Heating Controls and Accessories

Basmor Gas-fired Boilers, Type S are furnished with the following equipment:

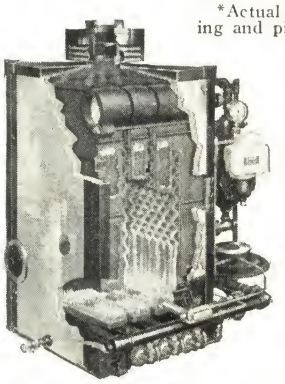
Housing and Insulation—Enameled exterior jacket complete, finished in two-tone green enamel, easily assembled and removed without disturbing piping. Heavy air cell asbestos insulation, scientifically designed draft hood.

Controls—Gas pressure regulator, electrically controlled "Instant Action" gas valve, with throttling type flame regulator, main gas shut-off valve.

Burner—Patented non-backfiring butterfly flame on all Series 25 Models.

High powered blue flame Bunsen. Designed for low pressure operation. Non-backfiring, quiet, easily renewable for cleaning on all Series 40 Models.

Safety Features—Safety gas control, pop safety valve, steam pressure regulator and low water cut-off. Also compound Retard Gauge with water seal, water gauge, and try cocks, boiler drain faucets, auxiliary pilot light and all necessary fittings for front and side manifold, pilot line and tubing for controls. No motor required.



Sectional View of Series 40

For Hot Water House Heating Controls and Accessories

Basmor Gas-fired Boilers, Type W, are furnished with the following equipment:

Housing and Insulation—Enameled exterior jacket complete in two-tone green enamel, easily assembled and removed without disturbing connections. Heavy air cell asbestos insulation, scientifically designed draft hood.

RATINGS AND CAPACITIES

Boiler No.	Number sections	Available B.t.u.	Steam Boiler Type S: Horse power	A.G.A. Rating	*Actual C. I. radiation boiler will handle	Approx. shipping weight: With jacket	Approx. shipping weight: Less jacket	Water Boiler Type W: A.G.A. Rating	*Actual C. I. radiation boiler will handle	Approximate shipping weight: With jacket	Approximate shipping weight: Less jacket
Series Twenty-five											
25-2	2	26,400	....	....	....	....	....	175	110	400	335
25-3	3	52,800	....	220	140	560	490	350	225	515	445
25-4	4	79,200	....	330	210	675	600	525	335	630	555
25-5	5	105,600	....	440	280	790	710	700	450	745	660
25-6	6	132,000	....	550	350	905	820	880	565	860	770
25-7	7	158,400	....	660	425	1020	925	1055	680	975	880
25-8	8	184,800	....	770	490	1140	1040	1230	800	1090	990
25-9	9	211,200	....	880	570	1250	1145	1405	920	1205	1100
25-10	10	237,600	....	990	630	1370	1255	1585	1045	1320	1210
25-11	11	264,000	....	1100	710	1480	1365	1760	1170	1435	1320
Series Forty											
40-6	6	280,000	8.4	1170	760	1550	....	1870	1240	1485	....
40-7	7	336,000	10.0	1400	810	1755	....	2240	1500	1690	....
40-8	8	392,000	11.7	1630	1070	1950	....	2510	1700	1885	....
40-9	9	448,000	13.4	1870	1240	2155	....	2990	2060	2090	....
40-10	10	504,000	15.1	2100	1400	2375	....	3360	2330	2310	....
40-11	11	560,000	16.7	2330	1570	2600	....	3730	2600	2535	....
40-12	12	616,000	18.4	2570	1750	2815	....	4110	2900	2750	....
40-13	13	672,000	20.1	2800	1820	3040	....	4480	3150	2975	....
40-14	14	728,000	21.7	3030	2100	3265	....	4850	3420	3200	....
40-15	15	784,000	23.4	3260	2260	3525	....	5220	3710	3460	....
40-16	16	840,000	25.1	3500	2430	3770	....	5600	4000	3705	....
40-17	17	896,000	26.8	3730	2600	3995	....	5970	4265	3930	....
40-18	18	952,000	28.4	3960	2760	4220	....	6340	4520	4155	....
40-19	19	1,008,000	30.1	4200	2960	4445	....	6720	4800	4480	....
40-20	20	1,064,000	31.8	4430	3080	4680	....	7090	5065	4615	....
40-21	21	1,120,000	33.5	4660	3300	4895	....	7460	5330	4840	....
40-22	22	1,176,000	35.1	4900	3470	5160	....	7840	5600	5090	....
40-23	23	1,232,000	36.8	5130	3640	5390	....	8210	5865	5320	....
40-24	24	1,288,000	38.5	5360	3820	5605	....	8580	6130	5550	....
40-25	25	1,344,000	40.1	5600	4000	5840	....	8960	6400	5735	....
40-26	26	1,400,000	41.8	5830	4165	6065	....	9330	6665	6000	....
40-27	27	1,456,000	43.5	6060	4325	6320	....	9700	6930	6255	....
40-28	28	1,512,000	45.2	6300	4500	6545	....	10,080	7200	6475	....
40-29	29	1,568,000	46.9	6530	4665	6770	....	10,450	7465	6755	....
40-30	30	1,624,000	48.5	6760	4830	7000	....	10,820	7730	6935	....
40-31	31	1,680,000	50.2	7000	5000	7225	....	11,200	8000	7160	....
40-32	32	1,736,000	51.9	7230	5165	7480	....	11,570	8265	7415	....
40-33	33	1,792,000	53.5	7460	5330	7705	....	11,940	8530	7640	....
40-34	34	1,848,000	55.2	7700	5500	7930	....	12,320	8805	7865	....
40-35	35	1,904,000	56.9	7930	5665	8160	....	12,690	9065	8095	....

*Actual Cast Iron Radiation boiler will handle which includes safety factor for starting and piping as recommended by the American Gas Association.

Controls—Gas pressure regulator, electrically controlled "Instant Action" gas valve, main gas shut-off valve.

Burner—Patented non-backfiring butterfly flame on all Series 25 Models.

High powered blue flame Bunsen. Designed for low pressure operation. Non-backfiring, quiet, easily renewable for cleaning on all Series 40 Models.

Safety Features—Safety gas control, automatic temperature control.

Also altitude gauge and thermometer, boiler drain faucets, auxiliary pilot light, all necessary fittings for front and side manifold, pilot line and tubing for controls. No motor required.

THE BRYANT HEATER & MFG. COMPANY

FACTORY AND EXPORT SALES
17825 St. Clair Avenue
CLEVELAND, OHIO
SALES OFFICES IN PRINCIPAL CITIES

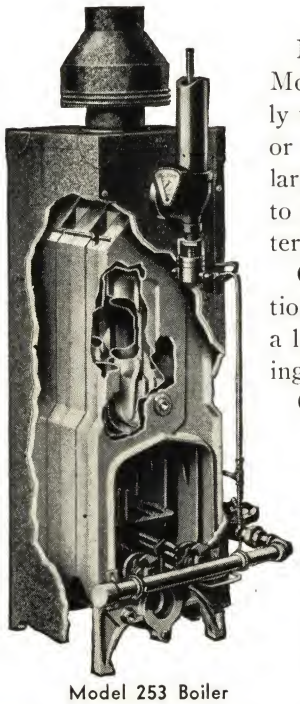
BRYANT GAS BOILERS

Complete Bryant Line

Bryant Gas Boilers cover the entire range of building-heating requirements. No building is so large or so small that the advantages of Bryant Automatic Gas Heating may not be enjoyed. To accomplish this in the most economical and efficient manner, the three standard lines of boilers have been improved. A new application of the proved principles of Bryant design has resulted in the Model 253 Boilers; Models 443 and 445 with increased ratings have succeeded the very popular Models 43 and 45 Boilers and Model 63 Boilers have been extended by the addition of four new sizes. The important dimensions and ratings of the boilers in these three lines will be found in the following pages:

TUBULAR TRADE MARK REGISTERED

BRYANT MODEL 253 BOILERS



Model 253 Boiler

Made in seven sizes Bryant Model 253 Boilers are particularly well suited for the small home, or for the completely insulated large home. They are adapted to either steam, vapor or hot water heating systems.

Cast iron vertical tubular sections with ribs and fins present a large amount of effective heating surface to hot gases.

Complete circulation of water below the burners and mixers is positive due to the sections extending down and around the burner chamber. Legs are cast on the end sections.

The steam dome is large and has internal cast baffles to insure dry steam.

A crystalline finished insulated jacket of a neutral color encloses the Model 253 Boiler.

The principle of Tubular construction is a feature of the boilers of this model which gives an economy of operation comparable with the larger models of the Bryant line.

BRYANT MODELS 443 AND 445 BOILERS

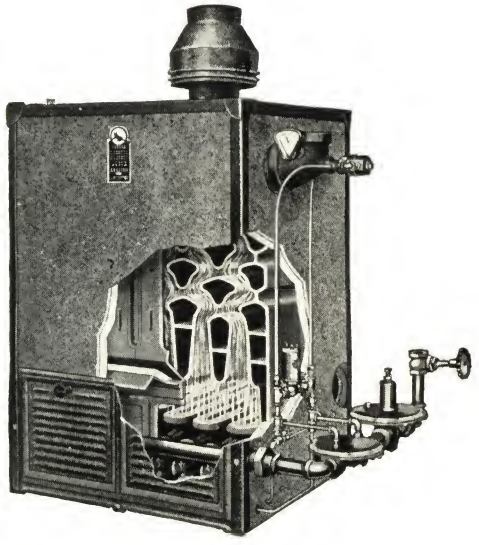
Models 443 and 445 Boilers cover the heating requirements for the average and large home. They are made up of batteries of cast-iron tubular sections, in eleven sizes and are adapted for either steam, vapor or hot water heating systems.

These boilers incorporate all of the many features for which Bryant Boilers have become renowned such as, Bryant Tubular construction, rapid circulation of the water, staggered gas travel, large lower tubes, large steam liberating area, and an enduring crystalline finished metal jacketed cover.

Model 445 Boilers (cutaway view shown on opposite page) have all controls enclosed and out of sight, symbolic of their attentionless reliability. This control cabinet also mounts the handsome instrument panel which centers at a single point the few gauges that ever call for passing inspection.

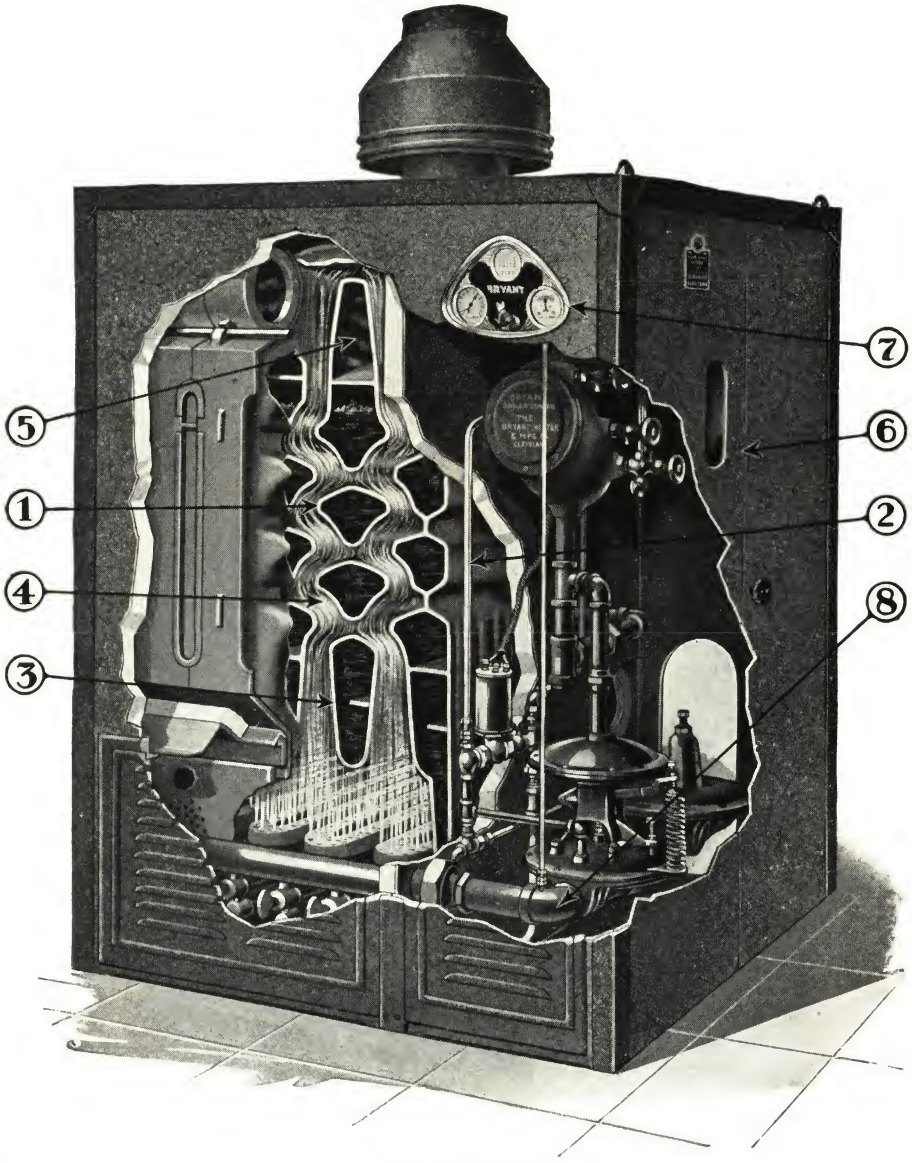
These features make the Model 445 Bryant the most practical boiler for use in the modern "dressed-up basement."

Model 443 Boilers have the same ratings as corresponding sizes of Model 445 Boilers but do not have the control cabinet and gauge panel.

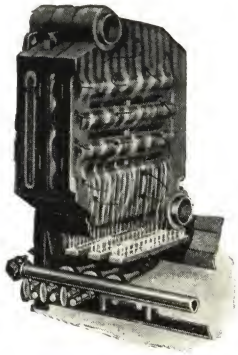


Model 443 Boiler

BRYANT TUBULAR BOILER MODEL 445



Cutaway View

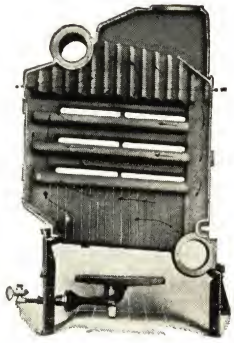


Battery of Sections

(1) Cast iron sections of the water tube type present a large area of heat absorbing surface.

(2) Pitch of water tubes promotes a definite, rapid circulation throughout the height of a Bryant Section preventing air bubbles from insulating the walls and assuring maximum heat transference.

(3) Large lower tubes ribbed to present a high percentage of heating surface within the zone of the hottest gases.



Bryant Tubular Section

(4) Staggered gas travel contributes to maximum efficiency. The hot gases from each burner are so baffled back and forth, constantly rubbing heating surfaces, that only sufficient warmth is left in the gases to promote the necessary draft.

(5) Large steam liberating area and ample steam chamber with baffle insures a steady water line and rapid steaming.

(6) Enduring crystalline finish adds to the handsome appearance of Bryant Boilers.

(7) Gauge panel centers at a single point the few gauges that ever call for passing inspection.

(8) Manifold and controls enclosed symbolic of their attentionless reliability.

BRYANT MODEL 63 BOILERS

Especially designed to meet large scale building heating requirements. Installed, either singly or in batteries, Model 63 Boilers give the impression of cleanliness, convenience and heating efficiency, and add materially to the appearance of a boiler room.

Made in thirteen sizes, but batteries of the larger sizes can be installed to meet any heating requirement. Model 63 Boilers are adapted to steam, vapor or hot water heating systems.

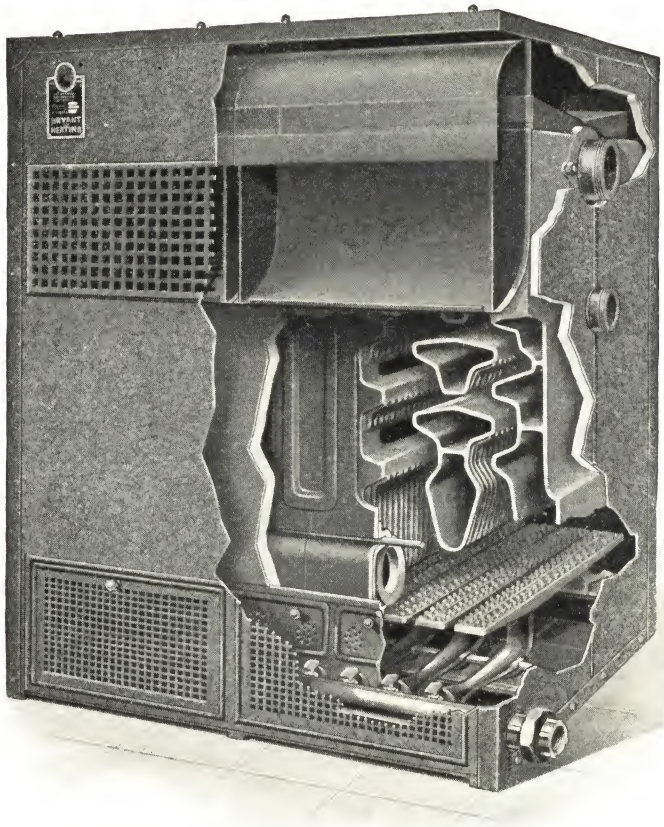
Cast Iron Boiler Sections in this model, as in all Bryant Boilers, are made of special composition to insure maximum life, and are repeatedly tested during manufacture far in excess of any possible pressure to which they may be subjected to in actual use.

An insulated metal jacketed cover, finished in attractive crystalline baked enamel, completely encloses the assembly of boiler sections, burners, mixers, manifold and burner cocks. All parts of the burner assembly are readily accessible through removable doors.

A 3-inch return tapping a few inches below the water line allows perfect equalization in steam heating systems.

Heating surfaces are easily cleaned from either the front or rear of the boiler.

The compact design of Model 63 Boilers gives economy of floor space while the improved style of built-in draft hood conserves much headroom as well as adding to the appearance of the heating plant.



Model 63 Boiler

Important Features

In the accompanying cutaway view of a Model 63 Bryant Boiler, the many important features of design are apparent.

Among these are the heavily ribbed heating surfaces of the boiler sections; the serpentine gas passages formed by the staggered tubular sections; the ample combustion space with two burners located between each pair of sections; the positive alignment of the burners produced by the burner bars; and the completely enclosed mixer tube and air shield.

Other salient points are the built-in draft hood consisting of the flue baffle extending completely over the boiler sections and the front and rear air ducts; the heavily insulated metal jacket finished in crystalline lacquer; the ample flow and return tappings and the large removable cleanout panels.

SPECIFICATIONS FOR BRYANT HEATING EQUIPMENT

Steam or Vapor

Boiler

Contractor shall furnish complete, and set up in basement in accordance with instructions furnished by the manufacturer, one No.....Bryant Tubular Steam Boiler, AGA rating.....square feet, as manufactured by THE BRYANT HEATER & MFG. COMPANY, Cleveland, Ohio. Boiler to be complete with gas pressure regulator, draft hood, boiler control, throttling control valve, solenoid valve, labeled gas shut-off valve, compound retard gauge and siphon, pop safety valve, thermostatic pilot control, and drain cocks.

Water Connection

Furnish and properly connect feed cock of proper size for boiler.

Bryant Gas Pressure Regulator

The vent opening shall be connected to the outside of the building foundation with galvanized pipe; union placed at regulator end, and elbow faced down on outdoor end of vent line.

Flue Pipe

Connect flue outlets on boiler with a.....inch header, made from.....gauge (specify a corrosion resisting metal) and connect same to chimney with (size in column 7, page 8).....inch.....gauge (specify a corrosion resisting metal) pipe.

Gas Supply Line

Furnish (size larger than column 12, page 8)..... inch gas line direct from meter to labeled gas shut-off valve on boiler.

Metal Jacketed Cover

Contractor shall furnish and install metal jacketed covering designed for boiler by the manufacturer.

Hot Water (Dual Control)

Boiler

Contractor shall furnish complete and set up in basement, in accordance with instructions furnished by the manufacturer, one No..... Bryant Tubular Hot Water Boiler, AGA rating.....square feet, as manufactured by THE BRYANT HEATER & MFG. COMPANY, Cleveland, Ohio. Boiler to be complete with gas pressure regulator, draft hood, Robertshaw thermostatic control with solenoid valve and diaphragm snap valve (or Robertshaw thermostatic control with snap action gas valve), labeled gas shut-off valve, altitude gauge, thermometer, thermostatic pilot control, and drain cocks.

Water Connection

Furnish and properly connect feed cock of proper size for boiler.

Bryant Gas Pressure Regulator

The vent opening shall be connected to the outside of the building foundation with galvanized pipe; union placed at regulator end, and elbow faced down on outdoor end of vent line.

Flue Pipe

Connect flue outlets on boiler with a.....inch header, made from.....gauge (specify a corrosion resisting metal) and connect same to chimney with (size in column 7, page 8).....inch.....gauge (specify a corrosion resisting metal) pipe.

Gas Supply Line

Furnish (size larger than column 12, page 8)..... inch gas line direct from meter to labeled gas shut-off valve on boiler.

Metal Jacketed Cover

Contractor shall furnish and install metal jacketed covering designed for boiler by the manufacturer.

Hot Water (Type "C" Control)

Use same form as for "Hot Water (Dual Control)," except change first paragraph to read:

Boiler

Contractor shall furnish complete and set up in basement, in accordance with instructions furnished by the manufacturer, one No. ..... Bryant Tubular Hot Water Boiler, AGA rating.....square feet, as manufactured by THE BRYANT HEATER & MFG. COMPANY, Cleveland, Ohio. Boiler to be complete with gas pressure regulator, draft hood, quick action valve, labeled gas shut-off valve, altitude gauge, thermometer, drain cocks and aquastat.

APPLICATIONS OF BRYANT GAS BOILERS

Bryant Boilers can be used with any type of steam, vapor or hot water heating system, or for the generation of low pressure steam for industrial work. They are classified as explained below according to the type of service to which they are adapted.

Type "S" Boilers

Steam boilers, automatically controlled to maintain any desired steam pressure from a few ounces up to 15 lb. per sq. in. They can also be operated under room temperature control either by the magnetic valve which is standard equipment on Type "S" Boilers, or by the motor of a room temperature control system. Type "S" Boilers are for use with steam, vapor or vacuum heating systems, or for generating steam for cooking or other industrial purposes.

A. G. A. rating sq. ft.	Boiler No.	Approximate shipping weight, lb.	A. G. A. rating sq. ft.	Boiler No.	Approximate shipping weight, lb.	A. G. A. rating sq. ft.	Boiler No.	Approximate shipping weight, lb.
210	4-S-253	430	1320	6-S-445	1975	3700	10-S-63	5360
300	5-S-253	485	1540	7-S-445	2215	4440	12-S-63	6120
380	6-S-253	555	1760	8-S-445	2420	5180	14-S-63	6880
450	7-S-253	625	1980	9-S-445	2640	5920	16-S-63	7620
530	8-S-253	680	2200	10-S-445	2975	6660	18-S-63	8475
600	9-S-253	795	2420	11-S-445	3200	7400	20-S-63	9220
680	10-S-253	850	2640	12-S-445	3420	8140	22-S-63	9970
			2860	13-S-445	3660	8880	24-S-63	10630
660	3-S-445	1320				9620	26-S-63	11280
880	4-S-445	1530				10360	28-S-63	12615
1100	5-S-445	1750	2960	8-S-63	4490	11100	30-S-63	13500

Model 443 boilers have the same ratings as Model 445 boilers; weight—140 lb. less.

Trimmings Furnished

Bryant Boiler Control (combined steam pressure governor and low water cut-off)
Solenoid Valve
Throttling Control Valve
Combination Thermostatic Pilot and Escapement Burner
Pop Safety Valve (set 15 lb.)
Gas Pressure Regulator
Labeled Shut-off Valve
Compound Pressure and Vacuum Gauge and Siphon
Water Level Gauge
Gas Pressure Gauge and Gauge Panel (Model 145 boilers only)
Metal Jacketed Cover
Draft Hood (built into Model 63 boilers)
Drain Cocks

Type "W" Boilers

Boilers equipped for use with hot water heating systems where dual control of the heating system is desired; that is, automatic room temperature and water temperature control. The room temperature control element on this boiler is a magnetic valve for connection to the room temperature thermostat (motor is not required).

A. G. A. rating sq. ft.	Boiler No.	Approximate shipping weight, lb.	A. G. A. rating sq. ft.	Boiler No.	Approximate shipping weight, lb.	A. G. A. rating sq. ft.	Boiler No.	Approximate shipping weight, lb.
380	4-W-253	380	2110	6-W-445	1920	5920	10-W-63	5310
510	5-W-253	435	2460	7-W-445	2165	7100	12-W-63	6080
640	6-W-253	500	2820	8 W-445	2385	8290	14-W-63	6840
770	7-W-253	565	3170	9-W-445	2600	9470	16-W-63	7570
900	8-W-253	620	3520	10-W-445	2900	10660	18-W-63	8410
980	9-W-253	745	3870	11-W-445	3150	11840	20-W-63	9150
1100	10-W-253	800	4220	12-W-445	3370	13020	22-W-63	9900
			4580	13-W-445	3610	14210	24-W-63	10580
1060	3-W-445	1250				15390	26-W-63	11220
1410	4-W-445	1470				16580	28-W-63	12550
1760	5-W-445	1690	4740	8-W-63	4440	17760	30-W-63	13450

Model 443 boilers have the same ratings as Model 445 boilers; weight—140 lb. less.

Trimmings Furnished

Robertshaw Reverse Action Thermostat
Combination Thermostatic Pilot and Escapement Burner
Solenoid Valve*
Diaphragm Snap Valve
Gas Pressure Regulator
Labeled Shut-off Valve
Altitude Gauge
Thermometer
Metal Jacketed Cover
Gas Pressure Gauge and Gauge Panel (Model 445 boilers only)
Draft Hood (built into Model 63 boilers)
Drain Cocks

*A lever-actuated gas valve (Snap Action Valve) which can be operated by the motor of a room temperature control system will be supplied on special request, in place of the Solenoid Valve.

Type "C" Boilers

Boilers equipped for use with hot water heating systems. They are provided with a Bryant Quick Action Valve which may be operated by the motor of a room temperature control system.

Type "A" Boilers

Water Boilers, completely automatic, equipped for use on direct hot water storage systems.

Type "SA" Boilers

Steam Boilers, completely automatic, equipped for use on indirect hot water storage systems.

Current for Electrical Equipment

The current for electrical control devices is most conveniently supplied by a 60 cycle 110 volt A. C. circuit. The transformer which is required with the solenoid valve will be furnished upon order.

Motors for use with type "C" boilers can be operated by any circuit for which the motor is designed.

TO SELECT THE APPROPRIATE BOILER

AGA Rating

Gas boilers are most commonly selected from their AGA rating, which is the boiler output measured in terms of square feet of direct cast-iron radiation. The average heat emission of direct cast-iron radiation is 240 B.t.u. per hour per sq. ft. for steam, and 150 B.t.u. per hour for water. The AGA rating is therefore secured by dividing the available heat units per hour by 240 for steam boilers and by 150 for water boilers.

Horsepower

The available heat expressed in B.t.u. per hour, the boiler horsepower (1 BHP = 33,500 B.t.u. per hour), and the heating surfaces are also given at the bottom of this page.

Starting and Piping Allowance

To determine the size of the boiler required for direct radiation, add to the installed radiation, expressed as equivalent direct radiation, an allowance for piping and for starting up a cold system. The combined starting and piping allowance runs from 67 per cent on small installations down to 33 per cent on installations of 3,500 sq. ft. and over. The determination of the proper factor rests on the judgment of the Engineer or Contractor. After adding the proper percentage to the installed radiation, the boiler having the nearest AGA rating is selected.

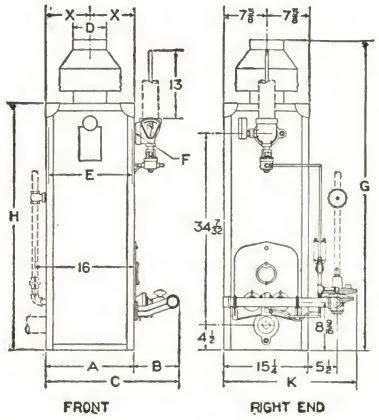
Indirect Radiation

Indirect radiation (such as a central fan job or unit heater installation), should be converted to equivalent direct radiation by using the manufacturer's rating tables. No rule for estimating piping load can be laid down. In an installation composed entirely of a central fan system, with all heating surface concentrated in one jacket near the boiler, the piping load will be quite small. The proper allowance must be determined by the Engineer or Contractor. The starting load will vary from about 25 per cent of the total condensing load, in the case of a unit heater installation using all re-circulated air, down to practically nothing in a central fan blast installation where the heaters are proportioned for all outside air.

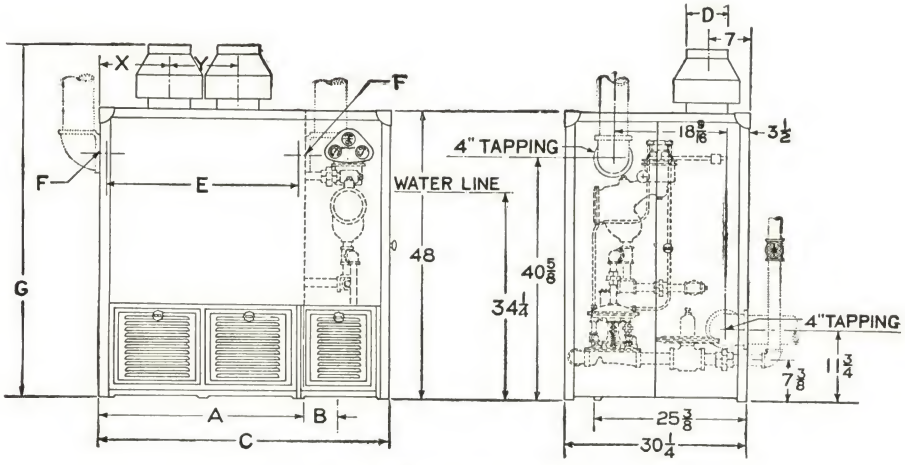
RATINGS, HEATING SURFACES, WATER CAPACITY

Boiler No.	Available B.t.u. per hour (output)		BHP	AGA rating sq. ft.		Sq. ft. of heating surface	Gas consumption cu. ft. per hour		Water capacity to water line, gal.	Size flow and return tappings, in.	Boiler No.
	Steam	Water		Steam	Water		1000 B.t.u. gas	500 B.t.u. gas			
Model 253 Boilers											
4	54,000	57,600	1.72	210	380	11.8	72	144	3.34	2½	4
5	72,000	76,800	2.30	300	510	15.7	96	192	4.42	2½	5
6	90,000	96,000	2.87	380	640	19.6	120	240	5.10	2½	6
7	108,000	115,200	3.44	450	770	23.5	144	288	5.90	2½	7
8	126,000	134,400	4.00	530	900	27.4	168	336	6.87	2½	8
9	144,000	146,500	4.60	600	980	31.3	183	366	7.75	2½	9
10	162,000	164,800	5.15	680	1100	35.2	206	412	8.64	2½	10
Models 443 and 445 Boilers											
3	158,400		4.73	660	1060	41.7	200	400	17.8	4	3
4	211,000		6.30	880	1410	55.1	260	520	22.2	4	4
5	264,000		7.88	1100	1760	68.5	330	660	26.2	4	5
6	317,000		9.55	1320	2110	81.9	400	800	31.0	4	6
7	370,000		11.00	1540	2460	95.3	460	920	35.4	4	7
8	422,000		12.60	1760	2820	108.7	530	1060	39.8	4	8
9	475,000		14.20	1980	3170	122.1	590	1180	44.2	4	9
10	528,000		15.70	2200	3520	135.5	660	1320	48.6	4	10
11	581,000		17.30	2420	3870	148.9	730	1460	53.0	4	11
12	634,000		18.90	2640	4227	162.3	790	1580	57.4	4	12
13	686,000		20.50	2860	4580	175.7	860	1720	61.8	4	13
Model 63 Boilers											
6	532,800		15.90	2220	3550	149.0	666	1332	77.7	6	6
8	710,400		21.20	2960	4740	197.0	888	1776	99.9	6	8
10	888,000		26.50	3700	5920	246.0	1110	2220	122.1	6	10
12	1,065,600		31.80	4440	7100	294.0	1332	2664	144.3	6	12
14	1,243,200		37.10	5180	8290	343.0	1554	3108	166.5	6	14
16	1,420,800		42.40	5920	9470	391.0	1776	3552	188.7	6	16
18	1,598,400		47.70	6660	10660	440.0	1998	3996	210.9	6	18
20	1,776,000		53.00	7400	11840	488.0	2220	4440	233.1	6	20
22	1,953,600		58.30	8140	13020	537.0	2442	4884	255.3	6	22
24	2,131,000		63.60	8880	14210	585.0	2664	5328	277.5	6	24
26	2,308,800		68.90	9620	15300	634.0	2886	5772	299.7	6	26
28	2,486,400		74.20	10360	16580	682.0	3108	6216	321.9	6	28
30	2,664,000		79.50	11100	17760	731.0	3330	6660	344.1	6	30

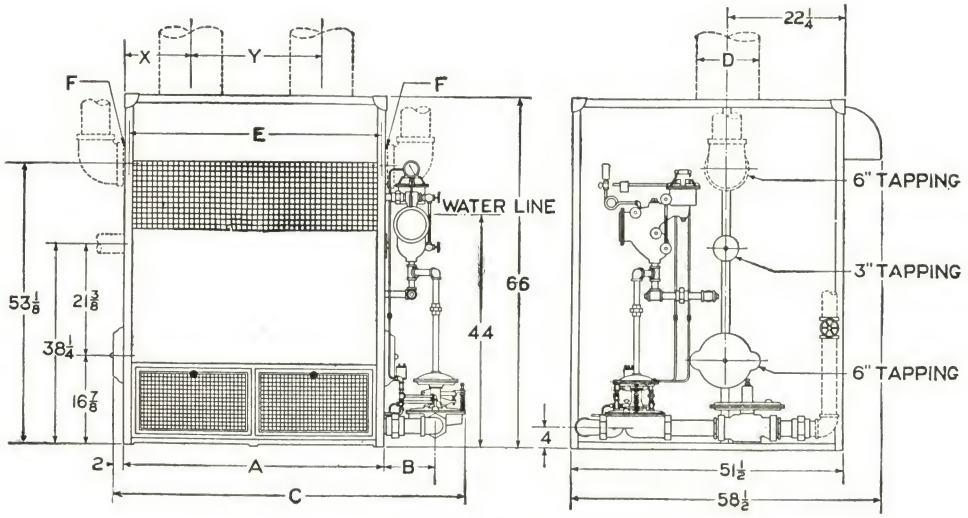
DIMENSIONAL DRAWINGS



Model 253 Boiler



Models 443 and 445 Boilers



Model 63 Boiler

PRINCIPAL DIMENSIONS OF BRYANT TUBULAR GAS BOILERS

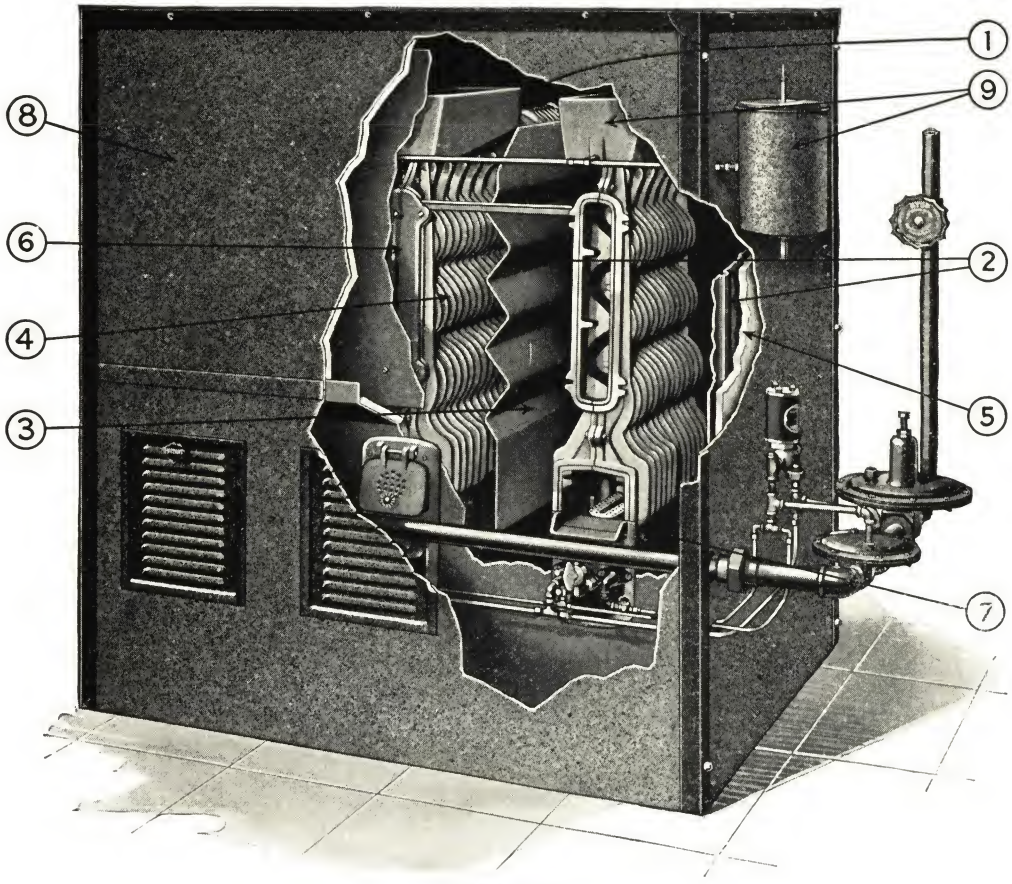
(Dimensions in Inches)

Boiler No.	Width of Boiler A	To CL of Trim B	Overall Width C	No. and Size of Boiler Flues D	Flue Outlet from Side Cover X	Distance between Flue Outlets Y	Size of flue to chimney	Width between Flow Tappings E	Flow Nipples and Returns F	Steam Header Sizes: Flow Loop	Steam Header Sizes: Drip	Water Header Size Flows and Returns	Height boiler only H	Height including Draft Hood G	Labeled shut-off valve	Gas pressure regulator	Diaphragm snap valve	Type "C" only, quick action gas valve	Gas manifold	Number of Pilot lights	Pop valve	Capacity of meter for 500 B.t.u. m'f'd gas cu. ft.	Capacity of meter for 1000 B.t.u. natural gas cu. ft.	K
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Model 253 Boilers																								
4	10 1/8	6 3/8	16 1/2	One-5	5 1/16	.....	5	8 3/4	Two-2 1/2x2 1/2	.....			44	54	3/4	3/4	3/4	1	1	1	3/4	144	72	24 3/8
5	12 1/4	7 3/8	19 5/8	One-5	6 1/8	.....	5	10 7/8	Two-2 1/2x2 1/2	.....			44	54	3/4	3/4	3/4	1	1	1	3/4	192	96	24 3/8
6	14 3/8	6 3/8	20 3/4	One-6	7 3/16	.....	6	13	Two-2 1/2x2 1/2	2 1/2	1	.....	44	55 5/8	3/4	3/4	3/4	1	1	1	3/4	240	120	24 3/8
7	16 1/2	7 3/8	23 7/8	One-7	8 1/4	.....	7	15 1/8	Two-2 1/2x2 1/2	2 1/2	1	.....	44	57	3/4	3/4	3/4	1	1	1	3/4	288	144	24 3/8
8	18 5/8	7 5/8	26 1/4	One-7	9 5/16	.....	7	17 1/4	Two-2 1/2x2 1/2	2 1/2	1	.....	44	57	3/4	3/4	3/4	1	1 1/4	1	1	336	168	24 3/8
9	20 3/4	8 5/8	29 3/8	One-8	10 3/8	.....	8	19 3/8	Two-2 1/2x2 1/2	2 1/2	1	.....	45	58	1	1	1	1	1 1/4	1	1	368	184	25 5/8
10	22 7/8	7 5/8	30 1/2	One-8	11 7/16	.....	8	21 1/2	Two-2 1/2x2 1/2	2 1/2	1	.....	45	58	1	1	1	1	1 1/4	1	1	412	206	25 5/8
Models 443 and 445 Boilers																								
3	16 1/4	7 1/4	30 3/8	One-7	8 1/8	.....	7	14 1/2	Two-4x2 7/8	3	2	2 1/2	48	60 1/2	1	1	1	1	1 1/4	1	1	360	180	
4	19 7/8	7 1/4	34	One-7	9 11/16	.....	7	18 1/8	Two-4x2 7/8	3	2	2 1/2	48	60 1/2	1	1	1	1	1 1/4	1	1	480	240	
5	23 1/2	7 1/4	37 5/8	One-8	11 3/4	.....	8	21 3/4	Two-4x2 7/8	3	2	3	48	60 1/2	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	2	1 1/4	600	300	
6	27 1/8	7 1/4	41 1/4	One-9	13 9/16	.....	9	25 3/8	Two-4x2 7/8	3	2	3	48	61	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	2	1 1/4	720	360	
7	30 3/4	7 1/4	44 7/8	One-9	15 3/8	.....	9	29	Two-4x2 7/8	3	2	3	48	61	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	3	1 1/4	840	420	
8	34 3/8	8 1/4	48 1/2	One-10	17 3/16	.....	10	32 5/8		3	2	3	48	64 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	4	1 1/2	960	480	
9	38	8 1/4	52 1/8	Two-8	11 3/4	14 3/16	10	36 1/4	Two-4x2 7/8	4	2	4	48	60 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	4	1 1/2	1080	540	
10	41 5/8	8 1/4	55 3/4	Two-8	11 3/4	17 15/16	10	39 7/8	Two-4x2 7/8	4	2	4	48	60 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	4	1 1/2	1200	600	
11	45 1/4	7 1/8	59 3/8	Two-9	11 3/4	21 3/4	11	43 1/2	Two-4x2 7/8	4	2	4	48	61	2	2	2	2	2	4	2	1320	660	
12	48 7/8	7 1/8	63	Two-9	11 3/4	25 7/16	11	47 1/8	Two-4x2 7/8	4	2	4	48	61	2	2	2	2	2	4	2	1440	720	
13	52 1/2	7 1/8	66 5/8	Three-8	11 13/16	14 5/16	12	50 3/4	Two-4x2 7/8	4	2	4	48	60 1/2	2	2	2	2	2	5	2	1560	780	
Model 63 Boilers																								
6	27 3/4	11	46 1/8	One-12	13 7/8	.....	12	26 1/4	*Two-6x3 1/8	4	1 1/2	5	66	66	2	2	2	2	2	2	2	1332	666	
8	35	11	53 3/8	One-14	17 1/2	.....	14	33 1/2	*Two-6x3 1/8	4	1 1/2	5	66	66	2	2	2	2	2	2	2	1776	888	
10	42 1/4	11	60 5/8	Two-12	10 5/8	21	16	40 3/4	*Two-6x3 1/8	5	1 1/2	5	66	66	2	2	2	2	2	3	2	2220	1110	
12	49 1/2	10 3/8	68 7/8	Two-12	12 7/16	24 5/8	16	48	*Two-6x3 1/8	5	2	6	66	66	2 1/2	2 1/2	2 1/2	.....	2 1/2	4	2 1/2	2664	1332	
14	56 3/4	10 3/8	76 1/8	Two-14	14 1/4	28 1/4	18	55 1/4	*Two-6x3 1/8	5	2	6	66	66	2 1/2	2 1/2	2 1/2	.....	2 1/2	4	2 1/2	3108	1554	
16	64	10 3/8	83 3/8	Two-14	14 1/4	35 1/2	20	62 1/2	*Two-6x3 1/8	6	2	6	66	66	2 1/2	2 1/2	2 1/2	.....	2 1/2	5	2 1/2	3552	1776	
18	71 1/4	10 3/8	90 5/8	Three-12	12 7/16	23 3/16	20	69 3/4	*Two-6x3 1/8	6	2 1/2	6	66	66	2 1/2	2 1/2	2 1/2	.....	2 1/2	6	3	3996	1998	
20	78 1/2	10 3/8	97 7/8	Three-14	14 1/4	25	20	77	*Two-6x3 1/8	6	2 1/2	6	66	66	2 1/2	2 1/2	2 1/2	.....	2 1/2	6	3	4440	2220	
22	85 3/4	10 1/4	105	Three-14	14 1/4	28 5/8	20	84 1/4	*Two-6x3 1/8	6	2 1/2	6	66	66	3	3	3	.....	3	7	3	4884	2442	
24	93	10 1/4	112 1/4	Three-14	14 1/4	32 1/4	22	91 1/2	*Two-6x3 1/8	6	2 1/2	6	66	66	3	3	3	.....	3	7	3	5328	2664	
26	100 1/4	10 1/4	119 1/2	Four-14	14 1/4	25**	24	98 3/4	*Two-6x3 1/8	6	3	6	66	66	3	3	3	.....	3	8	3 1/2	5772	2886	
28	107 1/2	10 1/4	126 3/4	Four-14	14 1/4	25**	24	106	*Two-6x3 1/8	6	3	6	66	66	3	3	3	.....	3	9	3 1/2	6216	3108	
30	114 3/4	10 1/4	134	Four-14	14 1/4	32 1/4**	26	113 1/4	*Two-6x3 1/8	6	3	6	66	66	3	3	3	.....	3	9	3 1/2	6660	3330	

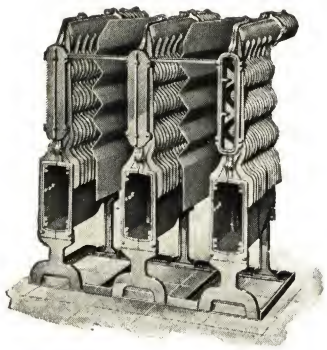
*6-in. boilers have two additional return tappings for 3-in. pipe, located 6 in. below the water line. Do not bush flow tappings; use reducing elbows if necessary.

**Two center flue outlets on No. 26 boiler are 21 3/4 in. apart; No. 28 boiler, 29 in. apart; No. 30 boiler, 21 3/4 in. apart.

BRYANT WARM AIR FURNACE



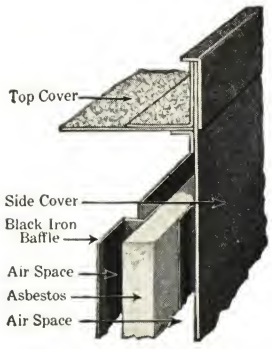
Cutaway View



Three Sections with Baffles

(1) Uniform distribution of the warm air is the result of a great deal of experimentation carried out in the Bryant laboratory in securing the correct relative location of the sections, jacket walls, and air inlets and outlets. A very uniform distribution of air flow and temperature is maintained over the entire area available for the attachment of warm air pipes.

(2) Radiation shields of black iron are placed midway between the sections and also between the sections and the cover. These shields intercept the radiant rays passing from one section to another and to the cover, thus adding two additional heating surfaces from which the warm air absorbs the heat.



Triple Insulated Cover

(3) Large free area of furnace and bonnet is considerably in excess of the warm air leader area rating. This insures a pressure condition within the jacket, making an effective safeguard against reversal of flow of air through any of the warm air ducts.

(4) Individual cast-iron sections with flue outlets extending outside of the furnace jacket are equipped with separate draft relief openings, thus insuring equal draft pull on all sections regardless of their location with respect to the flue manifold and chimney. A draft hood placed between the flue manifold and chimney is effective protection against down-drafts.

(5) Triple insulated cover reduces radiation loss to a minimum (see lower right-hand illustration). Cover construction from inside out includes: (a) radiation shield; (b) air space; (c) heavy air-cell asbestos; (d) air space; (e) outside metal cover.

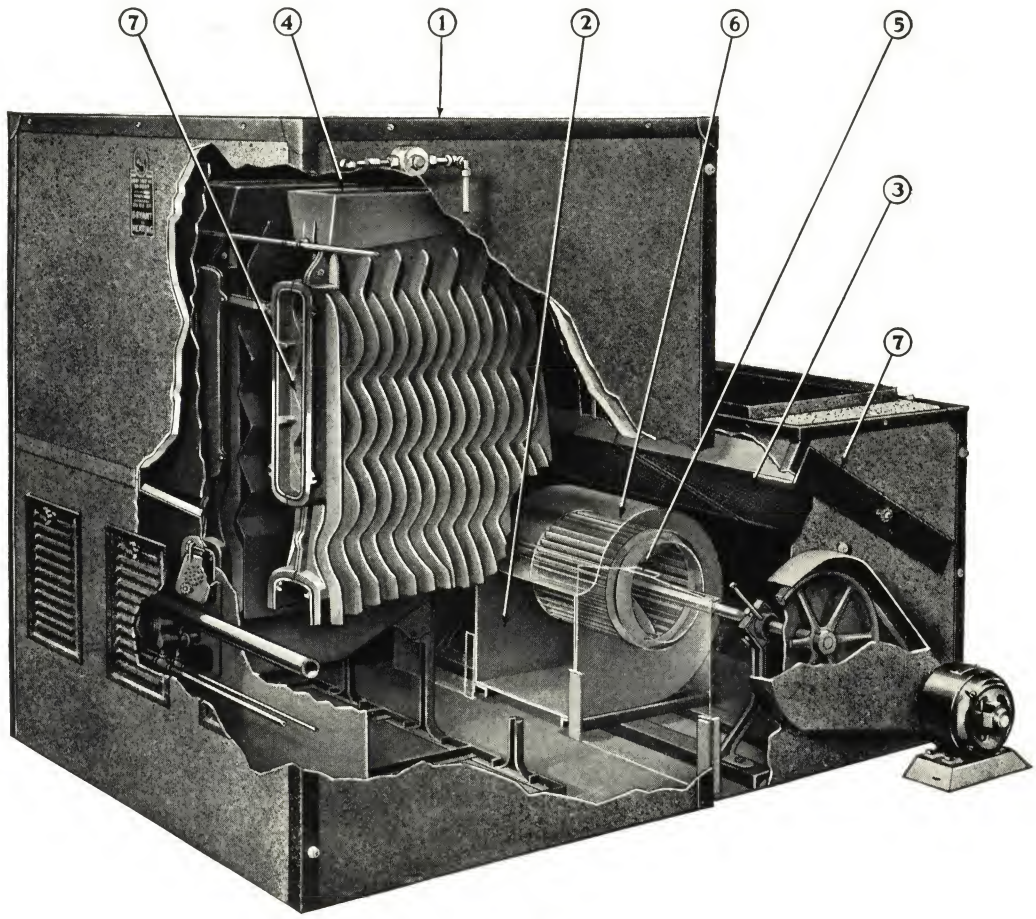
(6) Cleanout panel on each section makes it possible to easily reach and clean all of the inside heating surfaces.

(7) Sections high above floor allow free passage of the cold air coming into the furnace.

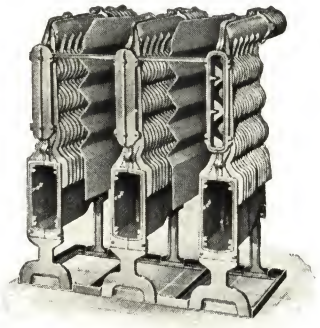
(8) Enduring crystalline finish adds to the handsome appearance of Bryant Furnaces. Manifold and burner cocks are enclosed.

(9) Bryant automatic humidification, standard on all Bryant Furnaces, is adjustable for any degree of relative humidity that may be required.

BRYANT FORCED WARM AIR UNIT



Cutaway View



Three Sections with Baffles

(1) Large volumes of low temperature air desirable for warm air heating systems are delivered by the Bryant Forced Warm Air Unit.

(2) Evenly heated air having positive circulation is obtained by means of the blower type fan unit, similar in design and operation to the largest high-power blowers.

(3) Warm filtered air free from dust and dirt gives greater health and comfort and a cleaner home in which to live.

Blower Type Fan Rotor

(4) Bryant automatic humidification, standard equipment on all Bryant Furnaces, will give a control of relative humidity within a wide range. Note that the design of the water pans permits a variation in the exposed water surface, which makes possible this control.

(5) The gravity capacity of these units is approximately 75% of the forced feed capacity providing the warm air ducts are sized according to the standard code and the hand-operated dampers are in the open position.

(6) Slow speed blower type fan is used, thus reducing to a minimum any vibration which might be caused by the air motion. No part of the blower assembly is in contact with either the unit casing or the furnace cover.

(7) Heating surfaces and filters are easily accessible for cleaning.

(8) The Bryant forced warm air unit embodies all of the features attributed to the Bryant Furnace as given on preceding page in addition to those mentioned on this page.

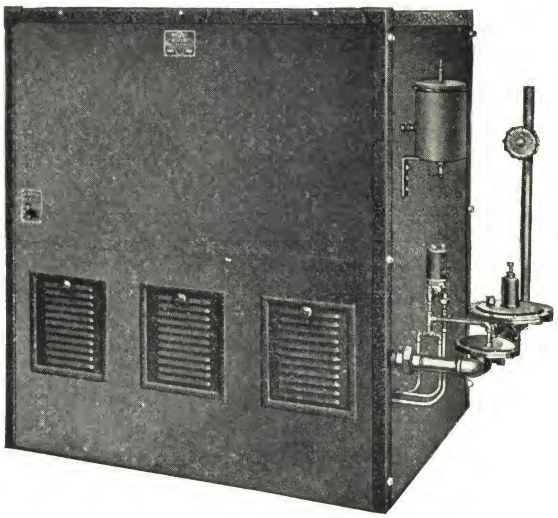
TO SELECT THE APPROPRIATE FURNACE

Bryant Gas Furnaces can be used with warm air heating systems of either the gravity or forced air type. They are completely automatic in their operation and are classified below according to the type of service they are adapted to.

Type "L" Furnaces

Type "L" Warm Air Furnaces operate on the gas-actuated control system; that is, the gas supply to the main burners is also utilized to operate the controls and all controls must be functioning properly before any gas can pass to the burners. They are equipped with a magnetic valve which can be operated by the thermostat of any standard room temperature control system. The following equipment is standard on Type "L" Furnaces:

- Thermostatic pilots
- Solenoid valve
- Snap valve
- Escapement burner
- Gas pressure regulator
- Temperature limit control
- Labeled shut-off valve
- Draft hood
- Flue outlet tees
- Metal jacketed cover
- Tubing for controls
- Complete humidifier

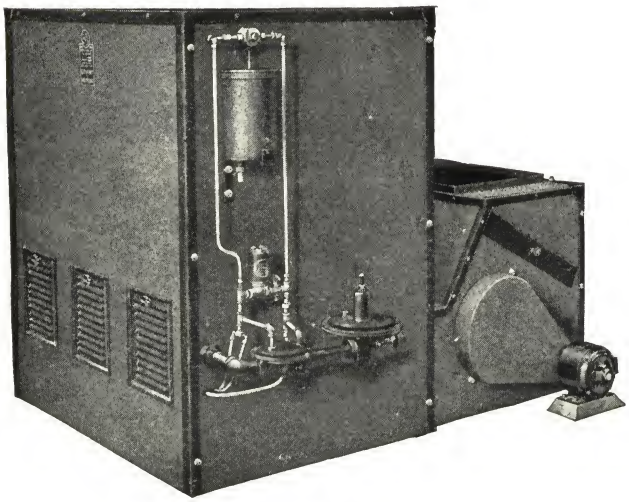


Type "L"
Bryant Warm Air Furnace No. 3-L-73

Type "Q" Furnaces

A lever operated gas control valve can be supplied on the above furnace in place of the snap valve, escapement burner and solenoid valve, as listed under standard equipment.

This furnace is designated as a Type "Q" Furnace. The limit control and thermostatic pilots cannot be used in conjunction with the Type "Q" Furnace.



Type "LF"
Bryant Forced Warm Air Furnace No. 3-LF-73

Type "LF" Furnaces

Type "LF" Forced Air Furnaces operate on exactly the same gas-actuated control system as described above in the text on Type "L" Furnaces. The magnetic valve can be operated by the thermostat of any standard room temperature control system. The following equipment is standard on Type "LF" Furnaces:

- Fan and filter unit
- Temperature limit control
- 2 pulleys and drive belt
- Thermostatic pilots
- Snap valve
- Complete humidifier
- Escapement burner
- Gas pressure regulator
- Labeled shut-off valve
- Draft hood
- Flue outlet tees
- Metal jacketed cover
- Tubing for controls

Note: The fan motor is not included in the above equipment, but can be furnished if desired.

GUARANTEED RATINGS OF BRYANT GRAVITY OR FORCED AIR FURNACES

Warm air furnaces are most commonly selected in accordance with the number of square inches of basement pipe area that they are capable of handling. In determining the proper size furnace, add together the square inches of basement pipe as determined from pages 5 and 6, keeping note of the separate totals for first and second floors. Refer to the table below, column headed "Total Area," and find which furnace will supply this area. Then see if it will handle this total area when it is divided between first and second floors as indicated by the separate totals. (The "basement pipe" or "leader" is the warm air duct leading from top of furnace to first floor register or to wall stack.)

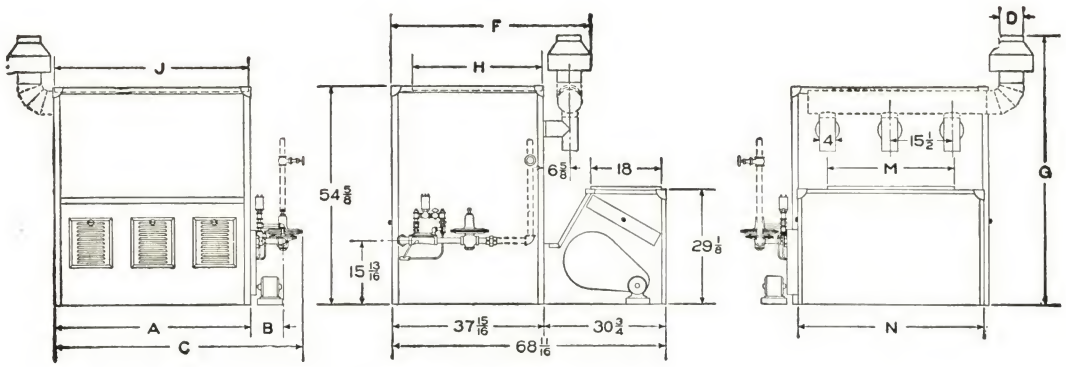
GUARANTEED RATINGS

Furnace No.	Basement pipe area, sq. in.			Maximum B.t.u. per hour at bonnet	Furnace No.	Basement pipe area, sq. in.			Maximum B.t.u. per hour at bonnet
	First floor	Second floor	Total			First floor	Second floor	Total	
2	525	0	525	70,400	5	1310	0	1310	176,000
	445	50	495			1150	100	1250	
	365	100	465			990	200	1190	
	285	150	435			830	300	1130	
	205	200	405			670	400	1070	
	120	250	370			510	500	1010	
						350	600	950	
						190	700	890	
3	785	0	785	105,600	6	1570	0	1570	211,200
	705	50	755			1370	125	1495	
	625	100	725			1170	250	1420	
	545	150	695			970	375	1345	
	465	200	665			770	500	1270	
	385	250	635			570	625	1195	
	305	300	605			370	750	1120	
	225	350	575			170	875	1045	
	145	400	545						
4	1045	0	1045	140,800	7	1830	0	1830	246,400
	925	75	1000			1630	125	1755	
	805	150	955			1430	250	1680	
	685	225	910			1230	375	1605	
	565	300	865			1030	500	1530	
	445	375	820			830	625	1455	
	325	450	775			630	750	1380	
	205	525	730			430	875	1305	

Note: For fan capacities see page 8.

It is recommended that leaders, stacks, and registers be sized according to the method adopted by the National Warm Air Heating Association, the American Society of Heating and Ventilating Engineers, and the National Association of Sheet Metal Contractors, for gravity systems. By using the Standard Code, no "factor of safety" is required in determining the furnace size, as all necessary allowances for radiation, starting and friction losses are made when the pipe sizes are calculated.

PRINCIPAL DIMENSIONS OF BRYANT FURNACES



DIMENSIONS OF FURNACES—TYPES "L" AND "Q"

(Dimensions in Inches)

Furnace No.	A	B	C	D	E*	F	G	H†	J†
2	33½	8⅞	47¼	5	30½	49¼	65½	32⅜	32½
3	49	8⅞	62¾	6	46	50⅛	67½	32⅜	48
4	64½	8⅞	78¼	7	29¼–29¼	50⅛	67½	32⅜	63½
5	80	8⅞	93¾	8	44¾–29¼	51	71	32⅜	79
6	95½	8⅞	109¼	8	44¾–44¾	51	71	32⅜	94½
7	111	8⅞	124¾	9	29¼–43½–29¼	50⅝	71½	32⅜	110

*Width of Cold Air Return ducts. Dimensions as given represent number, location, and size of return air openings, facing the furnace from the rear.

†Space for basement pipes leading to wall stacks and first floor registers.

TRIMMINSGS AND CONNECTIONS—TYPES "L," "Q" AND "LF"

(For Manufactured Gas or Natural Gas)

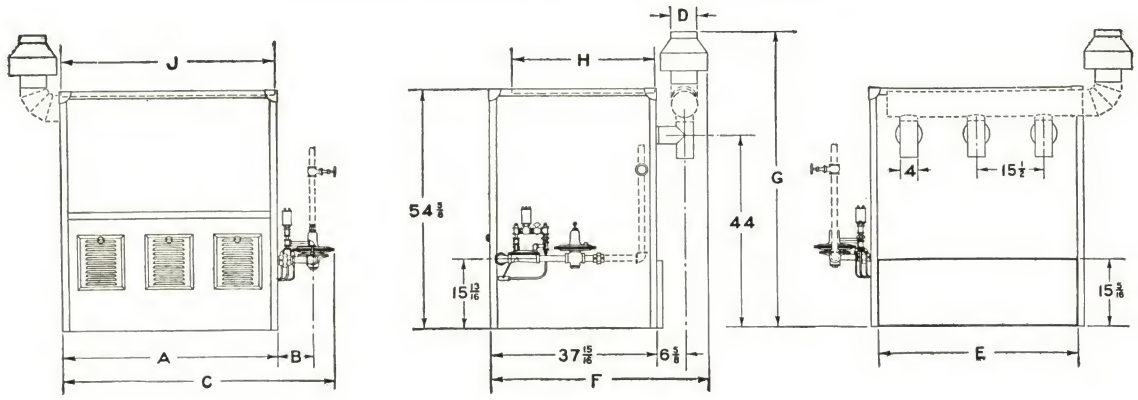
Furnace No.	Number of sections	Number of flue openings	Size of flue openings, in.	Size of flue to chimney, in.	Trim size, in.	Manifold size, in.	Capacity of meter	
							500 B.t.u.	1000 B.t.u.
2	2	2	4	5	1	1¼	176	88
3	3	3	4	6	1	1¼	264	132
4	4	4	4	7	1	1¼	352	176
5	5	5	4	8	1¼	1¼	440	220
6	6	6	4	8	1¼	1¼	528	264
7	7	7	4	9	1¼	1¼	616	308

RECOMMEND MINIMUM CHIMNEY SIZES

(Outside Dimensions of Standard Rectangular Tile)

Height, ft.	Gas consumption in thousands of B.t.u. per hour									
	100	200	300	400	500	750	1000	1250	1500	2000
20	7½x7½	7½x7½	8½x8½	8½x13	8½x13	13x13	13x13	13x18	13x18	18x18
40	7½x7½	7½x7½	8½x8½	8½x8½	8½x13	13x13	13x13	13x18	13x18	18x18
60	7½x7½	7½x7½	7½x7½	8½x8½	8½x13	13x13	13x13	13x13	13x18	18x18
80	7½x7½	7½x7½	7½x7½	8½x8½	8½x13	8½x13	13x13	13x13	13x18	13x18
100	7½x7½	7½x7½	7½x7½	8½x8½	8½x8½	8½x13	13x13	13x13	13x18	13x18

PRINCIPAL DIMENSIONS OF BRYANT FURNACES



DIMENSIONS OF FURNACES WITH FAN UNIT—TYPE "LF"

(Dimensions in Inches)

Furnace No.	A	B	C	D	F	G	H*	J*	M†	N
2	33½	8⅞	47¼	5	49¼	65½	32⅜	32½	32	46¼
3	49	8⅞	62¾	6	50⅛	67½	32⅜	48	32	46¼
4	64½	8⅞	78¼	7	50⅛	67½	32⅜	63½	51	61¾
5	80	8⅞	93¾	8	51	71	32⅜	79	51	61¾
6	95½	8⅞	109¼	8	51	71	32⅜	94½	2–36	92¾
7	111	8⅞	124¾	9	50⅝	71½	32⅜	110	2–36	92¾

*Space for basement pipes leading to wall stacks and first floor registers.
†Width of cold air return ducts.

SPECIFICATIONS FOR MOTORS, FANS AND FILTERS—TYPE "LF" FURNACES

Furnace size	Motor*—110 V. 60 cycle a-c. single phase						Number of filters	Fan			
	Type	Frame	Hp.	Wattage input	R.P.M.	Shaft, in.		R.P.M.	Air delivery		No. of fans
									C.F.M.	Static pressure	
2	5-KH	45-A	1/6	130	1725	½	2	480	850	⅛	1
3	5-KH	45-A	1/6	160	1725	½	2	600	1300	⅛	1
4	5-KH	45-A	1/6	170	1725	½	3	480	1700	⅛	2
5	5-KH	45-A	1/6	190	1725	½	3	540	2100	⅛	2
6	5-KX	53	¼	300	1725	⅝	4	600	2600	⅛	2
7	5-KX	53-A	⅓	350	1725	⅝	4	650	3000	⅛	2

*A motor is not included in the standard material furnished as given on page 11 unless specified on order. However, a drive pulley and belt is supplied which will fit the above motors.

THE BRYANT DUALATOR

The BRYANT DUALATOR is the latest product of the research and development activities of the Bryant Organization. It opens new fields and avenues of heating by providing means for supplying radiator heat and conditioned air from a single appliance. The Dualator heats and ventilates. It cleans and humidifies the air which is circulated through the home and maintains at all times the most desirable comfort conditions by the application of the best type of heating medium available. Summed up in a few words, the Dualator is the realization of all ideals in residential heating and ventilating equipment.

The interior view below shows clearly the important features that make possible the great flexibility of operation and wide range of adaptability.

The Dualator is composed of a standard Bryant boiler and an air conditioning plant combined into one complete unit. It delivers well tempered conditioned air. The positive humidifier maintains the desired humidity as closely as the new room thermostat controls the temperature. The fin type radiator with its great amount of radiating surface tempers air to just the proper degree. The air is circulated after being thoroughly cleaned through filters by a silent blower type fan. Large volumes of tempered air at low velocities are delivered. In summer this delivery of air accomplishes much in effective cooling.

Because of its wide range of adaptability and flexibility of operation the Bryant Dualator can be adapted to any type or combinations of heating systems.

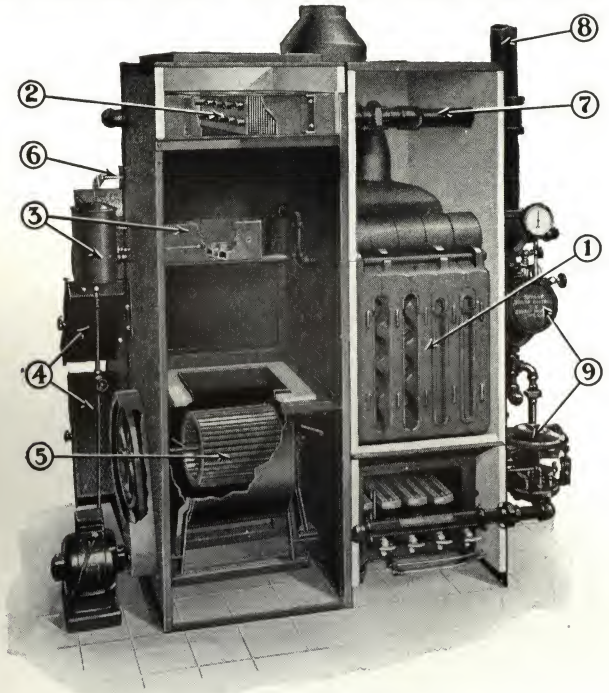
It is enclosed in a completely insulated, crystalline finished baked enamel metal jacket characteristic of all Bryant models.

(1) The Boiler—The Type "S" Model 443 Boiler has been selected as the heat generator for the Dualator. Cast-iron sections of the water tube type are of original and exclusive design, presenting a large area of heat-absorbing surface.

The pitch of the water tubes promotes a definite, rapid circulation of water over every square inch of heating surface, preventing air bubbles from insulating the inner walls, assuring maximum heat transference.

Staggered gas travel contributes to maximum efficiency. The hot gas from each burner is so baffled back and forth, constantly rubbing heating surfaces, that only sufficient warmth is left in the gas to promote the necessary draft.

(2) The Radiator—A fin type radiator, sturdy in construction, insuring long life, heats the air as it passes through it to the distribution system. The condensed steam flows back to



the boiler through tappings provided for in the making. Every available square inch of the radiator operates at maximum efficiency while the boiler is in operation.

The radiators are made in various sizes to meet the air conditioning requirements of the space to be heated or cooled. Sloping, horizontal tubes, spaced close together, cause a rapid pressure drop.

(3) Humidification—The air stream before being heated is moistened by a new, exclusive development of the Bryant Research Laboratory. Air is passed over a humidifying pan with a positive evaporating effect of high capacity. This pan has cored steam passages in the bottom which quickly heat the water almost to boiling, causing rapid evaporation. The steam condensate returns to the boiler. The water level in the pan is maintained by a float feed.

Automatic humidity control is provided by the action of a solenoid valve on the return line. An attractively finished humidity control, located in the room to be heated actuates this valve, permitting steam to flow through the coils of the pan, when humidity is desired.

(4) Air Filters—Air Filters with ample free opening and large dust collecting surface are incorporated on the inlet side of the circulating fan, reaching a practical limit in the amount of dust returned to the unit heater. Warm, filtered air, free from dust and dirt, gives greater health and comfort and a cleaner home in which to live.

(5) The Circulating Fan—A slow speed blower type fan is used, thus reducing to a minimum any vibration which might be caused by air motion. No part of the blower assembly is in contact with either the unit casing or the Dualator cover. This circulating fan, operated at low speed with large volume, having large capacity wool-packed bearings and the silent "V" belt, has been found to offer the most desirable air circulation.

(6) The Inlet Air Damper—A throttling inlet air damper is applied at the top of the filter box to control the air flow through the building.

As the air flow is reduced, less steam is condensed and consequently the steam boiler control throttles the gas supply. The flexibility of such throttling action is simpler and far superior to any other method of reducing the heat delivery under varying room temperatures as the heat production and delivery is in proportion to the room temperature. The movement of the inlet air damper is caused by the action of the room temperature regulator of the expansion type on a heat motor. The heat motor operates on the natural law of expansion and contraction of elements by the application of heat.

(7) Riser to Radiator—The size of the riser to the radiator is determined by the amount of heat necessary to warm the space with conditioned air. The inlet tapping on the radiator is sized to meet maximum load the radiator will handle.

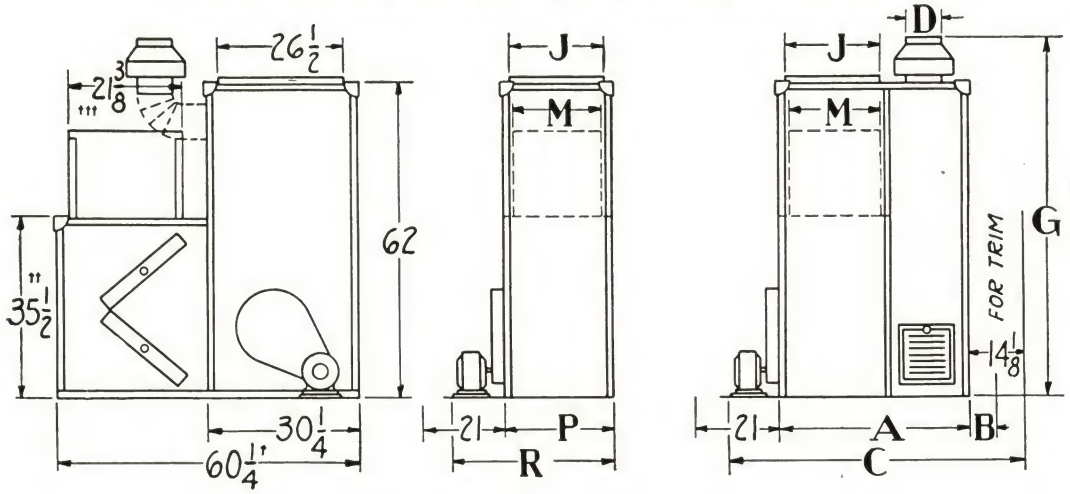
(8) Riser to the Installed Radiation—That the system may be balanced, the riser to the cast-iron radiation is sized according to the load, taking into consideration the amount of steam required by the fin radiator.

(9) Bryant Controls—Among other exclusive features are the time-tried and proven system of Bryant patented gas-actuated controls, which assure the completely automatic heating service for which Bryant Gas Heating plants are noted.

The No. 1100 Bryant Boiler Control is a combined steam pressure control and low-water cut-off. Fine adjustment and watch-like precision provide sensitive and positive operation.

The Bryant Throttling Control Valve controls the gas flow to the main burners, actuated by the steam pressure and the boiler demand. The action is on a leather diaphragm in the main control valve by reducing the total open area, thus reducing the flow of gas to the main burners. The main control valve operates by the unfailing force of gravity, the action being positive without attention.

DIMENSIONS AND RATINGS OF THE BRYANT DUALATOR



PRINCIPAL DIMENSIONS OF DUALATOR IN INCHES

Complete Unit	A	B	C	D	G*	M**	J***
4FS1	42 1/8	7 1/4	68 1/2	7	71 1/4	17 9/16	17 3/16
2	42 1/8	7 1/4	68 1/2	7	71 1/4	17 9/16	17 3/16
3	48 3/4	7 1/4	75 1/8	7	71 1/4	26 1/8	25 3/4
4	60 3/8	7 1/4	87	7	71 1/4	34 5/16	33 15/16
5FS1	45 3/4	7 1/4	72 1/8	8	73 1/4	17 9/16	17 3/16
2	45 3/4	7 1/4	72 1/8	8	73 1/4	17 9/16	17 3/16
3	52 3/8	7 1/4	78 3/4	8	73 1/4	26 1/8	25 3/4
4	64	7 1/4	90 5/8	8	73 1/4	34 5/16	33 15/16
5	72	7 1/4	98 3/4	8	73 1/4	43 1/4	42 7/8
6FS1	49 3/8	7 1/4	75 3/4	9	75 3/4	17 9/16	17 3/16
2	49 3/8	7 1/4	75 3/4	9	75 3/4	17 9/16	17 3/16
3	56	7 1/4	82 3/8	9	75 3/4	26 1/8	25 3/4
4	67 5/8	7 1/4	94 1/4	9	75 3/4	34 5/16	33 15/16
5	75 3/4	7 1/4	102 3/8	9	75 3/4	43 1/4	42 7/8
6	81 1/2	7 1/4	108 1/8	9	75 3/4	51 7/8	51 1/2

Heater Unit	R	P	M**	J***
HU 1	34 3/4	22 1/4	17 9/16	17 3/16
HU 2	34 3/4	22 1/4	17 9/16	17 3/16
HU 3	41 3/8	28 7/8	26 1/8	25 3/4
HU 4	53 1/4	40 3/4	34 5/16	33 15/16
HU 5	61 3/8	48 7/8	43 1/4	42 7/8
HU 6	67 1/8	54 5/8	51 7/8	51 1/2

On No. 1 Unit, these dimensions are: †47 5/8, ††24 1/8, †††10 7/8.

CHARACTERISTICS OF MOTORS, FANS AND FILTERS

Heater Unit No.	Motor 110 V AC 60 cycle single phase.				No. of Filters	Fan			
	H.P.	Wattage Input	Speed	Shaft		Speed	Air Delivery CFM	Air Delivery S. P.	Air Delivery No.
HU 1	1/4	100	1725	5/8	1	450	500	1/4	1
HU 2	1/4	125	1725	5/8	2	620	1000	1/4	1
HU 3	1/4	150	1725	5/8	2	450	1500	1/4	1
HU 4	1/3	225	1725	5/8	3	510	2000	1/4	1
HU 5	1/3	300	1725	5/8	4	440	2500	1/4	2
HU 6	1/3	350	1725	5/8	4	450	3000	1/4	2

Motors are not supplied as standard equipment with this unit.

RATINGS

Complete Unit No.	Available B. t. u. total	Available B. t. u. warm air	Available B. t. u. steam or vapor	Unit No.	Available B. t. u. warm air
4-FS-1	192,000	45,000	147,000	HU 1	45,000
4-FS-2	192,000	90,000	102,000	HU 2	90,000
4-FS-3	192,000	135,000	57,000	HU 3	135,000
4-FS-4	192,000	180,000	12,000	HU 4	180,000
				HU 5	225,000
5-FS-1	240,000	45,000	195,000	HU 6	270,000
5-FS-2	240,000	90,000	150,000		
5-FS-3	240,000	135,000	105,000		
5-FS-4	240,000	180,000	60,000		
5-FS-5	240,000	225,000	15,000		
6-FS-1	288,000	45,000	243,000		
6-FS-2	288,000	90,000	198,000		
6-FS-3	288,000	135,000	153,000		
6-FS-4	288,000	180,000	108,000		
6-FS-5	288,000	225,000	63,000		
6-FS-6	288,000	270,000	18,000		

ESTABLISHED 1857

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Gas-Fired Steam and Hot Water Boilers

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Products

GAS-ERA GAS-FIRED STEAM and HOT WATER BOILERS, all-cast.

For Mueller Gas-Fired Warm Air Furnaces, Air Conditioning Systems, Registers, Grilles and Ventilators, see Manufacturers' Index.

Mueller Gas-Era Gas-Fired Boiler

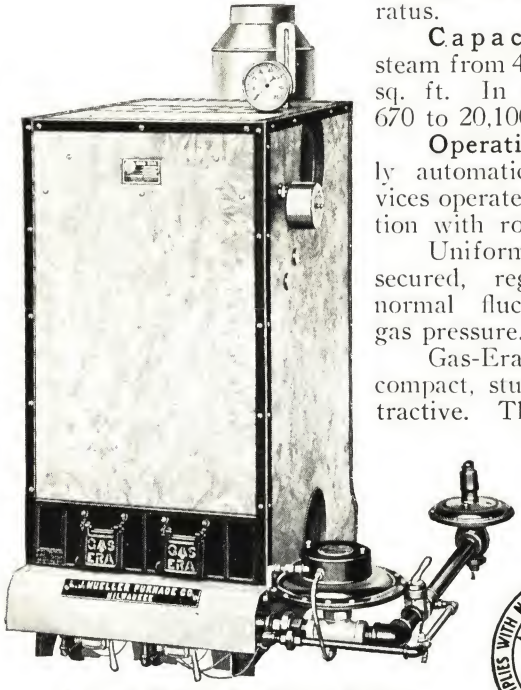
Uses—For heating every type of residence, apartment, church, school or public building. For direct or indirect water heating. For supplying low pressure steam for industrial uses, and operating air conditioning and drying apparatus.

Capacities—In steam from 420 to 12,600 sq. ft. In water from 670 to 20,100 sq. ft.

Operation—Entirely automatic. All devices operate in conjunction with room control.

Uniform results are secured, regardless of normal fluctuations in gas pressure.

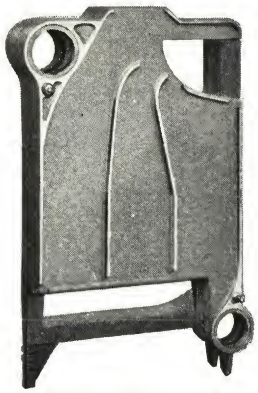
Gas-Era Boilers are compact, sturdy and attractive. The casing is furnished in attractive green prismatic finish, with rich black trimmings. The shield conceals manifold, cocks and mixers.



No. 25-W Gas-Era Water Boiler

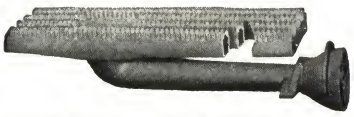
Construction—All interior surfaces are vertical and present a smooth surface which does not collect incrustation, and are accessible for cleaning, without removal of jacket. Flues are narrow, presenting extensive surface; no lugs to corrode. All exterior surface is water-backed. No loose base, end or top plates to leak air and lose heat. Heat absorbing tubes between burners secure individual and controlled secondary air supply to each burner.

Condensation is entirely eliminated within the boiler while maintaining high efficiency. Design of sections insures maximum heat absorption over every square inch of the unusually large area of prime surface. The extended surface of the sections is accurately ground and forms iron-to-iron contact; the flues are permanently gas-tight. Due to the small volumetric content and individual flues, damage by explosion is impossible. Liberal water holding capacity and ample steam space is provided in the sections. Steam boilers maintain a steady water line. Water boilers have free and positive circulation which cannot be reversed.



Intermediate and Burner Sections

Burners are cast iron and of stream line design. Vertical adjustment secures correct overhead for combustion with either natural or manufactured gas. Gas-Era Boilers are furnished with all equipment necessary for complete automatic operation.



Cast Iron Stream Line Burner

SIZES, CAPACITIES AND REQUIRED FLOOR SPACE FOR GAS-ERA HEATING BOILERS
Basement headroom for all sizes, 5 ft. Flues should not be less than total area of all vents

Boiler No.		A. G. A. ratings, sq. ft.		Floor space, in.	Vents		Size gas conn. required, in.	Boiler No.		A. G. A. ratings, sq. ft.		Floor space, in.	Vents		Size gas conn. required, in.
Steam or vapor	Hot water	Steam or vapor	Hot water		Number	Diam., in.		Steam or vapor	Hot water	Steam or vapor	Hot water		Number	Diam., in.	
13-S	13-W	420	670	31¼x46½	1	4	1	1225-S	1225-W	5,040	8,040	120½x 53⅝	3	10	2½
24-S	24-W	630	1005	35¼x46½	1	6	1	1327-S	1327-W	5,460	8,710	128¼x 54¾	3	11	3
25-S	25-W	840	1,340	39 x47⅞	1	7	1¼	1429-S	1429-W	5,880	9,380	136 x 54¾	3	11	3
37-S	37-W	1,260	2,010	46¾x51⅞	1	9	1½	1531-S	1531-W	6,300	10,050	143¾x 54¾	3	11	3
49-S	49-W	1,680	2,680	54½x53⅝	1	10	2	1634-S	1634-W	6,720	10,720	87½x107¼	2	14	3
511-S	511-W	2,100	3,350	62¼x54¾	1	11	2	1838-S	1838-W	7,560	12,060	95¼x109½	2	16	4
613-S	613-W	2,520	4,020	70 x51⅝	2	9	2½	2042-S	2042-W	8,400	13,400	103 x109½	2	16	4
715-S	715-W	2,940	4,690	79¾x53⅝	2	10	2½	2246-S	2246-W	9,240	14,740	110¾x112¼	2	17	4
817-S	817-W	3,360	5,360	87½x53⅝	2	10	2½	2450-S	2450-W	10,080	16,080	120½x107¼	3	14	4
919-S	919-W	3,780	6,030	95¼x54¾	2	11	2½	2654-S	2654-W	10,920	17,420	128¼x109½	3	16	4
1021-S	1021-W	4,200	6,700	103 x54¾	2	11	2½	2858-S	2858-W	11,760	18,760	136 x109½	3	16	5
1123-S	1123-W	4,620	7,370	110¾x56⅛	2	12	2½	3062-S	3062-W	12,600	20,100	143¾x109½	3	16	5

THE PEERLESS HEATER COMPANY

Manufacturers of Peerless Super-Section Gas Fired Boilers for Steam, Hot Water, Vapor Heating and Hot Water Supply Systems

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CANADIAN REPRESENTATION IN THE LARGER CITIES

New Peerless Super Section Gas Boilers

Products of nearly twenty years' experience in the development of gas heating equipment, these new Peerless Super Section Gas Boilers for water and steam are thoroughly modern and efficient. Built in two section sizes, 3 and 5 in., they meet every practical heating requirement, from smallest home to the largest public building.

These boilers have been tested and approved in accordance with the codes of the American Gas Association and the American Society of Heating and Ventilating Engineers.

Exclusive Peerless Features—Peerless patented water tube super section, a most efficient type of boiler construction; the Peerless clean-out doors, providing easy access to flues from both ends of the boiler.

Peerless Burners are of advanced design, raised port, center tapped type. Venturi mixing tubes and patent demixers produce efficient bunsen flame with absolute quiet shut-off.

Further Infomation and Prices—Will be sent on request.

New Peerless Super Section Gas Boiler for Steam, A.G.A. Approved

A. G. A. Ratings				Dimensions								
Water		Steam									Capacity of meter cu. ft. per hour	
Boiler No.	Rating, sq. ft.	Boiler No.	Rating, sq. ft.	Number of sections	Flow and return tapping	Length between tappings	Location int. tap sections from right	Vent. hoods, number and size	Gas valve and reg.	Safety valve	Nat. gas	Mfd. gas
3-in. Super Section Gas Boilers												
3-W-3	540	3-S-3	330	3	2-3″	11 11/16″	.....	1-6″	1″	3/4″	100	200
4-W-3	800	4-S-3	500	4	2-3″	15 5/8″	.....	1-8″	1″	3/4″	150	300
5-W-3	1010	5-S-3	630	5	2-3″	19 9/16″	.....	1-8″	1 1/4″	1″	190	380
6-W-3	1220	6-S-3	760	6	2-3″	23 1/2″	.....	1-8″	1 1/4″	1″	230	460
7-W-3	1310	7-S-3	820	7	2-3″	27 7/16″	.....	2-6″	1 1/4″	1″	270	535
8-W-3	1490	8-S-3	930	8	2-3″	31 3/8″	.....	2-6″	1 1/4″	1 1/4″	305	610
9-W-3	1680	9-S-3	1050	9	2-3″	35 5/16″	.....	2-6″	1 1/2″	1 1/4″	345	685
10-W-3	1870	10-S-3	1170	10	2-3″	39 1/4″	.....	2-6″	1 1/2″	1 1/4″	380	760
11-W-3	2050	11-S-3	1290	11	2-3″	43 3/16″	.....	2-6″	1 1/2″	1 1/4″	420	835
12-W-3	2240	12-S 3	1400	12	2-3″	47 1/8″	.....	3-6″	2″	1 1/4″	460	915
13-W-3	2430	13-S-3	1530	13	3-3″	51 1/16″	7th	3-6″	2″	1 1/2″	495	990
14-W-3	2610	14-S-3	1630	14	3-3″	55″	7th	3-6″	2″	1 1/2″	535	1065
15-W-3	2800	15-S-3	1750	15	3-3″	58 15/16″	7th	3-6″	2″	1 1/2″	570	1140
16-W-3	2990	16-S-3	1870	16	3-3″	62 7/8″	7th	3-6″	2″	1 1/2″	610	1215
17-W-3	3170	17-S-3	1980	17	4-3″	66 13/16″	7th-13th	4-6″	2″	1 1/2″	650	1295
18-W-3	3360	18-S-3	2100	18	4-3″	70 3/4″	7th-13th	4-6″	2″	2″	685	1370
19-W-3	3550	19-S-3	2220	19	4-3″	74 11/16″	7th-13th	4-6″	2″	2″	725	1445
20-W-3	3730	20-S-3	2330	20	4-3″	78 5/8″	7th-13th	4-6″	2″	2″	760	1520
5-in. Super Section Gas Boilers*												
5-W-5	2770	5-S-5	1730	5	2-5″	26″	.....	1-10″	2″	1 1/2″	520	1040
6-W-5	3330	6-S-5	2080	6	2-5″	31 1/4″	.....	1-12″	2″	2″	625	1250
7-W-5	3880	7-S-5	2430	7	2-5″	36 1/2″	.....	1-12″	2″	2″	730	1460
8-W-5	4440	8-S-5	2775	8	2-5″	41 3/4″	.....	1-14″	2 1/2″	2″	835	1665
9-W-5	4990	9-S-5	3120	9	2-5″	47″	.....	1-14″	2 1/2″	2″	935	1870
10-W-5	5550	10-S-5	3470	10	2-5″	52 1/4″	.....	1-14″	2 1/2″	2″	1040	2080
11-W-5	6100	11-S-5	3815	11	2-5″	57 1/2″	.....	1-16″	2 1/2″	2 1/2″	1145	2290
12-W-5	6650	12-S-5	4160	12	2-5″	62 3/4″	.....	2-12″	2 1/2″	2 1/2″	1250	2495
13-W-5	7200	13-S-5	4505	13	2-5 & 1-3″	68″	7th	2-12″	2 1/2″	2 1/2″	1350	2705
14-W-5	7770	14-S-5	4855	14	2-5 & 1-3″	73 1/4″	7th	2-12″	2 1/2″	2 1/2″	1455	2910
15-W-5	8320	15-S-5	5200	15	2-5 & 1-3″	78 1/2″	7th	1-12″ & 1-14″	2 1/2″	2 1/2″	1560	3120
16-W-5	8870	16-S-5	5550	16	2-5 & 1-3″	83 3/4″	7th	2-14″	3″	2 1/2″	1665	3330
17-W-5	9430	17-S-5	5895	17	2-5 & 2-3″	89″	7th-13th	2-14″	3″	3″	1770	3535
18-W-5	9980	18-S-5	6240	18	2-5 & 2-3″	94 1/4″	7th-13th	2-14″	3″	3″	1875	3745
19-W-5	10540	19-S-5	6585	19	2-5 & 2-3″	99 1/2″	7th-13th	2-14″	3″	3″	1980	3955
20-W-5	11090	20-S-5	6935	20	2-5 & 2-3″	104 3/4″	7th-13th	2-14″	3″	3″	2080	4160
21-W-5	11650	21-S-5	7280	21	2-5 & 2-3″	110″	7th-15th	1-14″ & 1-16″	3″	3″	2185	4370
22-W-5	12200	22-S-5	7625	22	2-5 & 2-3″	115 1/4″	7th-15th	2-16″	3″	3″	2290	4575

*5-in. Super Section Gas Boilers are constructed in sizes up to 44 sections each, although listed above to 22-section size only.

All Peerless *Super Section* Boilers, Completely Fitted with Following Accessories—

Metal Insulated Jacket (choice of six colors); Automatic Gas Valve with Electric Control Valve; Transformer; Automatic Safety Pilot; Regular Pilots and Pilot Cock (necessary piping and copper tubing for both); Labeled Shut-off Valve; Gas Pressure Regulator; Drain Cock; Draft Hoods; Clean-out Brush.

Peerless *Super Section* Water Boilers for Steam or Vapor Heating Systems—

Automatic Steam Pressure Control; Throttling Valve; Low Water Safety Cut-off; Pressure Relief Valve; Steam Gauge and Syphon; Water Column with Gauge and Tri-cocks.

Peerless *Super Section* Water Boilers for Hot Water Heating Systems—

Automatic Water Temperature Control; Combination Altitude Gauge and Thermometer.

THERMO SERVICE, INC.

Water Tube Steel Heating Boilers

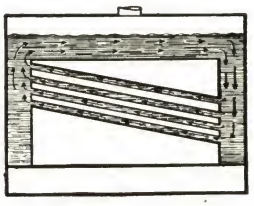
101 Park Avenue, NEW YORK, N. Y.

THERMO SERVICE BOILERS PROVIDE WATER TUBE ECONOMY

Engineers agree that water tube design means the greatest efficiency in boiler operation.

The circulating path of constant flowing water actually scrubs away the heat-resisting film. The small streams of water inside the water tubes sweep away the steam bubbles as they form and absorb every bit of available heat from the flames and gases.

Water tube boilers are universally used in power plants where every per cent of additional economy is considered important.



Path of Water Circulation in Thermo Service Water Tube Boiler

Domestic Hot Water—The Thermo Service Boiler provides a hot water heater completely enclosed within the boiler, eliminating the storage tank with its limited hot water supply. The heater, consisting of copper and brass tubes, is submerged in the hot boiler water. Tubes are attached directly to the incoming water supply and the house hot water taps.

Cleaning—Extra large cleanout doors, conveniently placed, give spacious access to every crevice and corner. Both fire and water surfaces can be thoroughly cleaned.

Triple Service—The Thermo Service boiler when equipped for triple service—

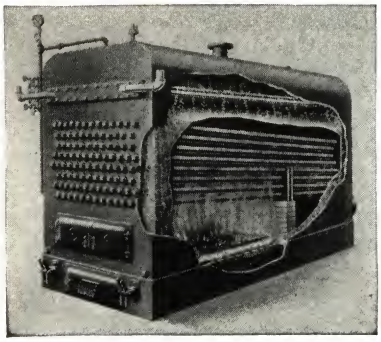
1. Heats the building with water tube economy.
2. Heats domestic hot water without tanks—without extra equipment.
3. Incinerates garbage and refuse—or provides auxiliary grates.

With an oil burner, gas burner, stoker or coal hand firing, you can put your boiler to triple use.

Heavy Steel Construction—There is not a plate in a Thermo Service Boiler less than ⅜ in. thick.

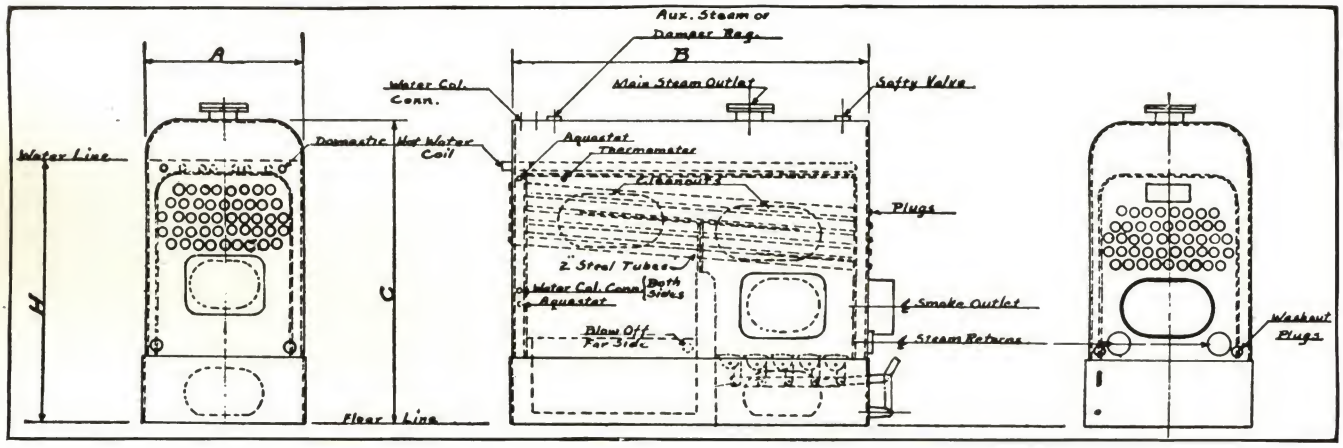
The heavy water leg construction consists of ⅜ in. plates welded around a ⅞ in. bar.

The staybolt holes are drilled, not punched and the welding edges are planed to a smooth non-fractured bevel.



Type "C" Thermo Service Coal Burning Boiler

Type "O" Thermo Service Oil Burning Boiler



THERMO SERVICE BOILER CAPACITIES AND DIMENSIONS

Boiler No.	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Nominal Steam rating, sq. ft.	1120	1470	1862	2240	2576	3010	3668	4578	5250	5964	6930	7686	8484	9254	10822	12460	13958	15400	17108	18620	20580	22386	24108	25718	28182
Nominal hot water rating, sq. ft.	1792	2352	2979	3584	4122	4816	5869	7325	8400	9542	11088	12298	13574	14806	17315	19936	22333	24640	27373	29792	32928	35818	38573	41149	45091
Weight complete, lbs.	2900	3150	3700	4100	4700	5100	5700	6100	7000	7900	8800	9800	10800	11200	12400	13400	14400	15100	16300	18000	19700	20800	22600	24200	27500
Heating surface, sq. ft.	80	105	133	160	184	215	262	327	375	426	495	549	606	661	773	890	997	1100	1222	1330	1470	1599	1722	1837	2013
Recommended diam. stack (one boiler), ins.	12	12	14	16	16	18	18	20	20	22	22	24	24	26	28	28	30	30	32	32	34	36	36	38	40
(A) Wth boiler, ins.	26¼	26¼	26¼	30⅛	30⅛	36⅛	36⅛	36⅛	42⅛	42⅛	48⅛	48⅛	48⅛	54⅛	54⅛	54⅛	60⅛	60⅛	60⅛	60⅛	68⅛	68⅛	74⅛	74⅛	80⅛
(B) Lgth boiler, ft. ins.	4–9	4–9	5–9	5–9	6–9	6–9	7–9	7–9	7–9	8–9	8–9	9–9	10–9	9–9	10–9	11–9	10–9	11–9	12–9	13–9	13–9	14–9	14–9	15–9	15–9
(C) Ht. boiler overall, ft. ins.	5–2	5–5½	5–6½	5–6½	5–7½	5–9	5–11	6–5	6–8	6–8	6–11	6–11	7–0	7–2	7–5	7–8	8–2	8–3	8–5	8–8	8–11	9–0	9–0	9–0	9–3
(H) Ht. water line, ins.	54½	58	59	59	60	60	62	68	71	71	73	73	74	75	78	81	84	85	87	90	91	92	92	92	94

THE H. B. SMITH CO.

Complete Line of Low Pressure Boilers for Steam, Vapor or Hot Water Heating Plants, Radiators and Accessories for Any Size Installation
Complete Line of Hy-Test Boilers for Hot Water Supply

WESTFIELD, MASS.

BRANCH OFFICES AND WAREHOUSES

BOSTON, 640 Main Street, Cambridge, Mass. NEW YORK, N. Y., 10 East 41st Street
PHILADELPHIA, PA., 2209 Chestnut Street

A SPECIAL LINE OF BOILERS FOR OIL BURNING

THE H. B. SMITH CO. takes pleasure in presenting a special line of boilers for oil burner operation.

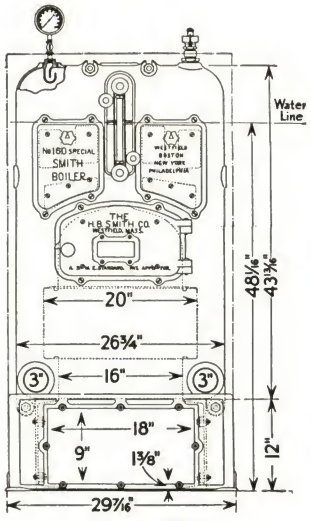
This special line features the usual assurance of quality products, proper ratings and economical allowances.

Close adherence to our specific recommendations for installing these boilers will insure an efficiency of not less than 75% and in many cases well over 80%.

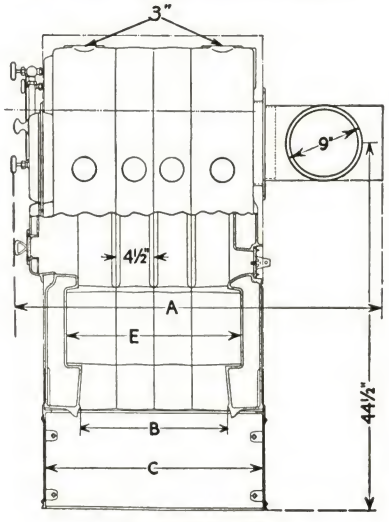
The ratings on these boilers are net ratings—see footnote under tables.

The oil delivery rate develops not only the net rating but also the additional allowance for piping pickup, etc., which varies from 30% to 45% of the net rating.

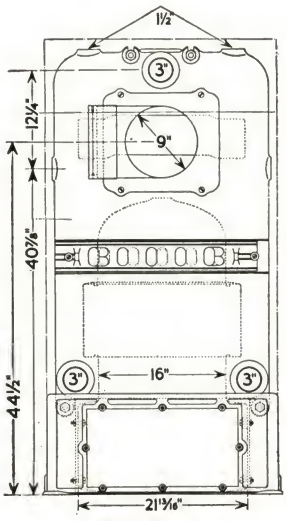
No. 160 Specialsmith Boiler



Front View



Longitudinal View



Rear View

SIZES, CAPACITIES AND DIMENSIONS OF NO. 160 SPECIALSMITH BOILER

Steam boiler		Water boiler		Oil delivery rate, gal. per hr.	Heating surface, sq. ft.	Max. number of flues	Furnace volume, cu. ft.	Average length furnace, ins.	Average width furnace, ins.	Average height crownsheet, ins.	B Min. length furnace, ins.	Min. width furnace, ins.	E Dimension, ins.	A Length boiler, over all, ins.	C Length boiler foundation, ins.	Chimney		Safety valve pipe size, in.	Water relief valve pipe size, in.
No.	Net rating, ft.	No.	Net rating, ft.													Size, ins.	Height, ft.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
160-S- 5	340	160-W- 5	580	1.12	32.	14	6.9	17½	19	36	13½	16	16⅜	45⅛	22¾	8x 8	30	1	½
160-S- 6	445	160-W- 6	760	1.46	42.4	18	8.7	22	19	36	18	16	20⅞	49⅝	27¼	8x 8	30	1	¾
160-S- 7	550	160-W- 7	935	1.84	52.9	22	10.5	26½	19	36	22½	16	25¾	54⅛	31¾	8x12	25	1	¾
160-S- 8	650	160-W- 8	1100	2.14	63.3	26	12.3	31	19	36	27	16	29⅞	58⅝	36¼	8x12	30	1	¾
160-S- 9	750	160-W- 9	1275	2.47	73.8	30	14.0	35½	19	36	31½	16	34⅜	63⅛	40¾	8x12	30	1	¾
160-S-10	860	160-W-10	1460	2.84	84.2	34	15.8	40	19	36	36	16	38⅞	67⅝	45¼	8x12	35	1	¾

All boilers tested to A. S. M. E. Standard Hydrostatic pressure.

Maximum allowable working pressure—steam 15 lbs.; water 30 lbs.

Column 2 and 4—These are "net ratings" i.e., equivalent installed direct radiation, plus hot water supply. Oil delivery values allow for factors such as piping and pickup.

Column 5—Oil heat value 141,000 B.t.u. per gallon—19,350 B.t.u. per pound.

Column 11—Average height from base of foundation.

If low water cutoff is used, install so as to cut off when water level is ½ in. in boiler gage glass.

Size firepot door (minimum dimensions)—12½x7 ins.

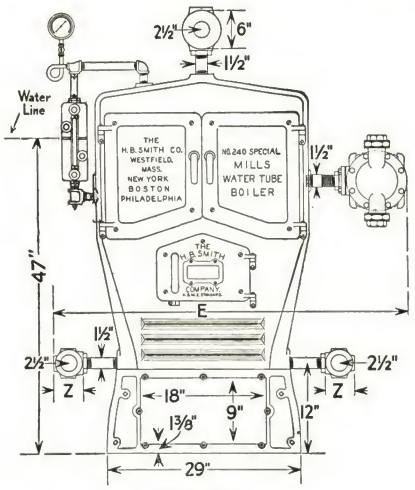
If domestic hot water heater is to be connected to several sections, order must specify in detail what sections are to be tapped and whether right or left hand.

All back sections No. 160 Smith tapped regular both sides—1½ ins.

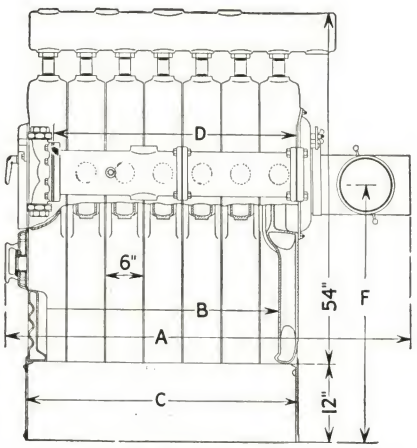
Supply tappings 3-3 ins.

Return tappings 4-3 ins.

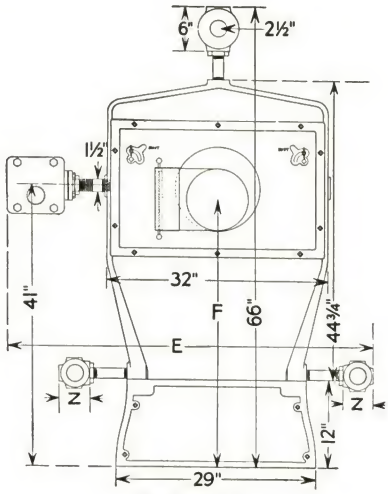
No. 240 Special Mills Water Tube Boilers



Front View



Longitudinal View



Rear View

SIZES, CAPACITIES AND DIMENSIONS OF NO. 240 SPECIAL MILLS WATER TUBE BOILERS

Steam boiler No.	Steam boiler Net rating, ft.	Water boiler No.	Water boiler Net rating, ft.	Oil delivery rate gal. per hr.	Heating surface sq. ft.	Max. number flues	Furnace volume, cu. ft.	Av. length furnace, ins.	Av. width furnace, ins.	Av. ht. crownsheet, ins.	B Min. length furnace, ins.	Min. width furnace, ins.	A Length boiler over all, ins.	C Length boiler foundation, ins.	F Height smoke-pipe opening, ins.	Dia. smokehood opening, ins.	Chimney Size, ins.	Chimney Height, ft.	Safety valve pipe size, ins.	Water relief valve, pipe size, in.	Automatic damper dia., ins.	Boiler covering surface, sq. ft.	24 Supply drum top tappings No. of tappings — Size tapping 1¼ S	1¼ W	1½ S	1½ W	2 S	2 W	2½ S	2½ W	3 S	3 W	4 S	4 W	D Length Smith-Manifold, in.	Schedule of heaters for Smith-Manifolds Sizes are inclusive
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23													25	
240-S- 4	675	240-W- 4	1115	2.06	61.9	13	7.62	18	22	33	18	20	45¼	26	39½	9	8x12	30	1	¾	9	22.5	1	1	. .	. .	2	2	. .	. .	1	1	. .	. .	20	301S 401S 601S
240-S- 5	900	240-W- 5	1500	2.76	76.5	16	10.1	24	22	33	24	20	51¼	32	39½	9	8x12	30	1	¾	9	27.5	. .	1	1	. .	2	2	. .	. .	1	1	. .	. .	38	301S-303S, 401S-403S, 601S-603S
240-S- 6	1125	240-W- 6	1875	3.46	91.2	19	12.58	30	22	33	30	20	57¼	38	39½	9	8x12	30	1¼	¾	9	32.5	. .	. .	1	1	2	2	. .	. .	1	1	. .	. .	38	301S-303S, 401S-403S, 601S-603S
240-S- 7	1350	240-W- 7	2250	4.15	105.3	22	15.06	36	22	33	36	20	63¼	44	39½	9	12x12	30	1¼	¾	9	37.5	. .	. .	. .	1	2	2	. .	. .	1	1	1	. .	38	301S-303S, 401S-403S, 601S-603S
240-S- 8	1575	240-W- 8	2600	4.83	120.5	25	17.54	42	22	33	42	20	75¾	50	40⅞	12	12x12	30	1¼	1	12	42.5	. .	. .	. .	. .	1	2	1	. .	1	1	1	1	44	301S-303S, 401S-403S, 601S-603S
240-S- 9	1800	240-W- 9	2975	5.46	135.1	28	20.02	48	22	33	48	20	81¾	56	40⅞	12	12x12	35	1½	1	12	47.5	. .	. .	. .	. .	1	1	1	1	1	1	1	1	56	301S-304S, 401S-404S, 601S-604S
240-S-10	2025	240-W-10	3350	6.10	149.8	31	22.5	54	22	33	54	20	87¾	62	40⅞	12	12x16	35	1½	1	12	52.5	. .	. .	. .	. .	1	1	1	1	1	1	1	1	56	301S-304S, 401S-404S, 601S-604S

Size firepot door opening (min. dimensions) ins. 12x 8
Width boiler over all (steam) ins.... E 52⅜
Width boiler over all (water) ins.... E 53⅛

Steamer Boiler Return Drum

Outside diam., ins.	Z 4½
Side tapped, ins.	1¼
Rear end tapped, ins.	2½
Top and bottom tapped (opp. ends) ins.	2

Water Boiler Return Drum

Outside diam., ins.	Z 6
Side tapped, ins.	1¼
Rear end tapped, ins.	4
Top and bottom tapped (opp. ends) ins.	2

All boilers tested to A. S. M. E. Standard Hydrostatic pressure.

Maximum allowable working pressure—steam 15 lbs.; water 30 lbs.

Column 2 and 4—These are "net ratings" i.e., equivalent installed direct radiation, plus hot water supply. Oil delivery values allow for factors such as piping and pickup.

Column 5—Oil heat value 141,000 B.t.u. per gallon—19,350 B.t.u. per pound.

Column 11—Average height from base of foundation.

Column 23—Square feet of exterior boiler surface. 100 lbs. insulation will cover approximately 15 sq. ft. surface to a thickness of 1½ ins.

Column 24—Tappings other than those listed are special. Order must specify sizes.

Column 25—Boilers can be furnished with Smith-Manifold for summer-winter domestic hot water supply. Front sections will not be tapped.

Order should specify whether right or left-hand (facing boiler) manifold is wanted. Right hand is furnished unless otherwise specified.

Order must specify in detail what sections are to be tapped and whether right or left hand if other types of heaters are to be used. Front sections will not be tapped.

If low water cutoff is used, install so as to cut off when water level is ½ in. in boiler gage glass.

Taco Heaters for Smith-Manifolds

SIZES AND CAPACITIES OF TACO HEATERS

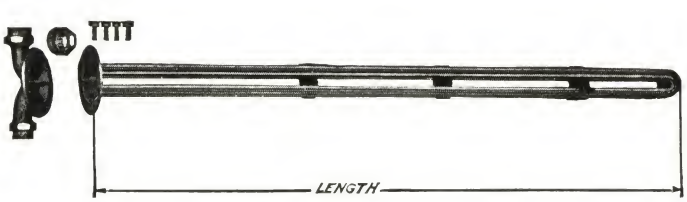
No.	(2) Length of heater, ins.	Tank cap. gal. (3) (summer-winter hot water)	Equivalent direct steam rad. ft. (factor .8)	Equivalent direct hot water rad. ft. (factor 1.3)	Heater inlet and outlet, ins.
301S	12	28	23	37	
302S	24	55	44	72	
303S	36	83	67	108	
304S	48	110	88	143	1½
305S	60	138	111	180	
306S	72	166	133	216	
(1) 307S	84	194	155	252	
(1) 401S	12	42	34	55	
402S	24	81	65	105	
403S	36	115	92	150	
404S	48	157	126	204	1½
405S	60	195	156	254	
406S	72	235	188	306	
(1) 407S	84	275	220	358	
(1) 408S	96	315	252	410	
(1) 601S	12	115	92	150	
602S	24	230	184	299	
603S	36	370	296	481	
604S	48	485	388	631	2
605S	60	610	488	793	
606S	72	740	592	963	
607S	84	850	680	1105	
608S	96	970	776	1261	

(1) These heaters are for special order only.

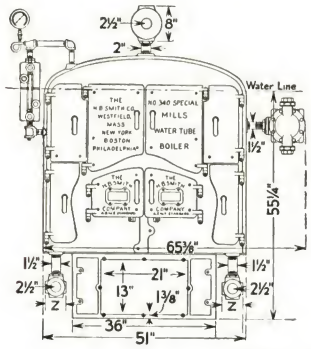
(2) This is the length of the tubular element of the heater. Compare this dimension with the manifold length shown on the boiler dimension sheet, to be sure that the heater in question can be properly installed.

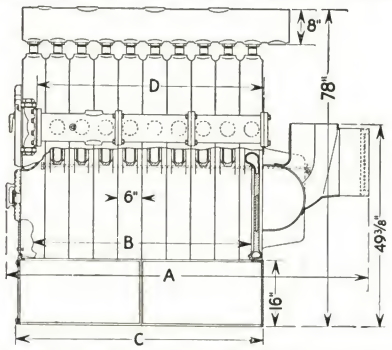
(3) Capacity based on water heated from 50° to 150° F. in three hours.

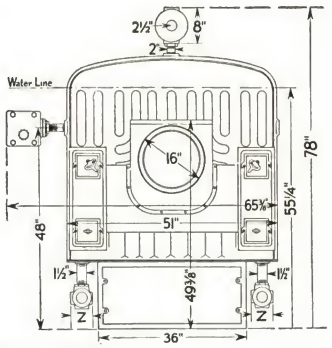
With the No. 440 Mills series there must be a manifold on each side of the boiler for summer hot water. A heater may be placed in each manifold, or the two manifolds may be connected at the rear with a horizontal pipe and the heater placed in one manifold only.



No. 340 Special Mills Water Tube Boilers







SIZES, CAPACITIES AND DIMENSIONS OF NO. 340 SPECIAL MILLS WATER TUBE BOILERS

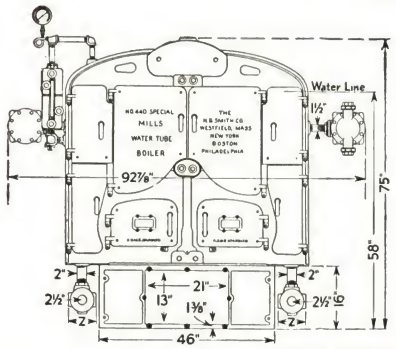
Steam boiler Number	Steam boiler Net rating, ft.	Water boiler Number	Water boiler Net rating, ft.	Oil del. rate, gal. per hr.	Heating surface, sq. ft.	Max. number flues	Fur. vol., cu. ft.	Av. length fur., ins.	Av. width fur., ins.	Av. ht. crnsht., ins.	B Min. lgth. fur., ins.	Min. width fur., ins.	A Lgth. boiler over all, ins.	C Lgth. boiler foundation, ins.	Smokehood opening, ins.	Chimney size, ins.	Chimney height, ft.	Safety valve pipe size, ins.	Water relief valve pipe size, ins.	Boiler covering surface, sq. ft.	22 Supply drum top tappings No. of tappings — Size tapping 2 S	2 W	2½ S	2½ W	3 S	3 W	4 S	4 W	5 S	5 W	D Length, Smith-Manifold, ins.	Schedule of heaters for Smith-Manifolds Sizes Are Inclusive
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21											23	
340-S- 6	2000	340-W- 6	3300	6.06	165.	23	22	33	32	36	30	28	76	37	12	12x16	30	1¼	1	49.5	1	1	. .	. .	2	2	1	1	. .	. .	38	301S–303S, 401S–403S, 601S–603S
340-S- 7	2400	340-W- 7	3950	7.24	192.5	26	26	39	32	36	36	28	82	43	12	12x16	35	1½	1	55.5	1	1	. .	. .	2	2	1	1	. .	. .	38	301S–303S, 401S–403S, 601S–603S
340-S- 8	2800	340-W- 8	4625	8.40	220.	29	30	45	32	36	42	28	88	49	12	16x16	30	1½	1	61.5	. .	1	1	. .	1	2	1	1	1	. .	44	301S–303S, 401S–403S, 601S–603S
340-S- 9	3200	340-W- 9	5275	9.57	247.5	32	34	51	32	36	48	28	94	55	12⅛x15⅜	16x16	35	2	1	67.5	. .	. .	1	1	1	1	1	1	1	1	56	301S–304S, 401S–404S, 601S–604S
340-S-10	3600	340-W-10	5950	10.70	275.	35	38	57	32	36	54	28	100	61	12⅛x15⅜	16x16	40	2	1¼	73.5	. .	. .	1	1	1	1	1	1	1	1	56	301S–304S, 401S–404S, 601S–604S
340-S-11	4000	340-W-11	6600	11.80	302.5	38	42	63	32	36	60	28	106	67	12⅛x15⅜	16x20	30	2	1¼	79.5	. .	. .	1	1	1	1	1	1	1	1	62	301S–305S, 401S–405S, 601S–605S
340-S-12	4400	340-W-12	7250	13.10	330.	41	46	69	32	36	66	28	112	73	12 x20	16x20	35	2	1¼	85.5	. .	. .	1	1	1	2	1	1	1	1	68	301S–305S, 401S–405S, 601S–605S
340-S-13	4800	340-W-13	7925	14.05	357.5	44	50	75	32	36	72	28	118	79	12 x20	16x20	40	2	1¼	91.5	. .	. .	. .	. .	1	1	2	2	1	1	74	301S–306S, 401S–406S, 601S–606S
340-S-14	5200	340-W-14	8575	15.20	385.	47	54	81	32	36	78	28	124	85	12 x20	16x20	45	2½	1¼	97.5	. .	. .	. .	. .	1	1	2	2	1	1	80	301S–306S, 401S–406S, 601S–606S

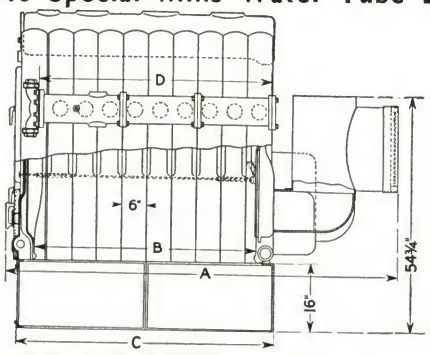
Size firepot door (min. dimensions) ins. 25x8

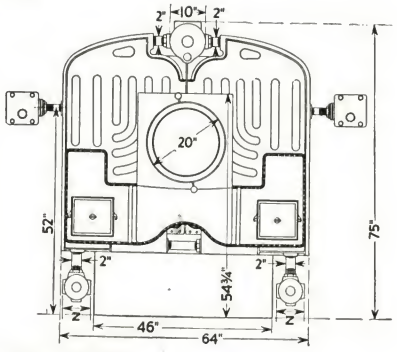
Steam Boiler Return Drum
Outside diam., ins..... Z 4½
Side tapped, ins..... 2
Rear end tapped, ins..... 3

Water Boiler Return Drum
Outside diam., ins..... Z 6
Side tapped, ins..... 2
Rear end tapped, ins..... 4

No. 440 Special Mills Water Tube Boilers







SIZES, CAPACITIES AND DIMENSIONS OF NO. 440 SPECIAL MILLS WATER TUBE BOILERS

Steam boiler Number	Steam boiler Net rating, ft.	Water boiler Number	Water boiler Net rating, ft.	Oil del. rate, gal. per hr.	Heating surface, sq. ft.	Max. number flues	Furnace volume, cu. ft.	Av. length fur., ins.	Av. width fur., ins.	Av. ht. crnsheet., ins.	B Min. lgth. fur., ins.	Min. width fur., ins.	A Lgth. boiler, over all, ins.	C Length boiler foundation, ins.	Smokehood opening, ins.	Chimney size, ins.	Chimney height, ft.	Safety valve pipe size, ins.	Water relief valve pipe size, ins.	Boiler covering surface, sq. ft.	22 Supply drum top tappings No. of tappings — Size tapping 2½ S	2½ W	3 S	3 W	3½ S	3½ W	4 S	4 W	5 S	5 W	6 S	6 W	D Length Smith-Manifold, in.	Schedule of heaters for Smith-Manifolds
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21													23	
440-S- 7	3600	440-W- 7	5950	10.70	262	26	43. 6	39	42	46	36	38	87⅛	43	13x16⅜	16x20	30	2	1	63	1	1	1	1	. .	. .	1	1	1	1	. .	. .	38	301S–303S, 401S–403S, 601S–603S
440-S- 8	4200	440-W- 8	6925	12.33	298	29	50. 3	45	42	46	42	38	93⅛	49	13x16⅜	16x20	35	2	1¼	70	1	1	1	1	. .	. .	1	1	1	1	. .	. .	44	301S–303S, 401S–403S, 601S–603S
440-S- 9	4800	440-W- 9	7925	14.03	334	32	57.	51	42	46	48	38	99⅛	55	13x16⅜	16x20	40	2	1¼	77	. .	. .	1	1	. .	. .	1	1	1	1	1	1	56	301S–304S, 401S–404S, 601S–604S
440-S-10	5400	440-W-10	8900	15.73	370	35	63. 7	57	42	46	54	38	105⅛	61	13x22⅜	16x20	45	2½	1¼	84	. .	. .	1	1	. .	. .	1	1	1	1	1	1	56	301S–304S, 401S–404S, 601S–604S
440-S-11	6000	440-W-11	9900	17.33	406	38	70. 4	63	42	46	60	38	111⅛	67	13x22⅜	20x20	35	2½	1½	91	. .	. .	1	1	. .	. .	1	1	1	1	1	1	62	301S–305S, 401S–405S, 601S–605S
440-S-12	6600	440-W-12	10900	19.03	442	41	77. 1	69	42	46	66	38	117⅛	73	13x22⅜	20x20	40	2½	1½	98	. .	. .	1	1	. .	. .	1	1	1	1	2	2	68	301S–305S, 401S–405S, 601S–605S
440-S-13	7200	440-W-13	11875	20.60	478	44	83. 8	75	42	46	72	38	123⅛	79	15x24½	20x24	35	2½	1½	105	. .	. .	. .	. .	1	1	. .	. .	1	1	2	2	74	301S–306S, 401S–406S, 601S–606S
440-S-14	7800	440-W-14	12875	22.20	514	47	90. 5	81	42	46	78	38	129⅛	85	15x24½	20x24	40	3	1½	112	. .	. .	. .	. .	1	1	. .	. .	1	1	2	2	80	301S–306S, 401S–406S, 601S–606S
440-S-15	8400	440-W-15	13850	23.90	550	50	97. 2	87	42	46	84	38	135⅛	91	15x24½	20x24	45	3	1½	119	. .	. .	. .	. .	1	1	. .	. .	1	1	2	2	86	301S–307S, 401S–407S, 601S–607S
440-S-16	9000	440-W-16	14850	25.40	586	53	103. 9	93	42	46	90	38	141⅛	97	15x24½	20x24	50	3	1½	126	. .	. .	. .	. .	1	1	. .	. .	1	1	2	2	92	301S–307S, 401S–407S, 601S–607S
440-S-17	9600	440-W-17	15850	27.30	622	56	110. 6	99	42	46	96	38	147⅛	103	15x24½	24x24	40	3½	1½	133	. .	. .	. .	. .	1	1	. .	. .	1	1	3	3	98	301S–308S, 401S–408S, 601S–608S
440-S-18	10200	440-W-18	16850	28.50	658	59	117. 3	105	42	46	102	38	153⅛	109	15x24½	24x24	45	3½	1½	140	. .	. .	. .	. .	1	1	. .	. .	1	1	3	3	104	301S–308S, 401S–408S, 601S–608S

Size firepot door openings (min. dimensions) ins. ..... Two 15x10

Supply Drum
Front end tapped, ins..... 2½
Rear end tapped..... One 2½ ins. One 2 ins.

Steam Boiler Return Drum
Outside diam., ins..... Z 6
Side tapped, ins..... 2
Undersides tapped, ins..... 1¼
Rear end tapped, ins..... 4

Water Boiler Return Drum
Outside diam., ins..... Z 8
Side tapped, ins..... 2
Rear end tapped, ins..... 5

All boilers tested to A. S. M. E. Standard Hydrostatic pressure.

Maximum allowable working pressure—steam 15 lbs.; water 30 lbs.

Column 2 and 4—These are "net ratings" i.e., equivalent installed direct radiation, plus hot water supply. Oil delivery values allow for factors such as piping and pickup.

Column 5—Oil heat value 141,000 B.t.u. per gallon—19,350 B.t.u. per pound.

Column 11—Average height from base of foundation.

Column 14—Includes clearance for automatic damper.

Column 21—Square feet of exterior boiler surface. 100 lbs. insulation will cover approximately 15 sq. ft. surface to a thickness of 1½ ins.

Column 22—Tappings other than those listed are special. Order must specify sizes.

Column 23—Boilers can be furnished with Smith-Manifolds for summer-winter domestic hot water supply. Front sections will not be tapped.

Order must specify in detail what sections are to be tapped and whether right hand or left hand if other types of heaters are to be used. Front sections will not be tapped.

If low water cutoff is used, install so as to cut off when water level is ½ in. in boiler gage glass.

GAR WOOD BOILER DIVISION

WOOD HYDRAULIC HOIST & BODY CO., INC.
415 Connecticut Avenue
DETROIT, MICH.

Gar-Wood Balanced Heating Unit

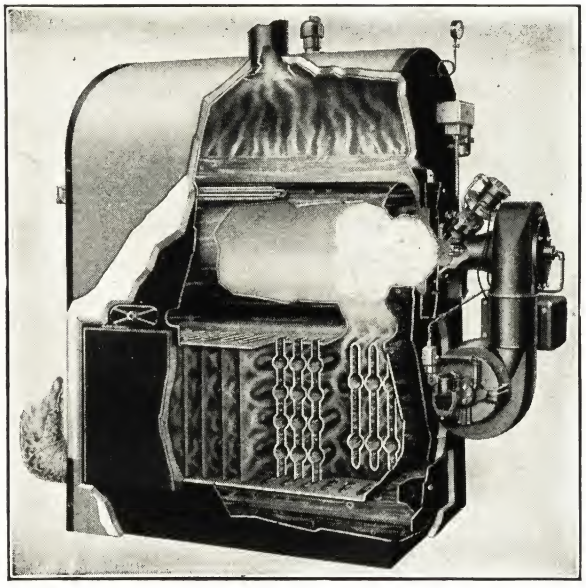
The unit consists of boiler with trimmings, insulation and metal jacket, and burner assembly with complete automatic controls.

Advantages of the Gar-Wood Heating Unit

Automatic Heat—Controlled temperature and steam pressure without manual operation.

Low Installation Cost—The unit is a complete machine shipped ready for piping.

Low Heating Costs—Highest efficiency due to correlated engineering for the single purpose of automatic intermittent firing of oil or gas.



Safety—Full automatic controls of approved design provide for any contingency.

Domestic Hot Water—Indirect heater and automatic control engineered as an integral part in the boiler.

Oil or Gas—Either oil or gas may be fired without changing the boiler.

The Boiler

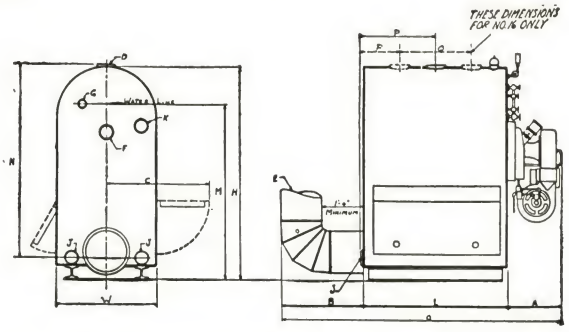
The Gar-Wood Boiler is designed without compromises for coal firing or to accommodate a wide variety of oil burners of radically different designs. For this reason a truly scientific machine is possible. It combines ample heating surface with a compact unit, an exceptionally high ratio of flue area to firebox heating surface, counter flow heat travel by placing the firebox on top, and the correct water content for the load carried. It is built of armco iron, electrically welded, and completely annealed.

The Burner

The burner is of the mechanical draft, pressure atomizing type and employs positive electric ignition. It bears the Underwriters' Laboratories label. It fires into a combustion chamber built as an integral part of the boiler. Because the burner is built for the one uniform condition in the Gar-Wood boiler, full advantage has been taken of all factors making for the highest combustion efficiency and stable operation.

Ratings

Based on standard 240 B.t.u. per hour per square foot for steam and 150 B.t.u. per hour per square foot for hot water, and are normal working loads. Under ordinary conditions add 30% to the net load to get the gross.



DIMENSIONS AND PIPE SIZES

		Series 5	Series 8	Series 12	Series 16
L	Length without insulation....in.	21¼	28¾	39¼	49¾
L	Length with insulation....in.	23¼	30¾	41¼	51¾
W	Width without insulation....in.	27	27	27	27
W	Width with insulation....in.	29	29	29	29
H	Height without insulation....in.	60	60	61	61
H	Height with insulation....in.	61	61	62	62
A	Without insulation....in.	17½	17½	17½	17½
A	With insulation....in.	16½	16½	16½	16½
B	Without insulation....in.	21	21	25	25
B	With insulation....in.	20	20	24	24
O	Over-all length....in.	59¾	67¼	81¾	92¼
C	Door clearance from boiler center..in.	30	30	30	30
*D	Steam nozzle....in.	4	4	4	(Two) 4
E	Stack diameter....in.	10	10	12	12
F	Automatic damper diameter....in.	4	4	4	4
G	Flow off....in.	1	1	1	1
**J	Water Return....in.	(Two) 2½	(Two) 2½	(Two) 2½	(Two) 2½
K	Water heater nipple....in.	3	3	3	3
M	Height of water line....in.	48½	48½	50¾	50¾
N	Returns to nozzle (height)....in.	56	56	56	56
P	Nozzle to return (length)....in.	11⅝	15⅜	19⅝	14⅝
Q	Between nozzle centers on No. 16..in.				22⅜
	Weight....lbs.	940	1366	1832	2175
	Water capacity....gals.	56	80	104	128
	Heating surface....sq. ft.	72	105	152	199

*Hot water boilers, 6-in. nozzle on the No. 12 and two 5-in. nozzles on the No. 16.

**Hot water boilers, 4-in. return tappings on No. 12 and 16. Connect water return to both water legs with drain cock on each.

CAPACITIES AND RATINGS

No.	B.t.u. per hr. at noz.	Gross steam load, sq. ft.	Gross hot water load, sq. ft.
Series 5			
5-135	158,000	658	1053
5-165	193,000	804	1286
5-180	210,600	877	1404
Series 8			
8-200	234,000	975	1560
8-250	292,500	1219	1950
8-275	321,700	1340	2144
Series 12			
12-30	351,000	1462	2340
12-35	409,500	1706	2730
12-40	000,000	1950	3120
Series 16			
16-45	526,500	2194	3510
16-50	585,000	2437	3900
16-55	643,500	2681	4290
16-60	702,000	2925	4680

ESTABLISHED 1853

BASS FOUNDRY & MACHINE COMPANY

Manufacturers of Electrically Welded Steel Water Tube Heating Boilers and Horizontal Return Tubular and Water Tube Power Boilers

FORT WAYNE, IND.

Bass Steel Heating Boilers

Provide heat, incineration, hot water, with greater efficiency at less cost. The Bass Steel Heating Boiler operates at the highest efficiency obtainable for the following reasons:

(1) It is of steel water tube design with long gas travel from grates to stack.

(2) Large firebox volume and smokeless in operation.

(3) It has an ample secondary combustion chamber with provision for admittance of secondary air.

(4) It has maximum direct or radiant heat absorbing surfaces.

(5) Positive and rapid water circulation is assured.

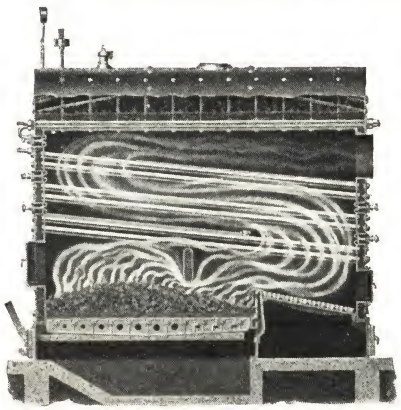
(6) It has minimum surface for collection of soot.

(7) It is easily accessible for cleaning of heating surfaces so that maximum efficiency can be maintained throughout the long life of the boiler.

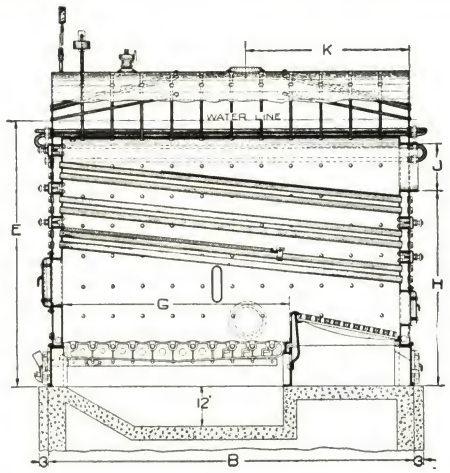
(8) Double firebox construction and adjustable baffles permits the use of all fuels, singly or in combination—coal or oil—without change in construction.

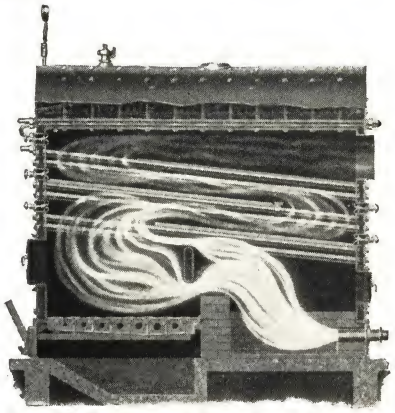
(9) Domestic hot water supply system of the submerged coil type built in boiler.

(10) Incineration without cost. Secondary firebox may be fitted with incinerator grates.



Sectional View of Bass Steel Heating Boiler Showing Arrangement for Coal Firing





Sectional View of Bass Steel Heating Boiler Showing Arrangement for Oil Firing

Exceptional Boiler Efficiency

The superiority of the Bass Triple Duty Type Steel Heating Boiler is based on sound engineering, modern construction and advanced mechanical devices. The long gas travel from grates to stack over and around the ample heat absorbing surfaces assures the full benefit of radiant heat from the fuel and positive, rapid circulation of water. The Bass Boiler, in fact, possesses all the advantages of the modern high pressure water tube boiler which shows such astounding efficiencies in the modern superpower stations.

The cost of this type of boiler is well within the range of low pressure heating.

Domestic Hot Water—Incineration

Domestic hot water is supplied by copper coils submerged in the boiler—at temperatures of 140° to 160° in quantities ranging from 40 to 4600 gal. per hour, depending upon the boiler size. Plenty of hot water in summer as well as winter may be economically supplied, where oil or gas burner is used, by arranging an aquastat control. The entire cost of installing and operating a separate hot water supply system is eliminated.

Incineration is accomplished by means of a secondary combustion chamber equipped with special grates on which garbage and refuse may be burned. This saves the entire installation and operating cost of a separate incinerator and conserves basement space.

Steam boiler No.	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10	S-11	S-12	S-13
Hand fired rating, sq. ft. rad.	700	960	1160	1340	1540	1820	2100	2880	3610	4340	4910	5550	6240
Hot water boiler No.	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10	W-11	W-12	W-13
Hand fired rating, sq. ft. rad.	1120	1530	1850	2140	2460	2910	3360	4440	5770	6940	7860	8890	9990
Steam boiler No.	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10	S-11	S-12	S-13
Oil, gas, stoker rating, sq. ft. rad.	860	1170	1410	1630	1870	2210	2550	3500	4380	5270	5960	6740	7580
Hot water boiler No.	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10	W-11	W-12	W-13
Oil, gas, stoker rating, sq. ft. rad.	1370	1870	2250	2600	2990	3530	4080	5600	7010	8430	9540	10790	12130
Weight complete, lb.	2100	2500	2750	3100	3900	4475	5100	5850	6800	7700	7550	8275	8950
Heating surface, sq. ft.	52	70	83	96	110	130	150	206	258	310	351	397	446
Grate area, sq. ft.	5.4	6.1	6.9	7.6	8.0	9.0	10.0	10.7	12.0	13.3	14.4	15.9	17.5
Main steam opening, in.	4	4	4	5	5	5	5	6	6	6	8	8	8
Number and size return opening, in.	2-4	2-4	2-4	2-5	2-5	2-5	2-5	2-6	2-6	2-6	2-8	2-8	2-8
Size safety valve, in.	1¼	1¼	1½	1½	1½	1½	2	2	2	2	2½	2½	2½
Area smoke outlet, sq. in.	108	108	108	108	187	187	187	220	220	220	310	310	310
Min. diam. stack, in.	10	12	12	14	18	18	18	20	20	20	22	22	22
Min. height stack, ft.	30	35	40	45	50	55	55	60	60	60	65	65	65
Boiler insulation, sq. ft.	34	38	45	52	58	69	74	77	96	115	110	125	140
A—Width over-all, in.	27	27	27	27	33	33	33	39	39	39	45	45	45
B—Length over-all, ft. in.	4-0	4-6	5-3	6-0	5-9	6-9	7-9	6-3	7-9	9-3	7-9	8-9	9-9
C—Height over-all, ft. in.	4-10½	4-10½	4-10½	4-10½	5-7	5-7	5-7	6-6	6-6	6-6	7-4	7-4	7-4
D—Height of base, in.	12	12	12	12	12	12	12	12	12	12	12	12	12
E—Height of water line, ft. in.	4-5	4-5	4-5	4-5	5-0	5-0	5-0	5-10	5-10	5-10	6-6	6-6	6-6
F—Width firebox and ashpit, in.	20	20	20	20	26	26	26	31	31	31	37	37	37
G—Length firebox and ashpit, in.	39	44¼	49½	54¾	44¼	49½	54¾	50	56	62	56	62	68
H—Height from floor to smoke outlet	42½	42½	42½	42½	46½	46½	46½	55	55	55	59	59	59
J—Height smoke outlet on boiler	6	6	6	6	8½	8½	8½	10	10	10	12	12	12
K—Location of steam outlet	18¾	26¼	33	32¼	33	39	41¼	32½	41¼	54	48	54	60

Steam boiler No.	S-14	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-25	.....
Hand fired rating, sq. ft. rad.	6770	7530	8300	9260	10240	11240	12220	15370	17680	19990	22280	24590	.....
Hot water boiler No.	W-14	W-15	W-16	W-17	W-18	W-19	W-20	W-21	W-22	W-23	W-24	W-25	.....
Hand fired rating, sq. ft. rad.	10840	12050	13280	14820	16390	17980	19550	24590	28290	31980	35660	39350	.....
Steam boiler No.	S-14	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-25	.....
Oil, gas, stoker rating, sq. ft. rad.	8220	9140	10080	11250	12440	13650	14840	18660	21470	24270	27060	29860	.....
Hot water boiler No.	W-14	W-15	W-16	W-17	W-18	W-19	W-20	W-21	W-22	W-23	W-24	W-25	.....
Oil, gas, stoker rating, sq. ft. rad.	13160	14630	16120	18000	19910	21840	23740	29860	34350	38840	43300	47790	.....
Weight complete, lb.	10350	11100	12100	14000	15100	16100	17200	20800	22600	24400	26400	28200	.....
Heating surface, sq. ft.	484	538	593	662	732	803	873	1098	1263	1427	1592	1757	.....
Grate area, sq. ft.	20.0	21.9	21.9	24.0	25.5	26.7	27.8	33.9	33.9	36.6	36.6	38.7	.....
Main steam opening, in.	8	8	8	8	8	8	8	10	10	10	10	10	.....
No. and size return opening, in.	2-8	2-8	2-8	2-8	2-8	2-8	2-8	2-10	2-10	2-10	2-10	2-10	.....
Size safety valve, in.	3	3	3	3	3½	3½	3½	4	4	4½	4½	4½	.....
Area smoke outlet, sq. in.	420	420	420	520	520	520	520	700	700	700	840	840	.....
Min. diam. stack, in.	24	24	24	26	26	26	28	30	32	36	36	40	.....
Min. height stack, ft.	70	70	70	75	75	75	80	80	85	90	95	100	.....
Boiler insulation, sq. ft.	144	160	175	171	189	207	225	238	270	310	350	380	.....
A—Width over-all, in.	51	51	51	63	63	63	63	75	75	75	75	75	.....
B—Length over-all, ft. in.	9-3	10-3	11-3	9-9	10-9	11-9	12-9	10-3	11-9	13-3	14-9	16-3	.....
C—Height over-all, ft. in.	7-10	7-10	7-10	8-10	8-10	8-10	8-10	11-3	11-3	11-3	11-3	11-3	.....
D—Height of base, in.	12	12	12	15	15	15	15	15	15	15	15	15	.....
E—Height of water line, ft. in.	6-8	6-8	6-8	7-6	7-6	7-6	7-6	9-9	9-9	9-9	9-9	9-9	.....
F—Width firebox and ashpit, in.	42½	42½	42½	54	54	54	54	66	66	66	66	66	.....
G—Length firebox and ashpit, in.	68	74	74	65	68	71¼	74	74	74	80	80	86	.....
H—Height from floor to smoke outlet.	58	58	58	64½	64½	64½	64½	87	87	87	87	87	.....
J—Height smoke outlet on boiler	14	14	14	16	16	16	16	20	20	20	20	20	.....
K—Location of steam outlet	49½	60	61¼	57	58½	69½	79½	60	69½	68¼	90	101½	.....

BURNHAM BOILER CORPORATION

IRVINGTON-ON-HUDSON, N. Y.

BRANCHES

TORONTO, ONT., Harbor Commission Building
SPRINGFIELD, MASS., 153 Plainfield Street
SAN FRANCISCO, CAL., 413-15 10th Street
QUEENS VILLAGE, L. I., N. Y., 222nd Street and L. I. R. R.
BOSTON (CAMBRIDGE), MASS., 195 Albany Street
CHICAGO, ILL., 1038 So. Kolmar Avenue
MONTREAL, QUE., 1410 Stanley Street
PHILADELPHIA, PA., 31st and Jefferson Streets
BALTIMORE, MD., 12 West Madison Street
LANCASTER, PA., 704 Griest Building
SHANGHAI, CHINA, 151 Avenue Foch

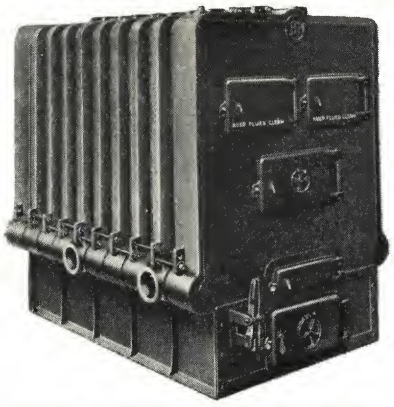
PLANTS: IRVINGTON, N. Y.; ELIZABETH, N. J.; LANCASTER, PA.; ZANESVILLE, OHIO

Products

Sectional Steam and Hot Water Boilers.
Smokeless Boilers.
Hot Water Supply Boilers.
Welded Steel Boilers.
Burnham Fero Radiators.

Tube Type Boilers for Steam and Hot Water Heating

Made in four series, 17, 21, 27 and 36 in. Within this range are found all the capacities required for the largest and smallest domestic and commercial uses. These boilers have the typical Burnham balanced long fire travel, direct flue cleaning doors, and double shaking grates. Control parts are all in front. The waterways are tube shaped, for faster steaming and circulation. Burnham Tube Type boilers are all sectional.



Burnham Water Tube Type Boiler 36-in. Series

Working Pressure Tests—Tested to two and one-half times working pressure of 30 lbs. for water and five times working pressure of 15 lbs. for steam.

RATINGS TUBE TYPE BOILERS FOR STEAM AND WATER

Steam			Steam and Water			Water		
Boiler No.	Rating, sq. ft.	Sup. and ret. tappings, in.	Number of sections	Grate area, sq. ft.	Chimney size, in.—ft.	Sup. and ret. tappings, in.	Rating, sq. ft.	Boiler No.
17-in. Series								
5-S-17	500	2-3	4	1.7	8x 8x30	2-3	850	5-W-17
6-S-17	650	2-3	5	2.2	8x 8x30	2-3	1100	6-W-17
7-S-17	800	2-3	6	2.7	8x12x35	2-3	1350	7-W-17
8-S-17	950	2-3	7	3.2	8x12x35	2-3	1500	8-W-17
9-S-17	1100	2-3	8	3.7	8x12x35	2-3	1850	9-W-17
21-in. Series								
2104-S	600	1-3	4	2.55	8x12x35	1-3	1000	2104-W
2105-S	800	2-3	5	3.28	8x12x35	2-3	1300	2105-W
2106-S	1000	2-3	6	4.01	12x12x35	2-3	1600	2106-W
2107-S	1200	3-3	7	4.74	12x12x35	3-3	1900	2107-W
2108-S	1400	3-3	8	5.47	12x12x40	3-3	2200	2108-W
2109-S	1600	4-3	9	6.20	12x12x40	3-3	2500	2109-W
27-in. Series								
2706-S	1600	2-4	6	5.86	12x12x40	2-4	2600	2706-W
2707-S	1975	2-4	7	6.98	12x16x40	2-4	3200	2707-W
2708-S	2350	3-4	8	8.11	16x16x45	2-4	3800	2708-W
2709-S	2725	3-4	9	9.23	16x16x50	3-4	4400	2709-W
2710-S	3100	3-4	10	10.34	16x20x50	3-4	5000	2710-W
2711-S	3475	3-4	11	11.48	16x20x55	3-4	5620	2711-W
2712-S	3850	4-4	12	12.61	20x20x60	4-4	6200	2712-W
36-in. Series								
3606-S	3200	2-4	6	8.13	16x20x45	3-4	5185	3606-W
3607-S	3850	3-4	7	9.63	16x20x50	3-4	6285	3607-W
3608-S	4500	3-4	8	11.13	20x20x50	4-4	7385	3608-W
3609-S	5150	4-4	9	12.63	20x20x50	4-4	8485	3609-W
3610-S	5800	4-4	10	14.13	20x20x55	4-4	9585	3610-W
3611-S	6450	5-4	11	15.63	20x20x55	5-4	10685	3611-W
3612-S	7100	5-4	12	17.13	20x24x60	5-4	11785	3612-W
3613-S	7750	5-4	13	18.63	24x24x60	5-4	12885	3613-W
3614-S	8400	5-4	14	20.13	24x24x60	5-4	13985	3614-W

Burnham Boilers Jacketed in Color

This is a water tube type boiler with all the fuel saving features of our other water tube boilers.

The jacket of heavy steel is lined with four-ply air cell asbestos, is enameled a rich red, and goes on after the boiler is installed and ready for firing.

Unusually efficient when oil is the fuel used, because of its extra long fire travel, completely surrounded with water, requiring no fire brick for protection.

Burnham Boiler with Colored Jacket

RATINGS—BURNHAM JACKETED BOILER

Boiler No.	Number of sections	Rating, sq. ft.	Grate area, sq. ft.	Supply and ret. tappings, in.	"L" length of base, in.	Over-all length, in.
Steam						
1-S-5	4	500	1.7	2-3	22	40½
1-S-6	5	650	2.2	2-3	26	44½
1-S-7	6	800	2.7	2-3	30	48½
1-S-8	7	950	3.2	2-3	34	52½
1-S-9	8	1100	3.7	2-3	38	56½
Water						
1-W-5	4	850	1.7	2-3	22	40½
1-W-6	5	1100	2.2	2-3	26	44½
1-W-7	6	1350	2.7	2-3	30	48½
1-W-8	7	1600	3.2	2-3	34	52½
1-W-9	8	1850	3.7	2-3	38	56½

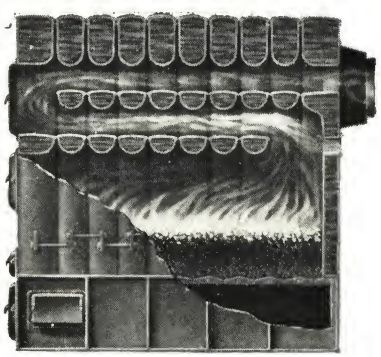
Burnham Big Twin Sectional

For the largest heating installations. Has a 50-in. grate, divided for easy shaking. The sections are twins, dividing down the middle of the boiler for convenience in handling. Has three-way fire travel that makes a short fuel bill. Every part will go through any opening through which a man can go sidewise. Ratings to 16,550 sq. ft. for steam; 27,000 sq. ft. for water.

Tube Type Smokeless Series

For burning soft coal efficiently and smokelessly. They get all possible heat units from the volatile gases that rise from the fuel bed. The gases are fed with air in such a way that they are quickly ignited and the heat transferred to the tubes. A three-way fire travel aids combustion of all fuel particles.

Meet the smoke ordinances of all municipalities.



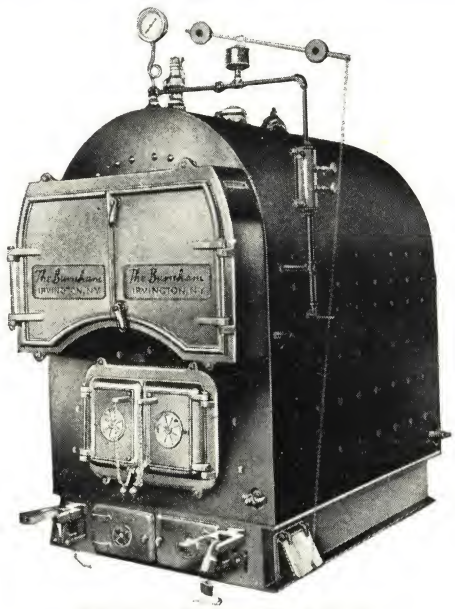
Burnham Smokeless Boiler
Note long fire travel

Burnham Three Purpose Welded Steel Boilers

For heat, hot water—health.

Heating, hot water supply, and incineration are provided for in designing this steel boiler.

Completely Welded—It is a completely welded boiler made to conform with A.S.M.E. Code, for a maximum steam working pressure of 15 lbs. It is compact in form, easy to handle in installation work and requires no masonry other than a solid foundation.



Burnham Welded Steel Boiler

Multiple Shaking Grates—Each with its own shaking mechanism. A partial fire may be maintained on part of the grates in mild weather, or any section can be cleaned without affecting the whole fire.

Hot Water Supply for Domestic Use—Obtained by the insertion of copper coils above the flues, entirely submerged in the water.

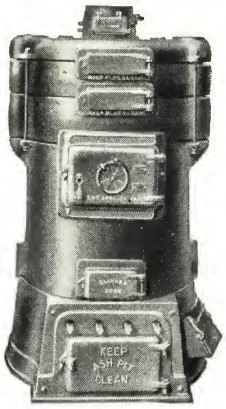
Oil Burning Apparatus—May be introduced from the rear, the flames being thrown forward against a baffle wall near the front of the firebox. The flames are thus retained longer in the firebox, before they begin their long fire travel journey to the chimney.

Incinerator Grate for Garbage Disposal—When oil fuel is used, a short grate is provided, the oil burning apparatus being entirely behind the baffle wall against which this grate rests. Not only does the grate act as an incinerator, but should the mechanical equipment ever fail and oil, gas or electricity be shut off during cold weather, this grate can be used for coal burning, without change or readjustment.

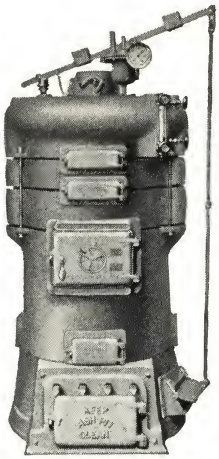
Size Range—This provides for both domestic and commercial uses. A special A.I.A. Folder giving pictures, full descriptions and ratings gladly sent on request.

Burnham Round Sectional Boilers

This is the boiler that made the long fire travel famous. The crown sheet is corrugated, more than doubling the surface directly over the fire. The nipple connections are outside, where they do not take up fire surface. Intermediate sections have flue clean-out openings both front and rear. No matter how many sections are added, the back and forth fire travel is maintained, and smoke outlet is always at the rear. Fire pot and crown sheet are in separate sections, making handling easier. In case of breakage only one part need be repaired.



Water



Steam

Burnham Round Sectional Boilers

On steam boilers, the top of dome section is half again as large as on the water boiler, and considerably larger, probably, than on any boiler made. There is plenty of room for rapid, frictionless expansion

RATINGS IMPROVED ROUND SECTIONAL STEAM AND WATER BOILERS

Steam			Steam and Water				Water	
Boiler No.	Direct radiation, sq. ft.	Water line, in.	Grate diam., in.	Grate area, sq. ft.	Supply and return tappings, in.	Smoke box diam., in.	Direct radiation, sq. ft.	Boiler No.
S-1804	330	42	18	1.77	2–2½	7	550	W-1804
S-1805	360	47	18	1.77	2–2½	7	600	W-1805
S-1806	390	52	18	1.77	2–2½	7	650	W-1806
S-2004	440	43	20	2.18	2–3	7	725	W-2004
S-2005	490	48	20	2.18	2–3	7	810	W-2005
S-2006	530	53	20	2.18	2–3	7	875	W-2006
S-2304	600	45	23	2.88	2–3	8	990	W-2304
S-2305	675	50	23	2.88	2–3	8	1115	W-2305
S-2306	725	55	23	2.88	2–3	8	1200	W-2306
S-2604	775	46	26	3.69	2–3½	9	1280	W-2604
S-2605	875	51	26	3.69	2–3½	9	1445	W-2605
S-2606	950	56	26	3.69	2–3½	9	1570	W-2606
S-2904	1125	48	29	4.58	2–4	10	1860	W-2904
S-2905	1250	53	29	4.58	2–4	10	2075	W-2905
S-2906	1350	58	29	4.58	2–4	10	2230	W-2906
S-31-4	1350	49	31	5.25	2–4	11	2230	W-31-4
S-31-5	1475	55	31	5.25	2–4	11	2450	W-31-5
S-31-6	1550	61	31	5.25	2–4	11	2560	W-31-6

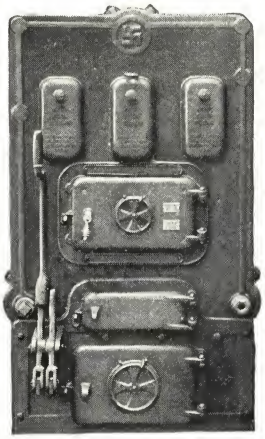
For Hot Water Supply

High Pressure Boiler—For use in apartment houses, hotels, country clubs, laundries and other quantity users of hot water.

Sectional construction. Guaranteed to 80 lbs. pressure; tested to two and one-half times its ratio working pressure. Supplies up to 3800 gal. requirements.

Burnham Junior Boiler—Will keep 175 to 700-gal. tank always full of hot water.

Burnham Laundry Stove—Tank capacities up to 80 gals.



High Pressure Boiler for Hot Water Supply

Catalogues

Covering any or all our boilers gladly sent on request.

ESTABLISHED 1855

THE BROWNELL COMPANY

DAYTON, OHIO

Sales and Service Agencies in All Principal Cities Throughout the U. S. A.

Products

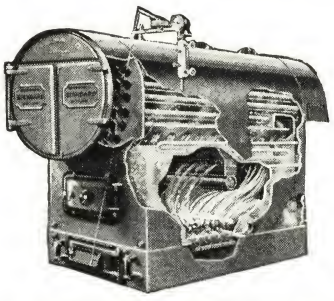
BOILERS — Large Capacity Steel Heating Boilers; Residence Steel Heating Boilers; H.R.T. Boilers for Power and Process; R.F.P. Riveted High Pressure Boilers; Scotch Boilers; Vertical Tubular Boilers; Feed Water Heaters; Stacks, Breeching, etc.

TRADE-MARK

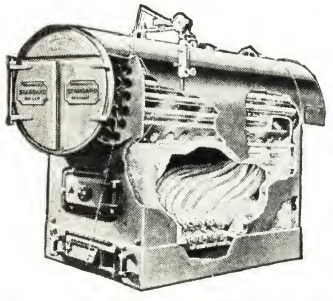
STOKERS—Heavy Duty, Single Retort, Ram Type Underfeed Stokers; Industrial, Worm Feed Type Side Dump Stokers; Commercial, Worm Feed Type Stokers; Residence and Small Buildings Underfeed Stokers.

BROWNELL "STANDARD" WELDED STEEL BOILER —SMOKELESS TYPE

Boiler No.	Capacity, sq. ft.	
	Steam	Water
S-1	900	1440
S-2	1260	2010
S-3	1490	2380
S-4	1730	2760
S-5	2040	3260
S-6	2400	3840
S-7	2890	4620
S-8	3240	5180
S-9	3520	5630
S-10	4500	7200
S-11	5050	8080
S-12	5550	8880
S-13	5990	9580
S-14	6560	10490
S-15	7540	12060
S-16	8280	13240
S-17	9040	14460
S-18	10440	16700
S-19	11600	18560
S-20	13000	20800
S-21	13880	22200
S-22	14750	23600
S-23	16420	26270
S-24	17430	27880
S-25	18710	29930
S-26	20440	32700
S-27	22560	36090
S-28	25000	40000
S-29	28290	45260
S-30	31150	49840
S-31	34030	54440



Brownell "Standard" Welded Steel Boiler—Smokeless Type



Brownell "Standard" Welded Steel Boiler—Direct Draft Type

BROWNELL "STANDARD" WELDED STEEL BOILER —DIRECT DRAFT TYPE

Boiler No.	Capacity, sq. ft.	
	Steam	Water
S-100R	525	840
S-101R	650	1040
S-101	900	1440
S-102	1260	2010
S-103	1490	2380
S-104	1730	2760
S-105	2040	3260
S-106	2400	3840
S-107	2890	4620
S-108	3240	5180
S-109	3520	5630
S-110	4500	7200
S-111	5050	8080
S-112	5550	8880
S-113	5990	9580
S-114	6560	10490
S-115	7540	12060
S-116	8280	13240
S-117	9040	14460
S-118	10440	16700
S-119	11600	18560
S-120	13000	20800
S-121	13880	22200
S-122	14750	23600
S-123	16420	26270
S-124	17430	27880
S-125	18710	29930
S-126	20440	32700
S-127	22560	36090
S-128	25000	40000
S-129	28290	45260
S-130	31150	49840
S-131	34030	54440

Brownell Boilers

Above boilers in direct draft type, available in six smallest sizes with red baked enamel steel jacket and insulation.

Brownell Boilers equipped with self-contained refractory arch and air admitting dampers (when requested) for use in cities having ordinances requiring provision for operation of heating boilers smokelessly.

Direct draft type also made especially for stoker, oil or gas firing in full range of sizes up to and including 41,330 sq. ft. of steam capacity.

Construction

THE BROWNELL COMPANY, with over 75 years' experience in the combustion field, is the first and only manufacturer of both boilers and stokers. Brownell Steel Heating Boilers are of one-piece electrically welded construction. They are particularly designed for long gas travel, spacious combustion, large steam liberating area, rapid steaming, and low maintenance costs. Brownell Stokers are made in a wide range of both types and sizes, designed to meet individual boiler room needs and are of unusually rugged construction.

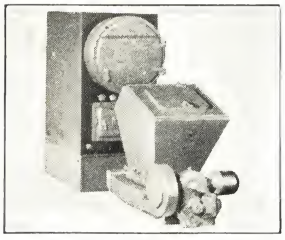
Information and Literature

THE BROWNELL COMPANY will be pleased to furnish descriptive bulletins giving detailed information covering their products.

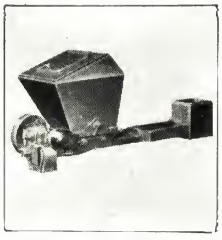
A Data Folio, giving complete engineering data and information on both boilers and stokers, is available for architects and consulting engineers.

A.I.A. File No. 30-c-1.

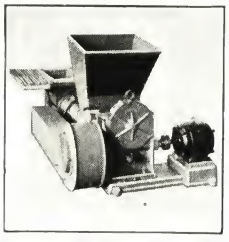
Write for complimentary copy.



Brownell "Ideal Home" Stoker and Brownell Steel Enameled Jacketed Steel Heating Boiler

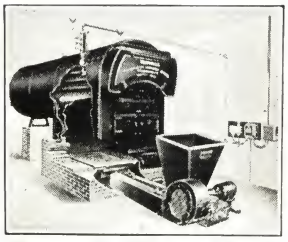


Brownell "Ideal Home" Stoker

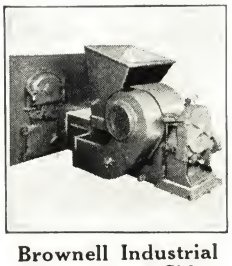


Brownell Commercial Worm Feed Type Stoker

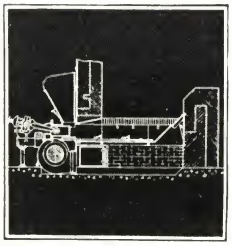
Brownell Commercial Worm Feed Type Stoker and Brownell Standard Steel Heating Boiler



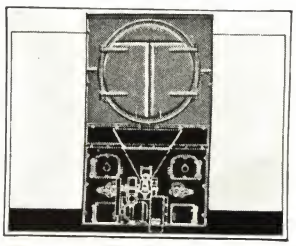
Brownell Worm Type Underfeed Stoker and Brownell Riveted Firebox Boiler



Brownell Industrial Worm Feed Side Dump Stoker



Brownell Heavy Duty Ram Type Stoker



Brownell Ram Type Heavy Duty Stoker and Brownell H.R.T. High Pressure Boiler

ESTABLISHED 1864

E. KEELER COMPANY

Manufacturers of Water Tube and Return Tubular Steel Boilers

WILLIAMSPORT, PA.

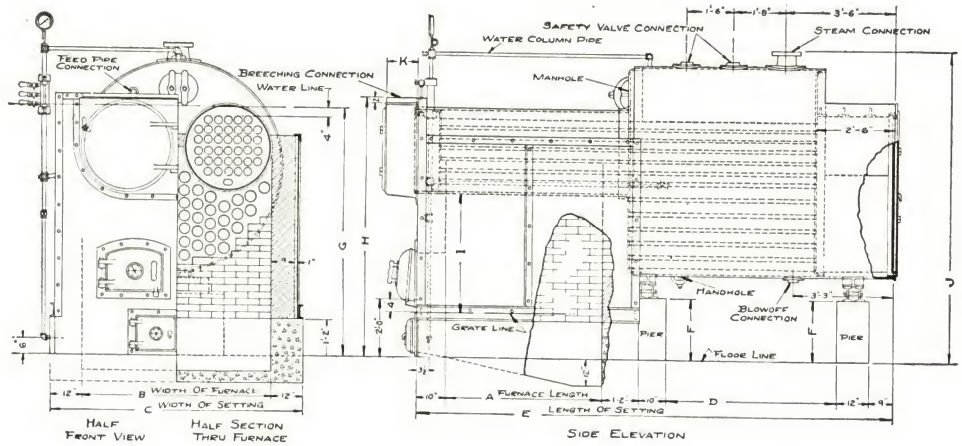
Experience and Responsibility of the Company

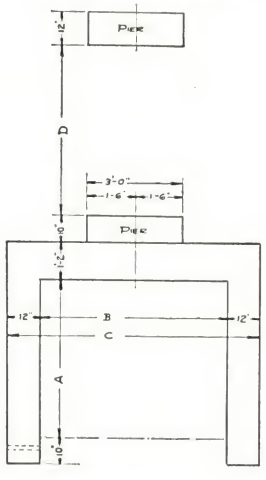
Continuous building of boilers for the past 67 years has earned for Keeler products a reputation for safety, durability and efficiency.

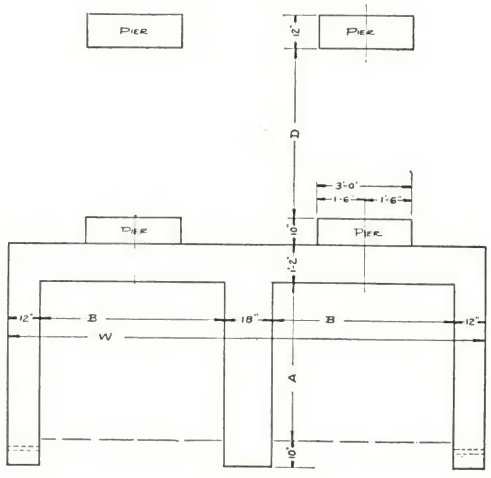
Keeler Double Duty Boilers for Heating or Power

This boiler is made with standard furnace, or with down-draft type. It is suitable for either steam or hot water heating or as a power boiler. It is a dependable, safe boiler for apartment houses, hotels, office buildings, factories, laundries, etc., where service does not warrant an expensive masonry setting.

The Double Duty is an all-steel horizontal return tube boiler of improved design, built for pressures up to 150 lb. The shell and drums are circular and have no flat sides to require troublesome cross ties running from side to side through the tube bank. There are no crown sheets to stay or waterbacks or other pockets to retard circulation and accumulate scale or sediment.







KEELER DOUBLE DUTY UP-DRAFT BOILER

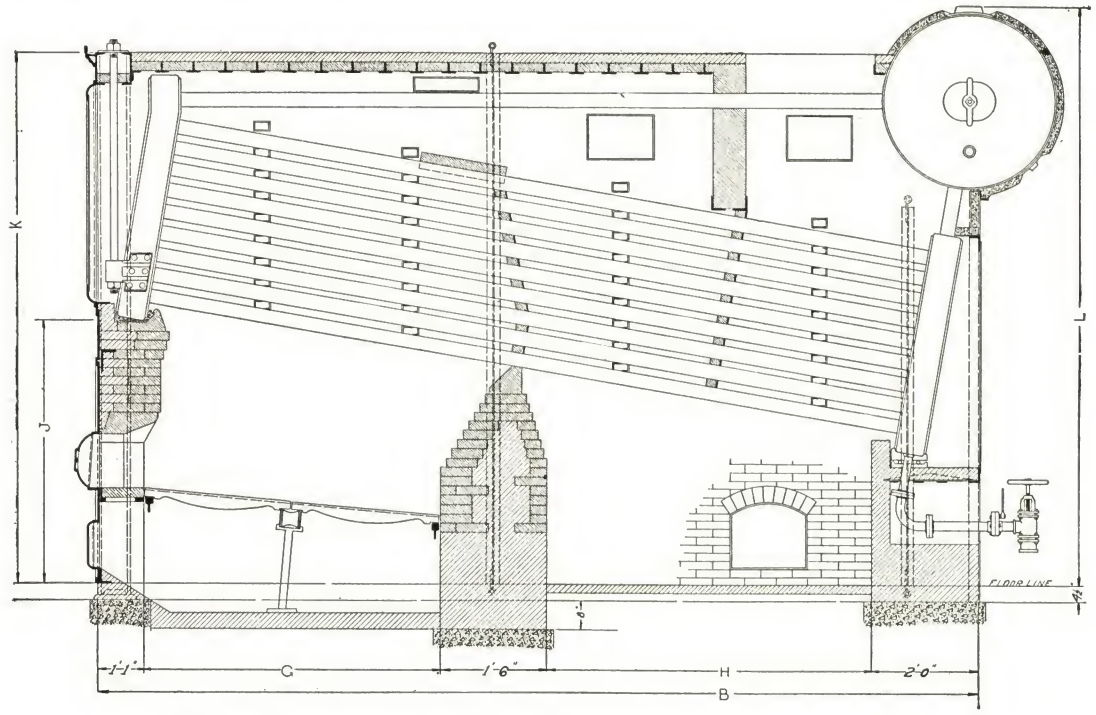
Boiler No.	Heating surface, sq. ft.	Grate area, sq. ft.	Dimensions, inches											Openings, in.					Smoke outlet, in.		Breech. diam., in.	Stack diam., in.	Stack height, ft.	Space required, in.	
			A	B	C	D	E	F	G	H	I	J	W	Steam	Safety	Feed	Blow-off	Water column tap	K	Width				Front	Rear
35	360	13.5	36	54	78	41½	132½	26⅜	79⅜	84¾	36	97⅝	150	3	2	¾	1	1	9⅜	56⅝	22	20	55	93	24
40	400	15.7	42	54	78	41½	138½	26⅜	79⅜	84¾	36	97⅝	150	3	2	¾	1	1	9⅜	56⅝	24	22	55	99	24
50	533	17.5	42	60	84	53½	150½	21⅞	79⅞	87¾	36	99⅛	162	3	2	1¼	1½	1	9⅜	62⅝	24	22	60	111	30
60	620	20	48	60	84	53½	156½	27⅞	89⅝	93¾	42	109¼	162	4	2-2	1¼	1½	1	9⅜	62⅝	26	24	60	117	30
70	735	20	48	60	84	65½	168½	33⅞	89⅝	93¾	42	109¼	162	4	2-2	1¼	1½	1	9⅜	62⅝	28	26	65	129	42
85	884	24	48	72	96	59½	162½	23⅝	90⅛	98 13/16	42	116⅞	186	5	2-2	1½	2	1	12⅜	72⅝	30	28	65	123	36
105	1065	30	60	72	96	65½	180½	23⅝	93⅞	98 13/16	42	116⅞	186	5	2-2½	1½	2	1	12⅜	72⅝	32	30	70	141	42
130	1300	36	72	72	96	77½	204½	23⅝	93⅞	98 13/16	42	116⅞	186	5	2-3	1½	2	1	12⅜	72⅝	34	32	70	165	54
150	1520	36	72	72	96	101½	228½	23⅝	93⅞	98 13/16	42	116⅞	186	6	2-3	1½	2½	1	12⅜	72⅝	36	34	75	189	78

Keeler Cross Drum Water Tube Boilers

Keeler cross drum water tube boilers are often favored by architects because they are built for higher pressures and can be readily installed in buildings where entrance and headroom are limited. 31,000 hp. are installed in Philadelphia schools alone.

Catalogue

The Keeler standard (long drum) water tube boilers, cross drum water tube boilers and horizontal return tubular boilers for heavy duty are described in our catalogue which may be had on request.



CROSS DRUM WATER TUBE BOILERS—4-IN. DIAM. TUBES—PRESSURE 160 LBS. AND OVER

Boiler No.	Size Vertical	Size Horizontal	Drum Diameter	Drum Length Single Setting	Drum Length Double Setting	No. Tubes in Bank	No. Cir. Tubes	Diameter Feed	Diameter Steam	Length of Tubes — Total Heating Surface of Tubes and Headers 12½′	13′	13½′	14′	14½′	15′	15½′	16′	16½′	17′	17½′	18′	A Width Battery Setting	A Width Single Setting	I Width of Grates	I Height Floor to Front Hdr.	K Height Floor to Top of Frame	L Height Floor to Ste. Flange
1	2′	3½′	36″	7′	5¾′	38	8	1¼″	5″	626	650	674	698	722	746	770	794	818	847	871	895	12′-10″	7′-0″	4′-0″	6′-0″	10′-3″	11′- 3½″
2	2′	4′	36″	7½′	6¼′	43	9	1¼″	5″	710	737	764	791	818	845	872	899	926	958	985	1012	13′-10″	7′-6″	4′-6″	6′-0″	10′-3″	11′- 3½″
3	2′	4½′	36″	8″	6¾′	48	10	1¼″	5″	791	821	851	881	911	941	971	1001	1031	1067	1097	1127	14′-10″	8′-0″	5′-0″	6′-0″	10′-3″	11′- 3½″
4	2′	5′	36″	8½′	7¼′	53	11	2″	5″	971	904	937	970	1003	1038	1071	1104	1137	1178	1211	1244	15′-10″	8′-6″	5′-6″	6′-0″	10′-3″	11′- 3½″
5	2½′	4′	36″	7½′	6¼′	51	8	2″	6″	815	846	877	908	939	970	1001	1032	1063	1102	1133	1164	13′-10″	7′-6″	4′-6″	6′-0″	10′-9″	11′-10½″
6	2½′	4½′	36″	8″	6¾′	57	9	2″	6″	901	937	973	1009	1045	1081	1117	1153	1189	1222	1258	1294	14′-10″	8′-0″	5′-0″	6″-0″	10′-9″	11′-10½″
7	2½′	5′	36″	8½′	7¼′	63	10	2″	6″	1001	1040	1079	1118	1157	1196	1235	1274	1313	1356	1395	1434	15′-10″	8′-6″	5′-6″	6′-0″	10′-9″	11′-10½″
8	2½′	5½′	36″	9″	7¾′	69	11	2″	6″	1099	1141	1183	1225	1267	1309	1351	1393	1435	1486	1528	1570	16′-10″	9′-0″	6′-0″	6′-0″	10′-9″	11′-10½″
9	2½′	6′	36″	9½′	8¼′	75	12	2″	6″	1194	1240	1286	1332	1378	1424	1470	1516	1562	1614	1660	1706	17′-10″	9′-6″	6′-6	6′-0″	10′-9″	11′-10½″
10	3′	4½′	42″	8″	6¾′	67	10	2″	6″	1044	1084	1124	1164	1204	1244	1284	1324	1364	1412	1452	1492	14′-10″	8′-8″	5′-0	6′-0″	11′-3″	12′- 7½″
11	3′	5′	42″	8½′	7¼′	74	11	2″	6″	1145	1190	1235	1280	1325	1370	1415	1460	1505	1555	1600	1645	15′-10″	8′-6″	5′-6	6′-0″	11′-3″	12′- 7½″
12	3′	5½′	42″	9″	7¾′	81	12	2″	6″	1255	1304	1353	1402	1451	1500	1549	1598	1647	1702	1751	1800	16′-10″	9′-0″	6′-0	6′-0″	11′-3″	12′- 7½″
13	3′	6′	42″	9½′	8¼′	88	13	2″	6″	1365	1418	1471	1524	1577	1630	1683	1736	1789	1849	1902	1955	17′-10″	9′-6″	6′-6	6′-0″	11′-3″	12′- 7½″
14	3′	6½′	42″	10″	8¾′	95	14	2″	6″	1473	1530	1587	1644	1701	1758	1815	1872	1929	1995	2052	2109	18′-10″	10′-0″	7′-0	6′-0″	11′-3″	12′- 7½″
15	3′	7′	42″	10½′	9¼′	102	15	2″	6″	1584	1645	1706	1767	1828	1889	1950	2011	2072	2143	2204	2265	19′-10″	10′-6″	7′-6	6′-0″	11′-3″	12′- 7½″
16	3′	7½′	42″	11″	9¾′	109	16	2″	6″	1691	1756	1821	1886	1951	2016	2081	2146	2211	2288	2353	2418	20′-10″	11′-0″	8′-0	6′-0″	11′-3″	12′- 7½″
17	3′	8′	42″	11½′	10¼′	116	17	2″	6″	1792	1862	1932	2002	2072	2142	2212	2282	2352	2431	2501	2571	21′-10″	11′-6″	8′-6	6′-0″	11′-3″	12′- 7½″
18	3½′	7½′	42″	11″	9¾′	124	15	2″	6″	1890	1963	2036	2109	2182	2255	2328	2401	2474	2559	2632	2705	20′-10″	11′-0″	8 -0	6′-0″	11′-9″	13′- 1½″
19	3½′	8′	48″	11½′	10¼′	132	16	2″	6″	.....	.....	.....	.....	.....	2398	2475	2552	2629	2719	2796	2873	21′-10″	11′-6″	8′-6	6′-0″	11′-9″	13′- 4½″
20	3½′	8½′	48″	12″	10¾′	140	17	2″	6″	.....	.....	.....	.....	.....	2589	2622	2705	2788	2878	2961	3044	22′-10″	12′-0″	9′-0	6′-0″	11′-9″	13′- 4½″
21	4′	8′	48″	11½′	10¼′	149	17	2½″	8″	.....	.....	.....	.....	.....	.....	.....	2839	2926	3021	3108	3195	21′-10″	11′-6″	8′-6	6′-0″	12′-3″	13′-10½″
22	4′	8½′	48″	12″	10¾′	158	18	2½″	8″	.....	.....	.....	.....	.....	.....	.....	3011	3103	3203	3295	3387	22′-10″	12′-0″	9′-0	6′-0″	12′-3″	13′-10½″
23	4′	9′	48″	12½′	11¼′	167	19	2½″	8″	.....	.....	.....	.....	.....	.....	.....	3181	3277	3385	3482	3579	23′-10″	12′-6″	9′-6	6′-0″	12′-3″	13′-10½″
24	4½′	8½′	48″	12″	10¾′	175	17	2½″	8″	.....	.....	.....	.....	.....	.....	.....	3299	3400	3506	3607	3708	22′-10″	12′-0″	9′-0	6′-0″	12′-9″	14′- 4½″
25	4½′	9′	48″	12½′	11¼′	185	18	2½″	8″	.....	.....	.....	.....	.....	.....	.....	3487	3594	3709	3816	3923	23′-10″	12′-6″	9′-6	6′-0″	12′-9″	14′- 4½″
26	4½′	9½′	48″	13″	11¾′	195	19	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	3909	4022	4135	24′-10″	13′-0″	10′-0	6′-0″	12′-9″	14′- 4½″
27	5′	9′	48″	12½′	11¼′	204	19	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	4050	4167	4284	23′-10″	12′-6″	9′-6	6′-0″	13′-3″	14′-10½″
28	5′	9½′	48″	13″	11¾′	215	20	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	4269	4392	4515	24′-10″	13′-0″	10′-0	6′-0″	13′-3″	14′-10½″
29	5′	10′	48″	13½′	12¼′	226	21	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	4479	4609	4739	25′-10″	13′-6″	10′-6	6′-0″	13′-3″	14′-10½″
30	5′	10½′	48″	14′	12¾′	237	22	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	4697	4833	4969	26′-10″	14′-0″	11′-0	6′-0″	13′-3″	14′-10½″
G—Length of Grates										5′-3″	5′-3″	5′-6″	5′-6″	5′-6″	5′-9″	5′-9″	6′-0″	6′-6″	6′-9″	7′-0″	7′-0″	.....	.....	.....	.....	.....	.....
H—Length of Combustion Chamber										4′-5″	4′-11″	5′-2″	5′-8″	6′-2″	6′-5″	6′-11″	7′-2″	7′-2″	7′-5″	7′-8″	8′-2″	.....	.....	.....	.....	.....	.....
B—Length Over All-Brick Setting										15′-3″	15′-9″	16′-3″	16′-9″	17′-3″	17′-9″	18′-3″	18′-9″	19′-3″	19′-9″	20′-3″	20′-9″	.....	.....	.....	.....	.....	.....

CROSS DRUM JUNIOR WATER TUBE BOILERS—3½-IN. DIAM. TUBES—PRESSURE 125 LBS.

										12′	12½′	13′	13½′	14′	14½′	15′	15½′	16′	16½′	17′	17½′	18′						
1	15″	35″	36″	76″	61″	30	8	1¼″	5″	436	453	470	487	504	521	538	555	571	589	607	625	643	11′- 6″	6′-4″	3′-4″	5′-2″	8′- 7″	9′-7½″
2	20″	35″	36″	76″	61″	38	8	1¼″	5″	527	547	567	587	607	627	648	668	688	710	731	753	775	11′- 6″	6′-4″	3′-4″	5′-2″	8′-11″	10′-0½″
3	20″	40″	36″	81″	66″	43	9	1¼″	5″	594	617	640	663	686	709	732	755	778	803	827	852	877	12′- 4″	6′-9″	3′-9″	5′-2″	8′-11″	10′-0½″
4	20″	45″	36″	86″	71″	48	10	1¼″	5″	666	691	716	741	766	791	817	842	868	896	923	951	979	13′- 2″	7′-2″	4′-2″	5′-2″	8′-11″	10′-0½″
5	20″	50″	36″	91″	76″	53	11	2″	6″	731	759	787	815	843	871	900	928	956	986	1017	1047	1077	14′- 0″	7′-7″	4′-7″	5′-2″	8′-11″	10′-1½″
6	25″	45″	36″	86″	71″	57	10	2″	6″	766	795	824	853	882	911	941	970	999	1031	1063	1095	1127	13′- 2″	7′-2″	4′-2″	5′-2″	9′- 5″	10′-6″
7	25″	50″	36″	91″	76″	63	11	2″	6″	818	854	890	926	962	998	1034	1070	1105	1140	1176	1211	1246	14′- 0″	7′-7″	4′-7″	5′-2″	9′- 5″	10′-6″
8	25″	55″	36″	96″	81″	69	12	2″	6″	926	961	996	1031	1066	1101	1137	1172	1208	1247	1285	1324	1363	14′-10″	8′-0″	5′-0″	5′-2″	9′- 5″	10′-6″
9	25″	60″	42″	101″	86″	75	13	2″	6″	1008	1046	1084	1122	1160	1198	1237	1275	1314	1354	1395	1435	1475	15′- 8″	8′-5″	5′-5″	5′-2″	9′- 5″	10′-9½″
10	30″	55″	42″	96″	81″	81	12	2″	6″	1059	1100	1141	1182	1223	1264	1305	1346	1386	1429	1471	1514	1557	16′- 6″	8′-0″	5′-0″	5′-2″	9′-11″	11′-2½″
11	30″	60″	42″	101″	86″	88	13	2″	6″	1152	1196	1240	1284	1328	1372	1417	1461	1505	1552	1597	1644	1691	15′- 8″	8′-5″	5′-5″	5′-2″	9′-11″	11′-2½″
12	30″	65″	42″	106″	91″	95	14	2″	6″	1240	1288	1336	1384	1432	1480	1528	1576	1624	1674	1724	1774	1824	16′- 6″	8′-10″	5′-10″	5′-2″	9′-11″	11′-2½″
13	30″	70″	42″	111″	96″	102	15	2″	6″	1333	1384	1435	1486	1537	1588	1640	1691	1743	1797	1850	1904	1958	17′- 4″	9′-3″	6′-3″	5′-2″	9′-11″	11′-2½″
G—Length of Grate										5′-6″	5′-6″	6′-0″	6′-0″	6′-0″	6′-0″	6′-0″	6′-0″	6′-0″	6′-3″	6′-3″	6′-6″	6′-6″	7′-0″	.....	.....	.....	.....	.....	.....
H—Length of Combustion Chamber										4′-5″	4′-11″	4′-11″	5′-5″	5′-11″	6′-5″	6′-11″	7′-5″	7′-8″	8′-2″	8′ 5″	8′-11″	8′-11″	.....	.....	.....	.....	.....	.....
B—Length of Setting Over All										14′-6″	15′-0″	15′-6″	16′-0″	16′-6″	17′-0″	17′-6″	18′-0″	18′-6″	19′-0″	19′-6″	20′-0″	20′-6″	.....	.....	.....	.....	.....	.....

Keeler Bent Tube Water Tube Boilers

Vertical Type—

Keeler bent tube water tube boilers, the culmination of 68 years' experience in building and designing.

Careful study and experimentation to design the best balanced curved tube boiler has been the aim of Keeler Engineers and tests have proven the attainment of the following features:

Adaptability for installation under a variety of building conditions.

Durability and low maintenance cost.

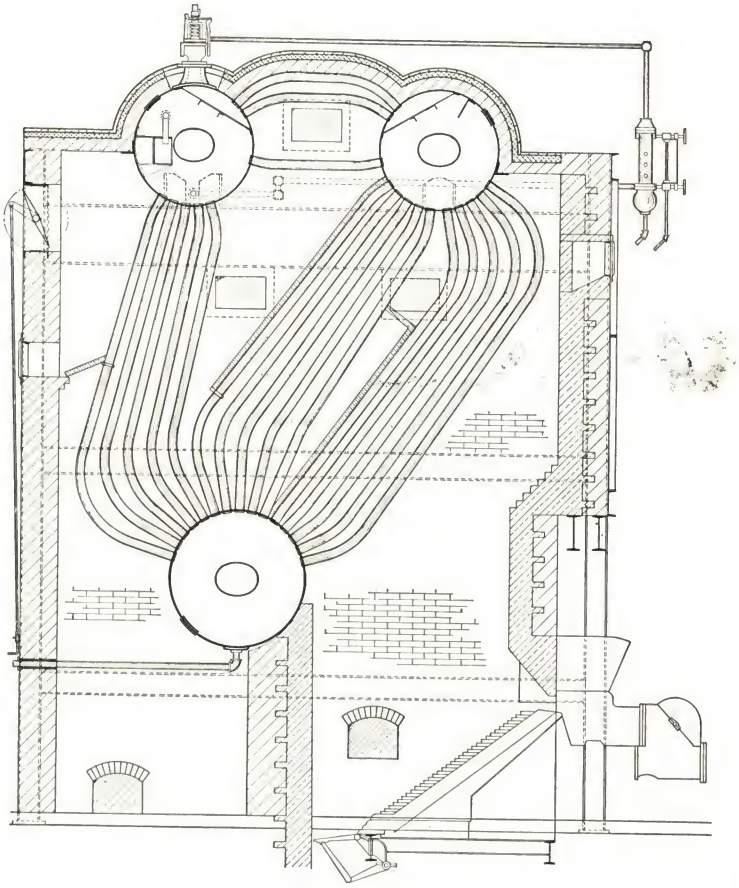
Ample cleaning facilities.

Steady water line assuring true gauge readings.

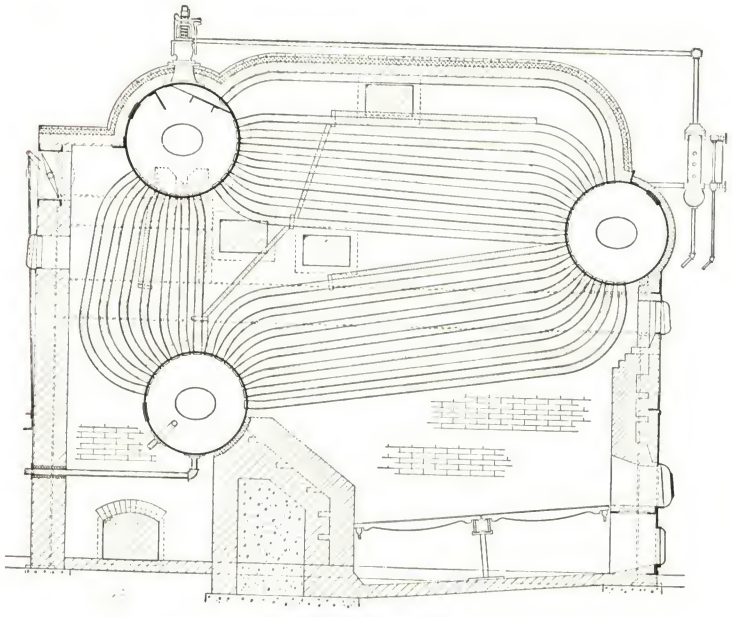
Ample steam liberation and storage capacity.

Dry steam under various conditions of operation.

Suspension framework that permits free expansion and contraction. A flexibility assuring easy maintenance of boiler setting.



Vertical Type



Low Head Room Type

Low Head Room Type—

All tubes curved to same radius allowing a precision of construction the accuracy of which cannot be had where the tubes are bent to different radius.

Bends are large enough to permit turbining.

Furnaces adaptable for the use of any type of furnace equipment or fuel.

Boilers are built with three or four drums to cover different requirements.

Prices and detail specification sent on request.

KEWANEE BOILER CORPORATION

Manufacturers of Steel Riveted Firebox Heating Boilers, Smokeless Boilers, Types "C" and "R" Welded Boilers, Water Heaters, Garbage Burners and Tanks

KEWANEE, ILL.

BRANCH OFFICES IN PRINCIPAL CITIES

KEWANEE BOILERS

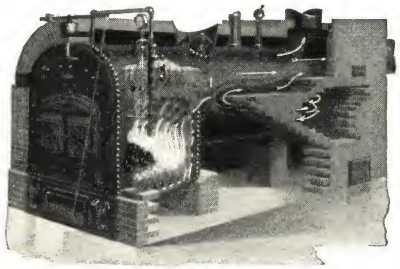
Kewanee Boilers are built sound and strong with 60 years' experience of an extensive organization backing them.

They burn any kind of fuel; hard and soft coal, hand-fired or stoker, screenings or coke; gas or oil.

All conform to the Steel Heating Boiler Institute's Code for ratings and A.S.M.E. Code for construction.

Rated capacity for any water boiler specified on these two pages is 60% greater than capacity of steam boiler.

Separate catalogues on Kewanee Steel Riveted Firebox Heating Boilers, Smokeless Boilers, Power Boilers, Types "C" and "R" Welded Boilers, Water Heaters, Garbage Burners and Tanks, sent on request.



Brick-set Boiler Up-draft Type
Also furnished in down-draft type

Kewanee Brick-set Riveted Firebox Boilers

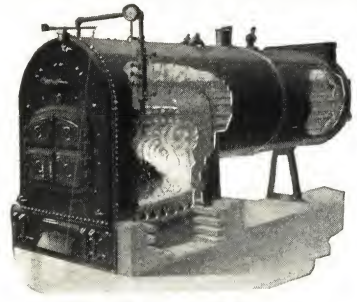
Standard of the trade for years. Made in the up-draft style for ordinary firing, also with the down-draft water grate for extreme smokeless operation.

SPECIFICATIONS—BRICK-SET DOWN-DRAFT BOILER

Boiler No.	104	105	106	107	108	109	110	111	112
Rated capacity, steam, sq. ft.:									
Burning coal, hand fired	1650	2320	3120	3250	4260	5020	5250	6270	7490
Oil, gas or stoker fired	3500	4130	4900	5050	5860	6680	7220	8160	9100
Width and length, in. x ft.	36x8.6	36x10.1	36x11.6	42x9.8	42x11.3	42x12.8	48x12.3	48x13.8	48x15.3
Over-all height, in.	77	77	77	83	83	83	90	90	90
Height of water line, in.	55	55	55	58½	58½	58½	61	61	61
Approximate weight, lbs.:									
With coal burning grates	4600	5100	5600	6200	6800	7300	8500	9100	9800
Without grates	4200	4700	5100	5700	6200	6600	7800	8300	8900

SPECIFICATIONS—BRICK-SET UP-DRAFT BOILER

Boiler No.	0	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20
Rated capacity, steam, sq. ft.:																				
Burning coal, hand fired	510	690	940	1240	1380	1830	2410	3340	4170	4300	5130	6070	7440	8770	10310	12080	12420	14670	16340	18610
Oil, gas or stoker fired	1440	1920	2230	2500	3060	3650	4250	5180	5950	6250	7140	8020	9520	11440	12630	14840	16210	18260	19840	26600
Width and length, in. x ft.	24x6.8	30x6.4	30x7.5	30x8.5	36x7.5	36x9	36x10.5	42x10	42x11.5	48x10.5	48x12	48x13.5	54x13.9	54x16.4	60x15.5	60x18	66x16	66x18	72x16	72x18
Over-all height, in.	64	70	70	70	77	77	77	83	83	90	90	90	96	96	108	108	114	114	120	120
Height of water line, in.	47	52	52	52	55	55	55	58½	58½	61	61	61	66	66	75	75	80	80	85½	85½
Approximate weight, lbs.:																				
With coal burning grates	1900	2400	2700	2900	3300	3700	4200	5400	6000	6700	7300	8000	10600	11900	14400	16000	17800	19100	21700	23500
Without grates	1800	2200	2400	2500	2900	3300	3700	4800	5300	6000	6500	7100	9400	10600	12900	14400	16200	17300	19800	21300



Type K Up-draft Boiler
Also furnished in down-draft type

Kewanee Type K Riveted Boilers

For heating average and smaller size buildings economically. Same rugged construction as the larger Kewanee Boilers. Made both in Portable up-draft and down-draft types.

SPECIFICATIONS—TYPE K SMOKELESS DOWN-DRAFT BOILER

Boiler No.	104K	105K	106K	107K	108K	109K	110K	111K	112K
Rated capacity, steam, sq. ft.:									
Burning coal, hand fired	1650	2320	3080	3250	3790	4310	4730	5340	5950
Oil, gas or stoker fired	2670	3140	3740	3980	4610	5240	5740	6480	7220
Width and length, in. x ft.	36x9.9	36x11.4	36x12.9	42x11.2	42x12.7	42x14.2	48x13.7	48x15.2	48x16.7
Over-all height, in.	65	65	65	71	71	71	77	77	77
Height of water line, in.	55	55	55	58½	58½	58½	61	61	61
Approximate weight, lbs.:									
With coal burning grates	5000	5600	6100	6900	7500	8100	9200	9900	10600
Without grates	4600	5200	5600	6400	6900	7400	8500	9100	9700

SPECIFICATIONS—TYPE K UP-DRAFT BOILER

Boiler No.	0K	1K	2K	3K	4K	5K	6K	8K	9K	10K	11K	12K	13K	14K	15K	16K	17K	18K	19K	20K
Rated capacity, steam, sq. ft.:																				
Coal, hand-fired	510	690	940	1240	1380	1830	2410	3340	3850	4170	4730	5290	6260	7520	8440	9910	11070	12540	13890	15810
Oil, gas or stoker fired	1040	1410	1580	1770	2360	2790	3230	4100	4680	5060	5740	6420	7600	9130	10250	12040	13450	15230	16860	19190
Width and length, in. x ft.	24x7.8	30x7.8	30x8.8	30x9.8	36x8.8	36x10.3	36x11.8	42x11.3	42x12.8	48x11.8	48x13.3	48x14.8	54x15.3	54x17.8	60x17	60x19.5	66x17.5	66x19.5	72x17.5	72x19.5
Over-all height, in.	51	59	59	59	65	65	65	71	71	77	77	77	83	83	93	93	99	99	105	105
Height of water line, in.	45	52	52	52	55	55	55	58½	58½	61	61	61	66	66	75	75	80	80	85½	85½
Approx. weight, lbs.:																				
With grates	2600	2900	3200	3500	3900	4400	4900	6300	6900	7600	8300	9000	11100	12400	15000	16600	17900	19200	21900	23700
Without grates	2300	2650	2900	3130	3550	3950	4400	5650	6180	6900	7500	8100	9900	11100	13500	15000	16250	17400	20000	21500

Kewanee Residence Type "R" Boilers

The modern steel boiler for residences and for any smaller buildings. Substantially equipped and built compactly with welded seams. The correct proportions and double pass flues produce most economical results with any kind of fuel. May be fitted with a handsome baked enamel steel jacket, as shown.

SPECIFICATIONS—RESIDENCE TYPE "R" BOILER

*Boiler No.	740	741	742	743	745	746	747	748
Rated capacity, steam, sq. ft.:								
Burning soft coal	370	510	690	920	1210	1560	1780	1960
Burning anthracite coal	430	590	790	1000	1350	1600	1780	1960
Oil, gas or stoker fired	450	620	840	1120	1470	1900	2160	2380
Width and length, in. x in.	31x27½	31x33½	31x39½	31x45½	31x45½	31x51½	31x57½	31x63½
Over-all height, in.	59½	59½	59½	59½	70¼	70¼	70¼	70¼
Height of water line, in.	48	48	48	48	58½	58½	58½	58½
Approximate weight, lbs.:								
With coal burning grates	1700	1900	2150	2360	2800	3050	3300	3550
Without grates	1540	1680	1900	2060	2500	2730	2920	3120

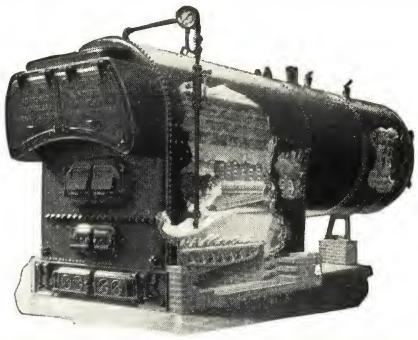
*Boiler Series 1740-1748 for oil, gas, stoker; Series 2740-2748 for anthracite.

Type "R" Boiler
Jacketed or Unjacketed 740-748 and 2740-2748 for coal. Also 1740-1748 for burning oil

Kewanee Portable Smokeless Riveted Boilers

With down-draft water grate. Preeminent for heavy duty wherever soft coal must be burned smokelessly. Used effectively either in single units for moderate loads or in batteries of big sizes for heating larger buildings with utmost economy. "300" Series regularly furnished. "900" Series is of more compact construction for 15 lbs. pressure only.

Kewanee makes a Steel Heating Boiler to heat every size and type of building and to suit any condition of service. Shipment of boilers may be made same day order is received.



Smokeless Boiler Portable Down-draft Type
"300" Series shown; also made in "900" Series for 15 lbs. pressure

SPECIFICATIONS—SMOKELESS DOWN-DRAFT BOILER

Boiler No.	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324
Rated capacity, steam, sq. ft.:																		
Burning coal, hand fired	3390	4260	5020	6100	6950	7650	8290	9000	10100	10820	12770	14740	16860	18420	20410	21690	29040	36810
Oil, gas or stoker fired	5050	5990	6650	7580	8430	9290	10070	10920	12260	13130	15500	17900	20460	22360	24800	26350	35300	44700
Width and length...in. x ft.	48x9.1	48x10.4	48x11.4	54x10.9	54x11.9	54x12.9	60x12.9	60x13.9	60x15.3	60x16.3	66x15.8	66x17.8	72x16.6	72x17.9	78x17.8	78x18.8	84x20.1	84x24.1
Over-all height...in.	84	84	84	89	89	89	98	98	101	101	107	107	113	113	115	115	121	121
Height of water line...in.	71	71	71	76	76	76	83	83	87	87	90	90	96	96	97	97	105	105
Approximate weight, lbs.:																		
With coal burning grates	7800	8600	9300	10400	11100	11900	14500	15300	16900	17800	20900	22900	25000	26500	28800	30000	37000	43000
Without grates	7300	8000	8600	9600	10200	10900	13300	14000	15500	16200	19300	21100	23100	24400	26600	27800	34300	40000

Type "C" Boiler with Corrugated Crown Sheet
749-770 and 2749-2770 for coal. Also 1749-1770 for burning oil

SPECIFICATIONS—PORTABLE DOWN-DRAFT BOILER—"900" SERIES

Boiler No.	932	933	934	935	936	937	938	939	940	941	942	943
Rated capacity, steam, sq. ft.:												
Burning coal, hand fired	7560	8840	10070	10810	12940	15260	17110	18300	20870	21760	29010	36790
Oil, gas or stoker fired	10060	10950	12220	13120	15710	18530	20770	22210	25350	26410	35220	44670
Width and length...in. x ft.	48x11.7	48x12.5	54x11.7	54x12.5	60x13	60x14.8	66x13.9	66x14.8	72x14.3	72x14.9	78x16.6	78x19.8
Over-all height...in.	92½	92½	101	101	106	106	112½	112½	118	118	119½	119½
Height of water line...in.	78	78	87	87	91	91	96	96	101	101	102½	102½
Approximate weight, lbs.:												
With coal burning grates	12100	12700	14600	15400	18000	19700	21900	22900	25800	26700	30700	35000
Without grates	11200	11700	13300	14000	16500	18100	20100	20900	23700	24600	28300	32400

Kewanee Type "C" Welded Boilers

Adaptable to restricted accommodations. Highly perfected series. A later Kewanee development having electric-weld seams. With smokeless arch and drum for soft coal. Shipped with base fully assembled.

SPECIFICATIONS—TYPE "C" WELDED BOILER

*Boiler No.	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770
Rtd.cap.,st.sq.ft.:																						
Coal, hand fired	2300	2690	3250	3630	4060	4550	5250	5950	6470	7000	8280	9610	10850	12110	14300	16380	18660	20750	22520	25530	28780	33070
Oil, gas or stoker	2790	3260	3940	4450	4930	5520	6370	7220	7850	8500	10040	11670	13180	14700	17420	19880	22650	25200	27300	31000	34900	40200
Width and length,in.x ft.	36x5.8	36x6.3	36x7.3	36x8	42x7.9	42x8.5	42x9.5	48x8.3	48x8.8	48x9.3	54x9.7	54x10.8	60x10.4	60x11.3	66x11.9	66x13.2	72x12.7	72x13.8	78x13.7	78x15	84x13.8	84x15.3
Over-all height,in.	77½	77½	77½	77½	83½	83½	83½	97	97	97	99	99	108½	108½	112	112	118	118	122	122	135	135
Height of water line...in.	69	69	69	69	72	72	72	82	82	82	85	85	94	94	95	95	101	101	103	103	114	114
Approx. wt. lbs.:																						
With grates	4300	4700	5200	5500	6000	6500	7100	8000	8500	9000	10600	11700	12900	14000	16300	17900	19800	21300	22600	24700	28400	31300
Without grates	3600	3800	4200	4600	5000	5400	5900	6600	7000	7300	8800	9600	10600	11500	13700	15100	16600	17800	19200	21100	24300	27000

*Boiler Series 1749-1770 for oil, gas or stoker; Series 2749-2770 for anthracite.

Kewanee Portable Riveted Firebox Boilers

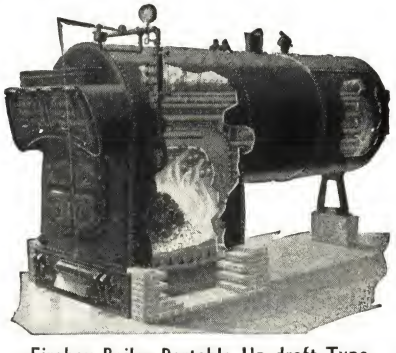
Regular up-draft grate firebox boiler with double pass flues. Asbestos covering. "400" Series Up-draft Boiler usually furnished. "500" Series has grate area and firebox enlarged somewhat and greater number of return tubes. "800" Series, compacted, for low pressures up to 15 lbs.

SPECIFICATIONS—PORTABLE UP-DRAFT BOILER—"500" SERIES

Boiler No.	524	526	528	530	532	534	536	538	540	542	544
Rated capacity, steam, sq. ft.:											
Burning coal, hand fired	7060	8770	10160	10310	13720	16380	18340	19460	21840	25540	28880
Oil, gas or stoker fired	10110	11390	12920	14650	16660	19890	22270	23630	26520	31010	35070
Width and length...in. x ft.	54x13.4	60x12.4	60x13.6	60x14.3	60x16.2	66x15.8	66x17.3	72x15.9	72x17.5	78x17.4	78x19.3
Over-all height...in.	89	98	98	101	101	107	107	113	113	115	115
Height of water line...in.	76	83	83	87	87	90	90	96	96	97	97
Approximate weight, lbs.:											
With coal burning grates	11160	12560	13550	15000	16640	20040	21500	23250	24870	26640	28870
Without grates	10150	11450	12100	13500	14900	18100	19300	20800	22300	24200	26300

SPECIFICATIONS—PORTABLE UP-DRAFT BOILER—"800" SERIES

Boiler No.	832	833	834	835	836	837	838	839	840	841	842	843
Rated capacity, steam sq. ft.:												
Burning coal, hand fired	7920	8750	8770	10310	12170	14210	16000	17930	20710	24230	30700	35170
Oil, gas or stoker fired	9620	10630	11320	12970	15460	17300	19430	21780	25130	28560	36380	42700
Width and length...in. x ft.	48x11.4	48x12.4	54x10.8	54x12.1	60x12.6	60x13.8	66x13	66x14.3	72x13.9	72x15.7	78x16.7	78x18.6
Over-all height...in.	92½	92½	101	101	106	106	112½	112½	118	118	119½	119½
Height of water line...in.	78	78	87	87	91	91	96	96	101	101	102½	102½
Approximate weight, lbs.:												
With coal burning grates	11400	12200	13000	14400	16000	17000	19800	21500	23600	25700	29400	32000
Without grates	10300	11000	11700	12900	14300	15300	17800	19200	21200	23200	26800	29200



Firebox Boiler Portable Up-draft Type
"400" Series shown; also made in "500" Series and "800" Series

SPECIFICATIONS—PORTABLE UP-DRAFT BOILER—"400" SERIES

Boiler No.	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424
Rated capacity, steam, sq. ft.:																		
Burning coal, hand fired	2550	3340	4170	4300	5130	6070	7440	8760	8700	10310	12420	14560	16350	18240	21200	23950	30930	33980
Oil, gas or stoker fired	4730	5270	6340	7040	7900	8760	9600	10640	11480	13220	15780	17680	19850	22150	25730	29080	37500	40480
Width and length...in. x ft.	48x8.6	48x9.5	48x11.1	54x10	54x11.1	54x12.1	60x12.4	60x13.6	60x14.3	60x16.2	66x15.8	66x17.3	72x15.9	72x17.5	78x17.9	78x19.9	84x20.1	84x22.1
Over-all height...in.	84	84	84	89	89	89	98	98	101	101	107	107	113	113	115	115	121	121
Height of water line...in.	71	71	71	76	76	76	83	83	87	87	90	90	96	96	97	97	105	105
Approximate weight, lbs.:																		
With coal burning grates	6900	7400	8300	9000	9800	10600	13200	14100	15900	17300	20400	22000	24000	25700	28000	31000	37000	40000
Without grates	6400	6800	7600	8300	9000	9700	12000	12800	14600	15900	18800	20200	22000	23600	25800	28600	34300	37100

MOLBY BOILER COMPANY, INC.

SUBSIDIARY OF THE UNIVERSAL PIPE AND RADIATOR COMPANY
Graybar Building, 420 Lexington Avenue (43rd Street)
NEW YORK, N. Y.

BRANCHES
PHILADELPHIA, PA., 2401 Chestnut Street
LANSDALE, PA., 50 Central Avenue
CHICAGO, ILL., 332 S. Michigan Avenue

Products

MOLBY MAGAZINE-FEED HEATING BOILERS for residences, apartment houses, schools, churches and industrial buildings. Low pressure steam, vapor and hot water heating and large volume hot water supply.

The
MOLBY
MAGAZINE-FEED
Buckwheat-Burning
BOILER
TRADE-MARK

Advantages of the Molby Boiler

The Molby Boiler is constructed throughout in accordance with the codes of the American Society of Mechanical Engineers and the American Society of Heating and Ventilating Engineers. It is recognized by heating experts as a boiler of the highest efficiency.

(1) Coal bills are reduced as much as one-half, sometimes more, as the Molby burns No. 1 buckwheat at a saving of $5.00 to $8.00 per ton. It requires no mixing with expensive larger sizes of coal.

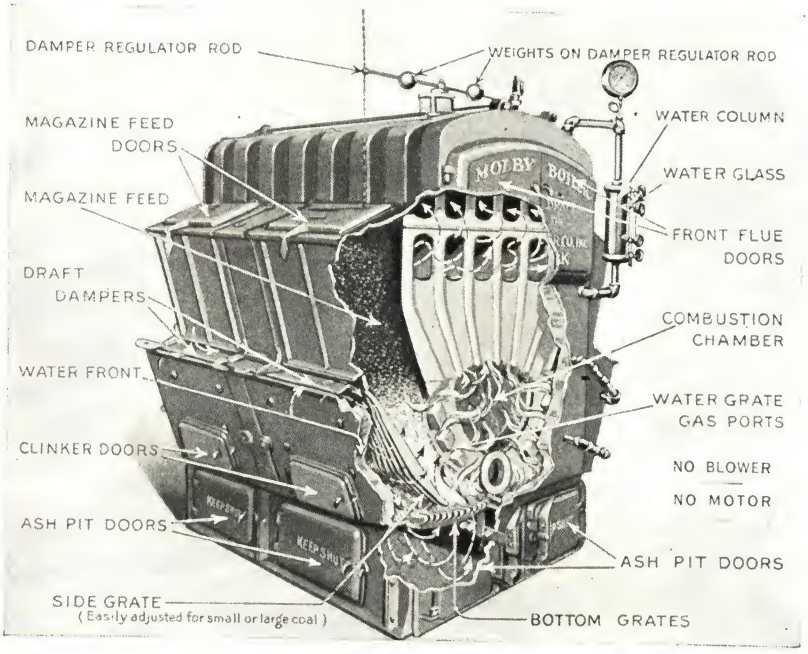
(2) Self-feeding. Only once every 12 to 24 hours is it necessary to refill the magazine, depending on the weather. The magazine or "coal hopper" built into and a part of the boiler itself feeds the fire by gravity. No night attendance is necessary.

(3) No forced draft is necessary. There is no cost for current, no noise of motors and fans and no machinery to get out of order.

(4) No waste. The Molby down-draft and cross-draft are exclusive features. Smoke and gases instead of escaping up the chimney are changed into heat.

(5) In the smaller residence installations the self-feeding feature relieves the owner, or whoever tends the boiler, of much arduous work and frequent firing. In apartment houses, greenhouses or other large places, the magazine-feed means a real saving in service costs.

(6) Made in twenty-two sizes. Where a Molby replaces another boiler no changes are necessary in present radiator and piping system.



Laboratory Tests and Performance Charts

Tests were made, not only by our own engineers, but in the nationally known Frost Research Laboratory, at Norristown, Pa., and these laboratory tests are certified by Robinson V. Frost, C.E., Member A.S.M.E. and A.S.H. & V.E.

Ask nearest office for Frost Laboratory Charts of boiler performances, efficiencies and ratings.

Construction—All Cast Iron

The sections are connected top and bottom by tight, non-corroding, cast iron push nipples. All parts are accurately finished.

The No. 1 series has one magazine. The No. 2 series and No. 3 series have a magazine on each side with two fires and a combination chamber between the two water grates. The gases burning from the two fires unite in the combustion chamber, assuring perfect combustion.

A magazine on each side makes it possible to carry one or two fires as desired. Each magazine is fired separately. In mild weather one fire is sufficient, which is still another economy feature of the Molby heating boiler.

Molby boilers are fitted with grates having a very high throw when open and a tremendous crushing power as they close. When closed, the grates prevent the smaller coal from dropping into the ash pit; when open, they will dump ash and slate freely. Ashes are easily shaken into deep ash pit. Ash pit doors and boiler cleanout doors are large.

Fuel

No. 1 buckwheat anthracite is used without mixing with the expensive larger sizes and without the aid of forced draft accessories, such as blower, motor, electric current, etc.

The Molby also burns pea, stove, nut or egg coal. Sized bituminous coal, of the free-burning, non-caking variety, may be used. Coke may also be used.

SIZES, CAPACITIES, DIMENSIONS, RATINGS

Steam			Steam and Water							Water		Ratings–Net Sq. Ft. E. D. R.	
			Size—inches										
No.	Water line, in.	Returns, number; size, in.	Height	Width	Length	Smoke pipe	Outlets	Chimney flue	Approximate shipping wt.	No.	Returns, number; size, in.	Steam	Water
1-4	44	2-3	54	41	35 1/2	10	2-3	8x12	1890	1-4	2-3	275	450
1-5	44	2-3	54	41	42	10	2-3	8x12	2230	1-5	2-3	375	615
1-6	44	2-3	54	41	48 1/2	10	2-3	8x12	2580	1-6	2-3	475	780
1-7	44	2-3	54	41	55	10	2-3	12x12	2950	1-7	2-3	575	945
1-8	44	2-3	54	41	61 1/2	10	2-3	12x12	3300	1-8	2-3	675	1110
2-5	50	2-4	62 1/2	61	37 5/8	14	2-3	8x12	3820	2-5	2-4	839	1343
2-6	50	2-4	62 1/2	61	44	14	2-3	12x12	4290	2-6	2-4	1087	1739
2-7	50	2-4	62 1/2	61	50 3/8	14	3-3	12x12	4690	2-7	2-4	1334	2135
2-8	50	2-4	62 1/2	61	56 3/4	14	3-3	12x16	5100	2-8	2-4	1585	2537
2-9	50	2-4	62 1/2	61	63 1/8	14	3-3	12x16	5510	2-9	2-4	1852	2964
2-10	50	2-4	62 1/2	61	69 1/2	14	3-3	16x16	5930	2-10	2-4	2138	3422
2-11	50	2-4	62 1/2	61	75 7/8	14	3-3	16x16	6350	2-11	2-4	2405	3969
2-12	50	2-4	62 1/2	61	81 3/8	14	2-3	16x16	6820	2-12	2-4	2672	4516
3-6	63	2-5	80	75 1/2	50 1/2	14	2-4	12x16	7150	3-6	2-5	1900	3135
3-7	63	2-5	80	75 1/2	59	14	2-4	16x16	8310	3-7	2-5	2275	3750
3-8	63	3-5	80	75 1/2	67 1/2	16	3-4	16x16	9500	3-8	3-5	2650	4370
3-9	63	3-5	80	75 1/2	76	16	3-4	16x20	10650	3-9	3-5	3025	4990
3-10	63	3-5	80	75 1/2	84 1/2	18	3-4	16x20	11840	3-10	3-5	3400	5610
3-11	63	3-5	80	75 1/2	93	18	4-4	20x20	13000	3-11	3-5	3775	6225
3-12	63	3-5	80	75 1/2	101 1/2	18	4-4	20x20	14150	3-12	3-5	4150	6845
3-13	63	3-5	80	75 1/2	110	18	4-4	20x24	15320	3-13	3-5	4525	7465
3-14	63	3-5	80	75 1/2	118 1/2	18	4-4	20x24	16590	3-14	3-5	4900	8085

Service to Architects

Architects are invited to consult our heating engineers. Information will be gladly furnished as to type and size of boiler or tank heater best suited to individual requirements.

ESTABLISHED 1850

THE THATCHER COMPANY

TELEPHONES
Mulberry 4-4480 (Newark)
MUrray Hill 2-4072 (New York)

39-41 St. Francis Street, NEWARK, N. J.

PLANTS: NEWARK and GARWOOD, N. J.

SALES OFFICES

NEW YORK, N. Y., 21 W. 44th Street

PHILADELPHIA, PA., 1004 So. 15th Street

CHICAGO, ILL., 341 No. Clark Street

Products

THATCHER STEAM and HOT WATER HEATING BOILERS—Round, "Progress" Square Sectional, "Elite" Red Enamel Jacketed, and "DeLuxe" Enamel Jacketed Types; Gas Fired Boilers.

THATCHER "GOTHIC" RADIATORS and CONCEALED RADIATORS for Steam and Hot Water.

THATCHER COAL and GAS RANGES; WARM AIR FURNACES.

Also Hot Water Supply Boilers, Garage Heating Systems, High Pressure Tank Heaters.

Thatcher Round Boiler (New Series)

For steam or hot water heating. Made in eighteen sizes with rated capacities from 350 to 1700 sq. ft. of steam radiation and 600 to 2950 sq. ft. of water radiation. Especially adaptable for oil burner purposes.

What the Architect May Expect from the New Thatcher Round Boiler—The extensive knowledge and wide experience accumulated during 80 years of continuous manufacture of high grade heaters has produced the New Thatcher Round Boiler. Each individual feature has been thoroughly tested separately as well as assembled, before it was put on the market and the architect may expect a properly designed and practical boiler with:

First—Greatly increased prime heating surfaces and fire travel to produce almost instantaneous heat at remarkably low fuel expenditure.

Second—Greatly increased coal carrying capacity by employing extra depth of fire pot. This increases the time between firing periods, and conserves fuel by slowly driving off all volatile gases so that they may be completely consumed.

Third—Erection so simplified that the savings in time required to install the New Thatcher Round Boiler will reduce the initial cost to the owner.

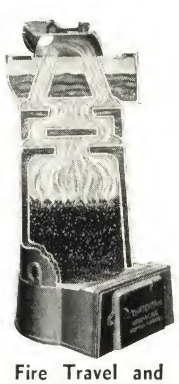
Construction Details—The following contribute to the above features:

Crown Sheet—A special feature is the casting of a crown sheet, or intermediate section, in the top of the fire pot above the direct rays of the fire. This allows contact of the water over the hottest part of the fire, expediting circulation and quick heating.

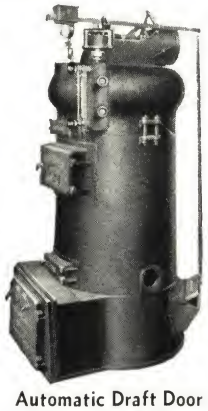
Boiler Section—Design causes the flames and hot gases to "mushroom" between sections and pass over every part of each section.

Regulator—Of the Sylphon type.

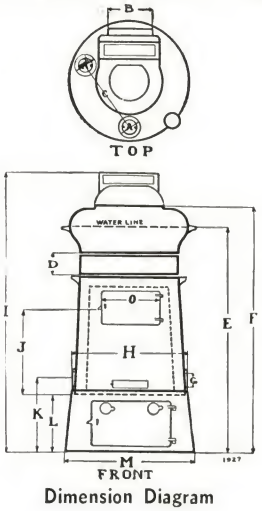
Ratings—The ratings of the new series are based on exhaustive tests under actual normal firing conditions and show unusual efficiency of operation and economy of fuel.



Fire Travel and Water Circulation



Automatic Draft Door Placed in Rear of Base



Dimension Diagram

RATINGS AND DIMENSIONS OF THATCHER ROUND BOILERS

*Boiler No.	Steam boiler rating, sq. ft.	Water boiler rating, sq. ft.	Grate area, sq. ft.	Coal cap., lb.	Dimensions covering both steam and water boilers, in.															
					A		B	C		D	E	F		G	H	I		J	K	L	M	O
					Steam	Water		Steam	Water			Steam	Water			Steam	Water					
117	350	600	1.39	133	1-2 1/2	2-2 1/2	8	0	18 5/8	0	42 1/4	48 1/4	44 1/4	2-2 1/2	19 3/4	57 1/4	53 1/4	21	14 3/4	12	23 3/4	10
217	400	700	1.39	133	1-2 1/2	2-2 1/2	8	0	18 5/8	5	47 1/4	53 1/4	49 1/4	2-2 1/2	19 3/4	62 1/4	58 1/4	21	14 3/4	12	23 3/4	10
317	450	800	1.39	133	1-2 1/2	2-2 1/2	8	0	18 5/8	9	51 1/4	57 1/4	53 1/4	2-2 1/2	19 3/4	66 1/4	62 1/4	21	14 3/4	12	23 3/4	10
119	500	900	1.77	148	1-3	2-3	8	0	20 1/2	0	43 1/2	49 1/2	45 1/4	2-2 1/2	21 3/4	58 1/2	54 1/4	22	14 3/4	12	25	11
219	600	1000	1.77	148	1-3	2-3	8	0	20 1/2	5	48 1/2	54 1/2	50 1/4	2-2 1/2	21 3/4	63 1/2	59 1/4	22	14 3/4	12	25	11
319	650	1100	1.77	148	1-3	2-3	8	0	20 1/2	9	52 1/2	58 1/2	54 1/4	2-2 1/2	21 3/4	67 1/2	63 1/4	22	14 3/4	12	25	11
120	700	1200	2.18	190	1-3	2-3	8	0	20	0	45 1/4	51 1/4	46 1/2	2-3	23 3/4	60 1/4	55 1/2	23 1/4	14 3/4	12	28	12
220	800	1300	2.18	190	1-3	2-3	8	0	20	5	50 1/4	56 1/4	51 1/2	2-3	23 3/4	65 1/4	60 1/2	23 1/4	14 3/4	12	28	12
320	850	1400	2.18	190	1-3	2-3	8	0	20	9	54 1/4	60 1/4	55 1/2	2-3	23 3/4	69 1/4	64 1/2	23 1/4	14 3/4	12	28	12
123	950	1500	2.90	265	2-4	2-4	9	20 1/2	23	0	47 1/2	53 1/2	48 3/4	2-3	26 3/4	63	58 1/4	24 1/2	15 3/4	13	30 1/2	13
223	1050	1650	2.90	265	2-4	2-4	9	20 1/2	23	5	52 1/2	58 1/2	53 3/4	2-3	26 3/4	68	63 1/4	24 1/2	15 3/4	13	30 1/2	13
323	1100	1800	2.90	265	2-4	2-4	9	20 1/2	23	9	56 1/2	62 1/2	57 3/4	2-3	26 3/4	72	67 1/4	24 1/2	15 3/4	13	30 1/2	13
126	1200	1950	3.69	355	2-4	2-4	9	21 3/4	24 1/2	0	48	54	49 1/4	2-4	29 3/4	63 1/2	58 3/4	25	16 1/4	13	33 3/4	14 1/2
226	1300	2150	3.69	355	2-4	2-4	9	21 3/4	24 1/2	5	53	59	54 1/4	2-4	29 3/4	68 1/2	63 3/4	25	16 1/4	13	33 3/4	14 1/2
326	1400	2350	3.69	355	2-4	2-4	9	21 3/4	24 1/2	9	57	63	58 1/4	2-4	29 3/4	72 1/2	67 3/4	25	16 1/4	13	33 3/4	14 1/2
129	1500	2550	4.55	445	2-4	2-4	10	23 1/2	26 1/2	0	49 1/2	55 1/2	51	2-4	32 3/4	66	61 1/2	25 1/2	17 1/4	14	37	16
229	1600	2750	4.55	445	2-4	2-4	10	23 1/2	26 1/2	5	54 1/2	60 1/2	56	2-4	32 3/4	71	66 1/2	25 1/2	17 1/4	14	37	16
329	1700	2950	4.55	445	2-4	2-4	10	23 1/2	26 1/2	9	58 1/2	64 1/2	60	2-4	32 3/4	75	70 1/2	25 1/2	17 1/4	14	37	16

*To designate steam boiler, add—S to boiler No.; to designate water boiler, add—W to boiler No.

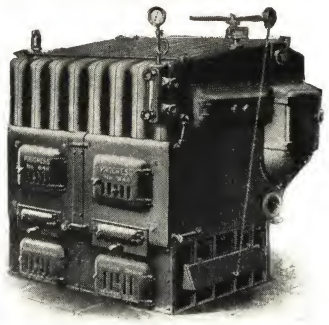
"Progress" Boilers, Single and Twin

The basic principle of triangular shaped sections, embodied in the design of all "Progress" boilers, is primarily responsible for their remarkable efficiency during their many years of manufacture. This design provides:

(1) The lowest practical water line on the market; (2) perfect water circulation; (3) triple fire travel.

Triple Fire Travel—The construction of the sections causes the flames and hot gases to pass three times through the entire length of the boiler, and to completely surround the water tubes, before escaping into the smoke flue.

Water Circulation—Thermo-siphon principle provides rapid, unobstructed circulation.



Single Steam Boiler

Ease of Firing and Cleaning—Side feed construction and several feed doors, insure easy firing and cleaning and economy of fuel.

Low Water Line—48 in. in the smaller and 55 in. in the larger boilers eliminate the objectionable boiler pit.

Grate—All shaker connections are in the rear outside of ash pit. Eliminate clogging and warping of grates.

Economy of Twin Boilers—For large buildings, cost less to install than two single boilers; radiation losses are less; floor space is saved; either half may be used independently. For very large capacities, twin boilers give excellent results erected in battery or in connection with a fan or ventilating system.

Triangular Shaped Section and Triple Fire Travel

Ratings—Following conditions should be maintained at the boiler: steam, 2 lb. pressure; hot water, 180°.

RATINGS AND DIMENSIONS OF "PROGRESS" BOILERS (SINGLE AND TWIN)
S—Steam W—Water T—Twin

Steam Boiler No.	Steam Boiler Radiation, sq. ft.	Flows, number and size, in.	Returns, number and size, in.	Grate area, sq. ft.	Number of feed doors	Water boiler No.	Water boiler Radiation, sq. ft.
52-S	1500	2-4	2-4	6.81	1	52-W	2500
62-S	2000	2-4	2-4	8.30	2	62-W	3350
72-S	2600	2-4	2-4	9.78	2	72-W	4300
82-S	3200	2-4	2-4	11.27	2	82-W	5250
92-S	3800	2-4	2-4	12.75	2	92-W	6200
102-S	4400	2-4	2-4	14.24	2	102-W	7150
64-S	3400	2-5	2-5	11.53	2	64-W	5600
74-S	4200	2-5	2-5	13.59	2	74-W	6900
84-S	5000	2-5	2-5	15.65	2	84-W	8200
94-S	5800	2-5	2-5	17.71	2	94-W	9500
104-S	6800	2-5	2-5	19.77	2	104-W	11150
114-S	7800	2-5	2-5	21.83	3	114-W	12800
124-S	8800	2-5	2-5	23.89	4	124-W	14450
134-S	9800	2-5	2-5	25.95	4	134-W	16100
144-S	10800	2-5	2-5	28.01	4	144-W	17750
112T-S	3500	6-3 & 4	4-3 & 4	15.11	3	112T-W	5850
122T-S	4000	6-3 & 4	4-3 & 4	16.60	4	122T-W	6700
132T-S	4600	6-3 & 4	4-3 & 4	18.08	4	132T-W	7650
142T-S	5200	6-3 & 4	4-3 & 4	19.57	4	142T-W	8600
152T-S	5800	6-3 & 4	4-3 & 4	21.05	4	152T-W	9550
162T-S	6400	6-3 & 4	4-3 & 4	22.54	4	162T-W	10500
172T-S	7000	6-3 & 4	4-3 & 4	24.02	4	172T-W	11450
182T-S	7600	6-3 & 4	4-3 & 4	25.51	4	182T-W	12400
192T-S	8200	6-3 & 4	4-3 & 4	26.99	4	192T-W	13350
154T-S	9200	6-4 & 5	4-4 & 5	29.24	4	154T-W	15100
164T-S	10000	6-4 & 5	4-4 & 5	31.30	4	164T-W	16400
174T-S	10800	6-4 & 5	4-4 & 5	33.36	4	174T-W	17700
184T-S	11600	6-4 & 5	4-4 & 5	35.42	4	184T-W	19000
194T-S	12600	6-4 & 5	4-4 & 5	37.48	4	194T-W	20650
204T-S	13600	6-4 & 5	4-4 & 5	39.54	4	204T-W	22300
214T-S	14600	6-4 & 5	4-4 & 5	41.60	5	214T-W	23950
224T-S	15600	6-4 & 5	4-4 & 5	43.66	6	224T-W	25600
234T-S	16600	6-4 & 5	4-4 & 5	45.72	7	234T-W	27250
244T-S	17600	6-4 & 5	4-4 & 5	47.78	8	244T-W	28900
254T-S	18600	6-4 & 5	4-4 & 5	49.84	8	254T-W	30550
264T-S	19600	6-4 & 5	4-4 & 5	51.90	8	264T-W	32200
274T-S	20600	6-4 & 5	4-4 & 5	53.96	8	274T-W	33850
284T-S	21600	6-4 & 5	4-4 & 5	56.02	8	284T-W	35500
294T-S	22600	6-4 & 5	4-4 & 5	58.08	8	294T-W	37150

Thatcher "Elite" Red Enamel Jacketed Boiler—Round and Square Patterns

A beautiful, dustproof and moistureproof, red enamel jacket *entirely* surrounds the castings of this boiler. The jacket contributes efficiency as well as beauty. Asbestocel lining, 1¼ in. thick, reflects heat back through dead air space to castings, heating iron on *both* sides of waterways and minimizing heat losses.

Round Pattern Thatcher "Elite" Enameled Jacketed Boiler

Staggered Fire Travel—Nearly a century's experience has developed the famous Thatcher Staggered Fire Travel, shunting the flames and hot gases under, over and around the water heating surfaces through many passageways.

CAPACITIES OF THATCHER "ELITE" BOILERS

Pattern	Boiler No.	Rating, sq. ft.	Grate area, sq. ft.	Coal cap., lb.	Height, in. To top outlet	Height, in. To water line	Openings, in. Flow	Openings, in. Return
				Steam				
Round	2-S	500	1.39	133	48¼	42¼	1–2½	2–2½
	3-S	600	1.77	148	49½	43½	1–3	2–2½
	301-S	675	1.77	148	54½	48½	1–3	2–2½
	4-S	750	2.18	190	51¼	45¼	1–3	2–3
	401-S	850	2.18	190	56¼	50¼	1–3	2–3
	5-S	975	2.90	265	53½	47½	2–4	2–3
	501-S	1075	2.90	265	58½	52½	2–4	2–3
	6-S	1200	3.69	355	54	48	2–4	2–4
Square	54	1500	6.81	.....	55	48	2–4	2–4
	65	2000	8.30	.....	55	48	2–4	2–4
	76	2600	9.78	.....	55	48	2–4	2–4
	87	3200	11.27	.....	55	48	2–4	2–4
	98	3800	12.75	.....	55	48	2–4	2–4
	760	4200	13.59	.....	64	55	2–5	2–5
	870	5000	15.65	.....	64	55	2–5	2–5
	980	5800	17.71	.....	64	55	2–5	2–5
				Water				
Round	2-W	800	1.39	133	44¼	.....	2–2½	2–2½
	3-W	950	1.77	148	45¼	.....	2–3	2–2½
	301-W	1050	1.77	148	50¼	.....	2–3	2–2½
	4-W	1200	2.18	190	46½	.....	2–3	2–3
	401-W	1350	2.18	190	51½	.....	2–3	2–3
	5-W	1525	2.90	265	48¾	.....	2–4	2–3
	501-W	1700	2.90	265	53¾	.....	2–4	2–3
	6-W	1950	3.69	355	49¼	.....	2–4	2–4
Square	54	2500	6.81	.....	55	.....	2–4	2–4
	65	3350	8.30	.....	55	.....	2–4	2–4
	76	4300	9.78	.....	55	.....	2–4	2–4
	87	5250	11.27	.....	55	.....	2–4	2–4
	98	6200	12.75	.....	55	.....	2–4	2–4
	760	6900	13.59	.....	64	.....	2–5	2–5
	870	8200	15.65	.....	64	.....	2–5	2–5
	980	9500	17.71	.....	64	.....	2–5	2–5

Note: Nipples to extend from supply and return outlets through casing furnished with above boilers. Steam boilers tapped through casing for hot water heater and water boilers for hot water coil.

Additional data upon application.

Thatcher "De Luxe" Boiler

Thatcher "De Luxe" Sectional Jacketed Boiler

The Thatcher "De Luxe" Boiler meets the requirements for an economical sectional boiler possessing the attractive, clean appearance desired for the modern cellar. The heavy metal jacket is carefully red enameled—the metal itself has exceptional lasting qualities and the enamel is thoroughly fused into it. The jacket is lined on the four sides and top with 4-ply asbestocel, an airtight insulation which retains the valuable heat units for boiler heat.

The "De Luxe" Boiler provides heat in the most efficient and economical way possible. The triple fire-travel principle brings the full power of the volatile gases into contact with the cast iron so that the water circulates in the boiler with unusual rapidity. In a hot water system this means rapid circulation of the water in the radiators and in a steam system, quick generation of steam.

Deep combustion chamber, large feed door and easily operated, heavy grates are additional features.

CAPACITIES OF THATCHER "DE LUXE" BOILERS

Boiler No.	Rating, sq. ft.	Grate area, sq. ft.	Height, in.		Openings, in.	
			To top outlet	To water line	Flow	Return
Steam						
175-S	575	1.95	54	46	1–3	2–3
176-S	750	2.48	54	46	2–3	2–3
177-S	925	2.95	54	46	2–3	2–3
178-S	1100	3.55	54	46	2–3	2–3
179-S	1275	3.98	54	46	2–3	2–3
180-S	1450	4.43	54	46	2–3	2–3
181-S	1625	4.90	54	46	2–3	2–3
266-S	2000	4.8	61	50	2–4	2–4
267-S	2600	6.3	61	50	2–4	2–4
268-S	3200	7.8	61	50	2–4	2–4
269-S	3800	9.2	61	50	2–4	2–4
270-S	4400	10.7	61	50	2–4	2–4
271-S	5000	11.2	61	50	2–4	2–4
Water						
175-W	950	1.95	54	.....	1–3	2–3
176-W	1250	2.48	54	.....	2–3	2–3
177-W	1550	2.95	54	.....	2–3	2–3
178-W	1850	3.55	54	.....	2–3	2–3
179-W	2150	3.98	54	.....	2–3	2–3
180-W	2450	4.43	54	.....	2–3	2–3
181-W	2750	4.90	54	.....	2–3	2–3
266-W	3300	4.8	61	.....	2–4	2–4
267-W	4300	6.3	61	.....	2–4	2–4
268-W	5300	7.8	61	.....	2–4	2–4
269-W	6300	9.2	61	.....	2–4	2–4
270-W	7300	10.7	61	.....	2–4	2–4
271-W	8300	11.2	61	.....	2–4	2–4

Thatcher "Gothic" Radiators—Beautiful and Efficient

Made in heights from 14 to 38 in. and can be used for any kind of hot water, steam, vapor or vacuum system.

Radiator Tapping List—All Thatcher Gothic Radiators are tapped 1½-in. both ends; may be bushed to sizes required.

All radiators have right-hand threads at both supply and return. They are connected at top and bottom with heavy malleable iron push nipples and are vented ⅛ in. for both steam and water.

"Gothic" Four-tube Radiator

Steam, 1-pipe		Steam, 2-pipe (sup. and ret.)		Water (tapped for sup. and ret.)	
sq. ft.	in.	sq. ft.	in.	sq. ft.	in.
Up to 24	1	Up to 48	1 x ¾	Up to 40	1 x 1
25 to 60	1¼	49 to 96	1¼x1	41 to 72	1¼x1¼
61 to 100	1½	Above 96	1½x1¼	Above 72	1½x1½
Above 100	2				

HEATING SURFACE PER SECTION

	Rad., sq. ft. per section							
Height, in...	38	32	26	23	20	18	17	14
3-tube.....	3½	3	2⅓	....	1¾	....	....	....
4-tube.....	4¼	3½	2¾	....	2¼	....	....	....
5-tube.....	5	4⅓	3½	3	2⅔	....	....	....
6-tube.....	6	5	4	....	3	2¾	....	2
7-tube.....	....	....	....	....	3⅔	....	3	2½

Length: 2½ in. per section. Add ½ in. for each bushing.

Width of feet and width of sections: 3-tube, 4½ in.; 4-tube, 6¼ in.; 5-tube, 8 in.; 6-tube, 9¾ in.; 7-tube, 11⅜ in.

Thatcher Concealed Radiators

The Thatcher Company is one of the pioneers in the development of the concealed Fin Type Radiator. Complete details of Concealed Radiators upon Request.

Thatcher Warm Air Furnaces

Two types and sufficient sizes to meet requirements. May be installed singly or in batteries. Guaranteed gastight, dustproof, durable and free from defects in material and workmanship.

Equipment—All heaters supplied with large water pan and cover and complete damper regulator, consisting of a brass safety chain and nickelplated adjuster for upstairs damper control.

Disc Water Heater—Furnished extra. It is suspended in the furnace and will supply from 40 to 50 gal. of hot water per hour for domestic purposes.

"Thatcher New Meteor" Furnace

"THATCHER NEW METEOR" FURNACE

No.	Diam. casing, in.	Diam. fire pot, in.	Height castings, in.	Diam. smoke pipe, in., cast iron rad.	Heating capacity, cu. ft.	Heat pipe cap., sq. in.
18–36	36	18	48	7	9–11,000	295
20–40	40	20	49	8	11–13,000	375
22–44	44	22	49	8	13–17,000	480
24–48	48	24	49½	8	17–23,000	575
26–52	52	26	52	9	23–28,000	680
*158	58	30	60½	10	33–38,000	866
†165	65	34	61	10	38–43,000	1040

*Furnished with revolving shaker only. Not fitted with water coil openings.

†Furnished with steel radiator instead of cast iron.

"THATCHER WARM FRIEND PIPELESS" FURNACE

No.	Diam. fire pot, in.	Diam. outer casing, in.	Diam. smoke pipe, in., cast iron rad.	Floor opening for register, in.	Min. height of cellar, in.	Approximate heating capacity, cu. ft.
18–40	18	40	7	25½ x 25½	70	5 to 8,000
20–44	20	44	8	28¼ x 28¼	72	8 to 12,000
22–48	22	48	8	31 x 31	72½	12 to 15,000
24–52	24	52	8	34 x 34	74	20 to 26,000

No. 88 Single Oven Range

Thatcher Single and Double Oven Coal Ranges

Made in the finest grade of gray iron. All sheet metal parts Wellsville steel of heavy gauge; nickel trimmings are heavily plated and buffed. Waterbacks are large and effective. Triangular revolving grates have both bars fitted with shaker shanks for removing ashes. Direct draft damper is operated from outside of range. Range is fitted with sifting grate and large ash pan. Either side of the double range may be used independently.

SINGLE AND DOUBLE OVEN COAL RANGES

No.	Top, in.	Covers	Covers, in.	Ovens, in.
77	34 x25½	6	8	16 x17x10½
78	36 x25½	6	8	16 x17x10½
88	38 x26½	6	8	18½x19x12
820	40½x28¾	6	8	20 x20x13
920	40½x28¾	6	9	20 x20x13
18 (double)	50¾x27¼	8	8	13 x20x14

Thatcher Gas Fired Boilers

The Thatcher Gas Fired Boiler is entirely automatic in operation. Convenience in installation, ease of operation and economy of fuel are additional outstanding features. Write for complete details.

SPENCER HEATER COMPANY

DIVISION OF LYCOMING MANUFACTURING COMPANY

Makers of Spencer Boilers

WILLIAMSPORT, PA.

ALBANY, N. Y.
BALTIMORE, MD.
BETHLEHEM, PA.
BIRMINGHAM, ALA.
BOSTON, MASS.
BUFFALO, N. Y.
CINCINNATI, OHIO
HARRISBURG, PA.
NEW YORK, N. Y.
PHILADELPHIA, PA.
PITTSBURGH, PA.
ROCHESTER, N. Y.
ST. LOUIS, MO.
SCRANTON, PA.
SYRACUSE, N. Y.

Product

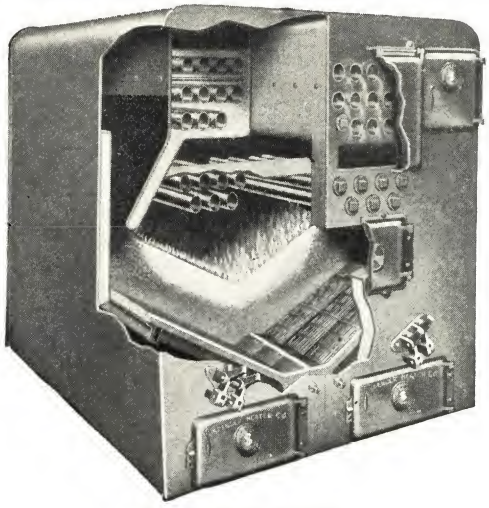
SPENCER MAGAZINE FEED BOILERS.

Spencer Boilers

The Spencer is the original magazine feed boiler with sloping grates, a gravity stoker boiler. The water-jacketed magazine holds enough fuel for 12 to 24 hours. Fuel feeds automatically by gravity, as fast or as slow as the fire requires—no motors or mechanical or moving parts. Uniform depth of fire bed makes certain that the fire is always at its most efficient combustion point, giving maximum efficiency with minimum fuel cost.

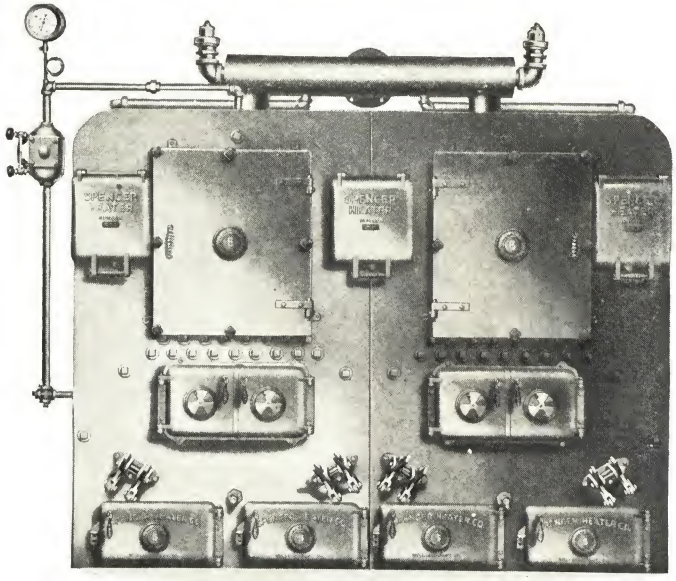
TRADE-MARK

Spencer Boilers are made in sizes to suit every type of home or building, large or small. The direct cast iron column radiation load which each size Spencer will carry is guaranteed. You are assured that the Spencer you specify will deliver sufficient heat for the radiation listed for it.



Cross Section Diagram

Showing the correct scientific construction used in Spencer Steel Tubular Boilers



M-8 Series, Spencer Tubular Steam Boiler

The largest type of Spencer Boiler, a four-grate boiler for use in multiple story buildings

SIZES AND GUARANTEED CAPACITIES OF SPENCER STEEL TUBULAR BOILERS

	Boiler No.	Direct cast iron column radiation loads,* sq. ft. steam	Grate area, sq. ft.	Outlets, number and size, in.	Returns, number and size, in.	Size chimney flue, in.——ft.	Smoke pipe diam., in.	Over-all dimensions, in.		
								Length	Width	Height
M6 Series	M6-5	2,000	12.2	1—6	2—2½	12x12—40	14	58½	58	66
	M6-6	2,300	14.	1—6	2—2½	12x12—40	14	65½	58	66
	M6-7	2,600	15.8	1—6	2—2½	12x16—45	14	72½	58	66
	M6-8	2,900	17.6	1—6	2—2½	12x16—45	14	79½	58	66
	M6-9	3,200	19.4	1—6	2—2½	16x16—50	14	86½	58	66
	M6-10	3,500	21.2	1—6	2—2½	16x16—50	14	93½	58	66
M7 Series	M7-6	4,000	19.	1—8	2—3	20x20—60	18	75½	68	80
	M7-7	4,700	22.	1—8	2—3	20x20—60	18	82½	68	80
	M7-8	5,400	25.	1—8	2—3	20x20—65	18	89½	68	80
	M7-9	6,100	28.	1—8	2—3	22x22—70	18	96½	68	80
	M7-10	6,800	31.	1—8	2—3	22x22—70	18	103½	68	80
M8 Series	M8-6	8,000	32.36	1—8	2—4	24x24—65	24	79¼	108	85
	M8-7	9,750	37.02	1—8	2—4	24x24—65	24	86¼	108	85
	M8-8	11,500	41.68	1—8	2—4	30x30—70	24	93¼	108	85
	M8-9	13,250	46.34	1—8	2—4	36x36—70	24	100¼	108	85
	M8-10	15,000	51.	1—8	2—4	36x36—70	24	107¼	108	85

*Allowance has been made for heat loss in covered mains, risers, and returns, as covered by our guarantee.

Spencer Automatic Heat for Different Types of Buildings

Spencer Boilers are especially efficient in industrial buildings, greenhouses and garages where uniform heat is desirable; they give the constant, uniform and healthful heat essential in schools, churches, apartments and theatres, without the attention of a night fireman.

For the home, the Spencer is particularly convenient, as it requires attention only once or twice in 24 hours.

J Type—A small magazine feed boiler for steam, vapor or hot water systems for the small home.

L-1 Type—A magazine feed boiler for steam, vapor or hot water systems in 6 to 12-room homes, or small office or industrial buildings.

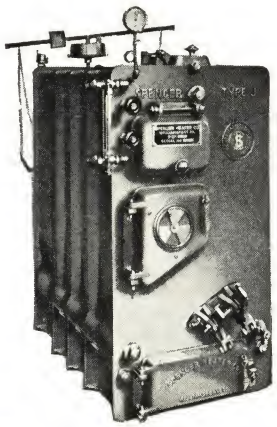
L-2 Type—A magazine feed boiler for steam, vapor or hot water systems in large dwellings, or small office, industrial or institutional buildings.

L-3 Type—A magazine feed boiler for steam, vapor or hot water systems in very large homes, small apartment houses and other buildings.

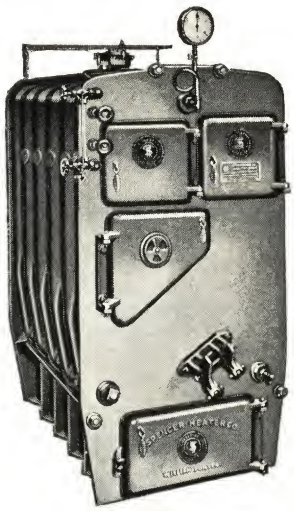
M-6 Type—A magazine feed, steel tubular boiler for steam systems in very large homes, small apartment houses and other buildings.

M-7 Type—A magazine feed, steel tubular boiler for steam systems in moderate size apartment houses, schools, churches and other buildings.

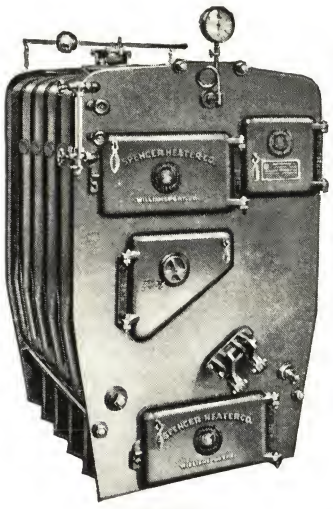
M-8 Type—A magazine feed, steel tubular boiler for steam systems in very large apartment houses, schools, churches and other buildings.



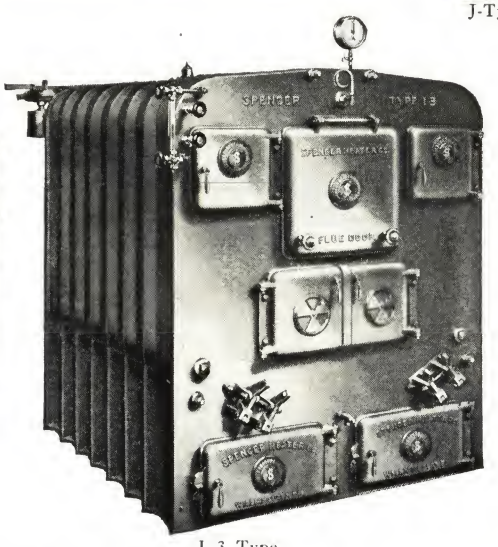
J-Type


L-1 Type

Spencer Sectional Boilers



L-2 Type



L-3 Type

Spencer Sectional Boilers

The Lowest Cost Heat You Can Buy

Spencer Boilers are designed especially to burn small-size, low-cost fuels, such as No. 1 Buckwheat anthracite, or small-size by-product coke. No. 1 Buckwheat, for example, costs as much as $5.00 less a ton than the larger sizes. Where anthracite or coke is not available, smaller sizes of non-coking graded semi-bituminous, such as Pocahontas, may be successfully used. For any home or building, Spencer Automatic Heat gives the "lowest cost heat you can buy."

Literature

Write for complete description and illustrations of all Spencer Boilers.

SIZES AND GUARANTEED CAPACITIES OF SPENCER CAST IRON SECTIONAL BOILERS

	Boiler No.	Direct cast iron column radiation loads, sq. ft.*		Grate area, sq. ft.	Steam and water outlets, number and size, in.	Steam and water Returns, number and size, in.	Size chimney flue, in.——ft.	Smoke pipe diam. in.	Over-all dimensions, in.		
		Steam	Water						Length	Width	Height
J-Series	J-3	175	290	1.30	1-3	2-3	8x 8—35	8	26½	24	45
	J-4	265	440	1.90	1-3	2-3	8x 8—35	8	33½	24	45
	J-5	355	590	2.50	1-3	2-3	8x 8—35	8	40½	24	45
L-1 Series	L-105	390	645	2.60	1-4	2-4	8x 8—35	10	39	32	57
	L-106	510	845	3.33	2-4	2-4	8x 8—35	10	46	32	57
	L-107	630	1,045	4.07	2-4	2-4	8x12—35	10	53	32	57
	L-108	750	1,245	4.80	2-4	2-4	8x12—35	10	60	32	57
L-2 Series	L-205	550	910	3.63	1-4	2-4	8x12—35	10	39	40	60
	L-206	725	1,200	4.66	2-4	2-4	8x12—35	10	46	40	60
	L-207	900	1,490	5.68	2-4	2-4	8x12—40	10	53	40	60
	L-208	1,075	1,780	6.70	2-4	2-4	12x12—40	10	60	40	60
	L-209	1,250	2,070	7.73	2-4	2-4	12x12—40	10	67	40	60
L-3 Series	L-305	1,150	1,900	7.29	2-4	2-4	12x12—40	14	42	56	65
	L-306	1,500	2,475	9.33	2-4	2-4	12x12—40	14	49	56	65
	L-307	1,850	3,050	11.37	2-4	2-4	12x12—40	14	56	56	65
	L-308	2,200	3,625	13.41	2-4	2-4	12x16—45	14	63	56	65
	L-309	2,550	4,200	15.45	2-4	2-4	12x16—45	14	70	56	65
	L-310	2,900	4,775	17.49	2-4	2-4	16x16—50	14	77	56	65
	L-311	3,250	5,350	19.53	2-4	2-4	16x16—50	14	84	56	65

*Allowance has been made for heat loss in covered mains, risers, and returns, as covered by our guarantee.

THE TITUSVILLE IRON WORKS COMPANY

Boilers, Tanks and Steel Plate Work

TITUSVILLE, PA.

BRANCH OFFICES

AMSTERDAM, N. Y.
ATLANTA, GA., 511 Grand Theatre Building
BARRE, VT., 46 Pearl Street
BIRMINGHAM, ALA., 239 Brown-Marx Building
BUFFALO, N. Y., 1502 Marine Trust Building
CHARLOTTE, N. C., 705 Realty Building
CHICAGO, ILL., 20 No. Wacker Drive
CINCINNATI, OHIO, 2208 Crane Avenue
CLEVELAND, OHIO, 16909 Clifton Boulevard
COLUMBUS, OHIO, 359-69 Dublin Avenue
DALLAS, TEX., 803 Burt Building
DETROIT, MICH., 2842 West Grand Boulevard
ERIE, PA., 507 Cherry Street
KANSAS CITY, MO., 611 Brooklyn Avenue
LOS ANGELES, CALIF., 940 Maple Avenue
NASHVILLE, TENN., 1605 Church Street
NEW ORLEANS, LA., 612 Godchaux Building
NEW YORK, N. Y., 285 Madison Avenue
PHILADELPHIA, PA., 1015 Chestnut Street
PITTSBURGH, PA., 2224 Farmers' Bank Building
RICHMOND, VA., 1708 Lewis Street
ST. LOUIS, MO., 1010 Telephone Building
WASHINGTON, D. C., 1013 Woodward Building

Products

FIRETUBE STEEL BOILERS for Power and Heating.
TUBELESS STEEL WATER HEATERS.
Also manufacturers of Steel Plate Work, including Tanks, Smokestacks, etc.; Boiler Fronts and Castings, Grates, etc.

Facilities

Our shop is one of the largest and best equipped boiler manufacturing plants in the country. It is provided with the latest improved machinery, including hydraulic and pneumatic riveting machines, also best hydraulic flanging equipment. Electric overhead cranes insure careful and rapid handling of material. Our welding machines are of the most modern improved types and the operators, experts, who do nothing but welding daily. All seams of Titusville welded boilers are welded *inside* and *outside* by electric arc-machines.

A large stock of plates and tubes is carried and shipment can be made with reasonable promptness. Also a large stock of completed Tico and Acme riveted firebox boilers and a large stock of welded firebox heating boilers ready for immediate shipment.

A.S.M.E. Code

Our boilers are made in strict accordance with the latest boiler code of the American Society of Mechanical Engineers, or can be made to conform to local requirements.

Inspection and Test

All boilers are thoroughly inspected during their entire construction by a representative of the Hartford Steam Boiler Inspection and Insurance Company, who is in continual attendance at our works. Boilers are tested to required hydrostatic pressure, made absolutely tight and stamped "ASME." All workmanship and material are guaranteed first class in every respect. The insurance company's test certificate is furnished free of charge, if desired.

Working Pressures

All boilers when used for high pressure or power service are made for 100 to 150 lb. working pressure, A.S.M.E. Code, and are tested with hydrostatic pressure 50% in excess of the working pressure. Standard heating boilers are made for 15 lb. working pressure A.S.M.E. Code and tested to 60 lb. hydrostatic pressure.

Steam Radiation Ratings

Firebox and horizontal tubular heating boilers are all rated on basis of 14 sq. ft. of radiation per square foot of fire surface.

In determining the size of a boiler, take the actual amount of cast iron radiation or equivalent, plus the piping, and add about 5 to 10% and select a boiler with the next highest rating.

Equipment

All our boilers are provided with complete castings as illustrated below. Stationary grates are standard equipment on all horizontal tubular boilers. Shaking grates are standard with all firebox boilers.

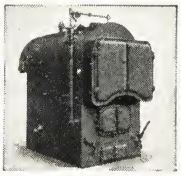
Special grates can be furnished on all types when desired.

Catalogues

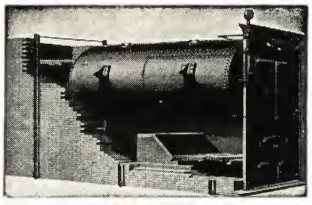
New catalogues and pamphlets on welded firebox boilers and other types gladly sent on request.

Series "WS"—Welded Smokeless Boiler

Series "W"—Welded Boiler



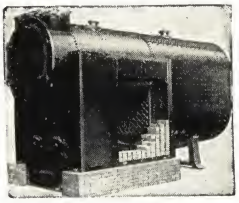
Series "SR"—Compact Type Welded Boiler



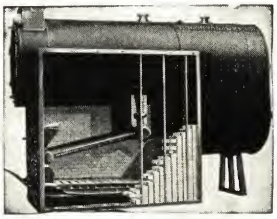
Horizontal Tubular Boiler for Power and Heating

Series "RS"—Smokeless Riveted Firebox Boiler

Series "R"—Riveted Firebox Boiler

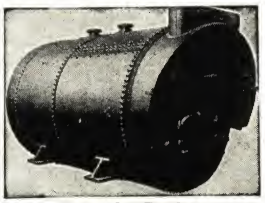


Perfection Return Tubular Portable Boiler

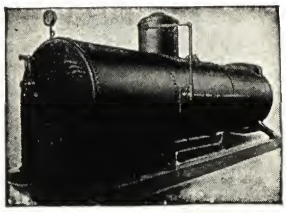


Perfection Smokeless Return Tubular Portable Boiler

Vertical Boiler



Scotch Boiler



Locomotive Boiler

Jacketed Tubeless Water Heater

AUBURN STOKER CORPORATION

AUBURN, IND.

REPRESENTATIVES IN PRINCIPAL CITIES

"UNDERFEED TYPE" HYDRAULIC STOKERS

Types and Sizes

Auburn Hydraulic Stoker, Senior and Junior, ram type, narrow retort stokers.

Four Juniors for boilers and industrial furnaces of from 1500 to 10,000 sq. ft. of radiation or 12 to 75 b. hp.

Eight Seniors for from 7400 to 55,000 sq. ft. of radiation or 60 to 450 b. hp.

Operation

The main coal ram, directly connected to the piston rod of the hydraulic motor, moves back and forth below the bottom of the coal hopper charging between 1 and 6 lbs. of coal at each stroke. Secondary pushers, attached to a bar operated from the ram, distribute the coal through the entire length of the retort. Secondary pushers are adjustable for different types of fuel. Air is introduced to the fuel bed through tuyere blocks which are so designed as to be self-cooling and are installed with allowance for expansion. The narrow retort permits air to permeate the entire fuel bed which eliminates dead centers in the fire. The speed of the ram is controlled by the volume of oil supplied to the piston, the length of the stroke and the operating pressure remaining the same. Automatic controls insure the desired pressure or temperature.

Features

Thirty years of experience in the design and construction of power plant equipment are included in the Auburn Hydraulic Stoker.

All parts are ruggedly yet simply constructed.

There are few moving parts, most of which operate in a continuous bath of lubricating oil which is the medium of the hydraulic drive.

Simple straight line transmission of power insures low operating and maintenance costs.

A 45° range control lever in the oil line permits a wide variance in the rate of coal feed to meet fluctuations in the load conditions. This patented Auburn feature is one of the most outstanding developments in the small stoker field.

The oil pump is the manufacturer's own design and, while it operates at pressures of from 75 to 125 lbs. per sq. in., each pump is tested to ten times the normal operating pressure.

In the Senior Stoker the power and fan unit is separate from the hydraulic motor and ram mechanism and may be installed at the side, in back, on top of the boiler or in another room if necessary. There is plenty of room in front of the boiler for cleaning the fire.

In the Junior Stoker the power and fan unit is an integral part of the machine but can be furnished separate when local conditions necessitate.

Side dump plates can be furnished for the larger sizes of Senior Stokers when they would prove convenient.

All Auburn stokers can be equipped with steam turbine drive or with an auxiliary turbine drive connected on an extension of the electrical motor shaft.

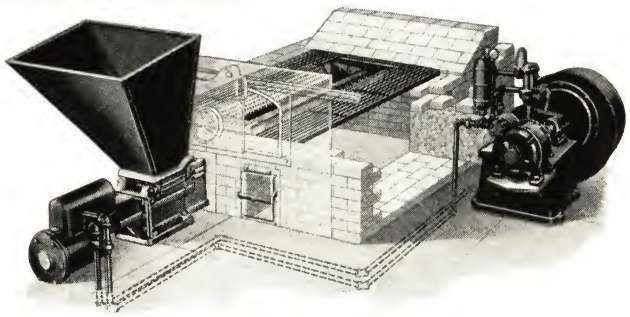
Installations frequently include new boiler fronts and sliding doors to facilitate cleaning.

Quality

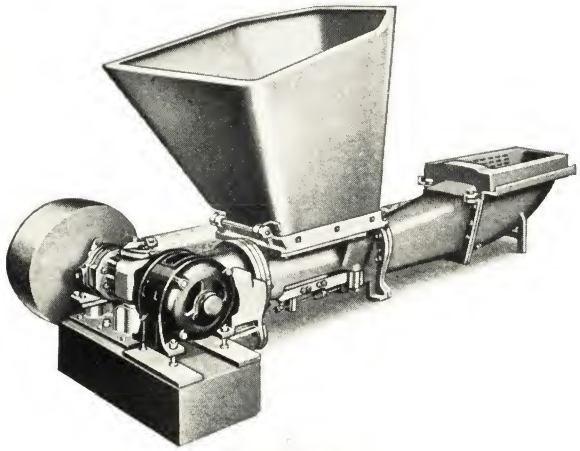
Auburn Hydraulic Stokers are manufactured by the AUBURN STOKER CORPORATION, a subsidiary of the Auburn Foundry Company, Auburn, Indiana, a company well regarded for its stability, service, and quality of product. Enthusiastic owners of Auburn Stokers all over the United States and Canada can and will testify as to the quality of the product.

Engineering Service

Competent engineering service and recommendations, as well as descriptive literature, may be secured from authorized Auburn Distributers in the principal cities of the country.



"Senior" Stoker with Dead Plates



"Junior" Stoker

COMBUSTIONEER, INC.

Automatic Bituminous and Anthracite Coal Burners

GOSHEN, INDIANA

BRANCH OFFICES: CHICAGO, ILL. AND DETROIT, MICH.

AUTOMATIC (BITUMINOUS AND ANTHRACITE) COAL BURNING STOKERS FOR INDUSTRY, COMMERCE AND THE HOME

Safe, Automatic Heat

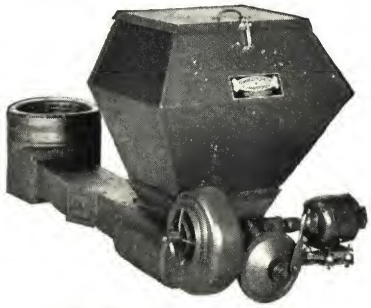
The Combustioneer method of forced-draft, under-feeding, creates a coal fire that burns evenly and makes a constant, incandescent bed of fire. As the coal approaches the fire, it gradually is heated. The exact amount of air necessary for complete combustion is delivered under adequate pressure during the period of firing. The coal is burned efficiently. The volatile gases are released, pass through the incandescent fuel bed and burn. Soot and smoke are consumed—also turned into valuable heat!

The deep, hot fire-bed, at the exact point on top of the retort where it belongs, produces complete combustion, so that nothing but clinkers remain. There is no waste with Combustioneer.

Positive, automatic controls regulate the temperature or steam pressure exactly as it is wanted.

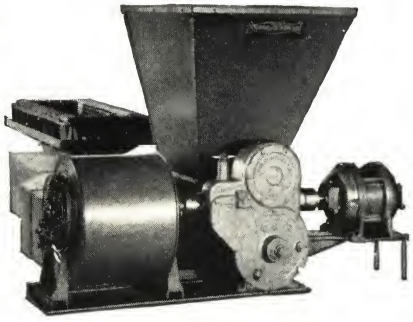
Thousands of Combustioneers are in use in large and small buildings, apartments, hospitals, hotels, homes, factories, dormitories and commercial buildings. These efficient automatic stokers burn the lower-priced sizes of coal. They burn less coal. They increase boiler efficiency, allow the fireman's time to be spent on more productive work and give a better spread of boiler-room operating costs.

Combustioneer Automatic Coal Burners furnish all of the comfort, convenience and efficiency of automatic heat at a tremendous saving in time, money and effort. And they are safe.



Combustioneer Furnastoker

1700 sq. in. of warm air outlet, 1100 sq. ft. of steam radiation or 1760 sq. ft. of hot water radiation. Coal-burning capacity, 25 or 50 lb. an hour, 10 b.hp.



Combustioneer Model 120

For the largest buildings: Handles any high pressure boiler or low pressure heating job up to capacity of 1200 lb. of coal an hour. Capacity, 26,400 sq. ft. of steam radiation or 42,240 sq. ft. of hot water radiation, 240 b.hp.

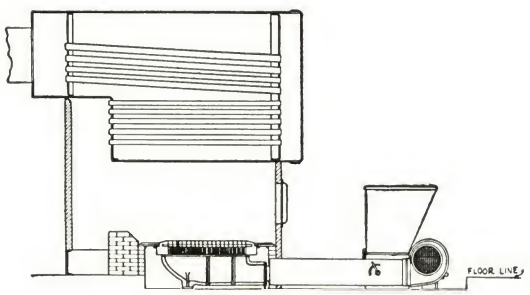
Perfect Parts Make a Balanced Unit

The operation of these efficient coal burners is automatic. One small motor does the work. A chrome vanadium steel feed-worm on the motor shaft automatically carries the coal from the hopper to the fire-box, where it is fed from beneath—*the proper method of firing coal.* Air control and speed of coal feed are regulated as desired. There are no gears to shift.

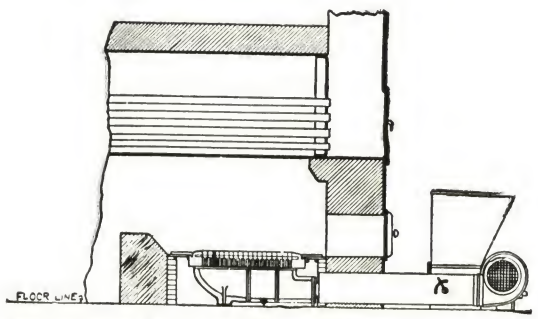
Patented Gear Case

One of the most interesting and important features of the Combustioneer is the gear case—a perfectly machined mechanism, operated on smooth running ball bearings. Accurately machined bronze and tempered steel gears, producing 20 speeds with only 3 gears under load in the gear case, are lubricated by the modern splash oil system.

All parts are accessible from the front. The entire mechanism is efficiently and protectively enclosed in a substantial gear case housing. The perfect precision of the parts, as beautifully fitted as a fine watch, insures long years of smooth, quiet, dependable operation under all working conditions.



Combustioneer Applied to Firebox Boiler



Combustioneer Applied to Horizontal Return Tubular Boiler

COMBUSTIONEER CAPACITY RATINGS

Based on 11,500 B.t.u. coal—motor speed 1750 r.p.m.

Model	Coal burning capacity per hr.	Motor hp.	Boiler hp.	Capacity steam radiation, sq. ft.	Capacity hot water radiation, sq. ft.
Furnastoker	50	¼	10	1,100	1,760*
No. 9	90	½	18	2,000	3,200
No. 13	130	¾	26	2,900	4,640
No. 20	200	1	40	4,400	7,040
No. 35	350	1½	70	7,700	12,320
No. 50	500	2	100	11,000	17,600
No. 80	800	3	160	17,600	28,160
No. 120	1200	5	240	26,400	42,240
No. 6 (Bituminous)	60	⅓	12	1,320	2,100
No. A-4 (Anthracite)	40	⅓	9	1,000	1,600
**No. A-3 (Anthracite)	30	¼	6¾	750	1,200
**No. B-3 (Bituminous)	30	¼	6¾	750	1,200

*Furnastoker provides 1700 sq. in. of warm air outlet.
Note: One square inch of warm air outlet pipes in a dwelling is usually taken as the equivalent of 1 square foot of hot water radiation.
**Based on 12,500 B.t.u. coal.

Automatic Controls

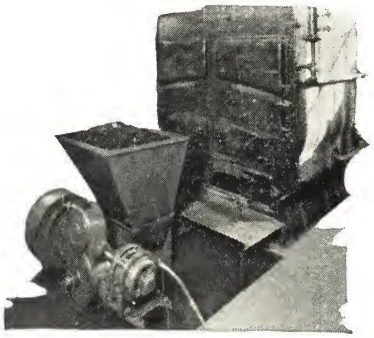
Quick as a wink, the Combustioneer obeys, always, for it is started and stopped, as the steam or temperature requirements demand, by automatic regulators. These controls can be set to handle any load condition, at any time, in the day or night, and operate equally well for warm air, hot water and high or low pressure steam.

The thermoswitch starts and stops the machine automatically, keeping the fire always at the exact point needed to hold the temperature constant.

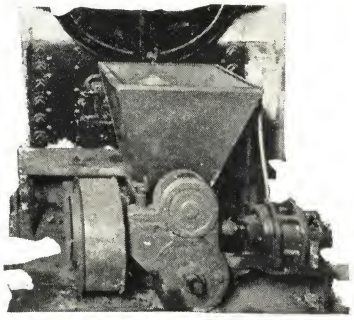
For high or low pressure steam, vapor, or hot water systems, there are controls which automatically make and break an electric current according to changes in pressure, vacuum or temperature. There is an air regulator which controls the amount of air taken in at the fan inlet, giving the correct amount of air needed to insure perfect combustion.

Unique Shearing Plate

There are many other exclusive features of the Combustioneer. The coal hopper and air duct are of heavy gauge, copper-bearing steel, strong, sturdy and long-lived. The shearing plate, a unique and exclusive Combustioneer feature, is provided for easy and quick removal of any foreign substance which may become an obstruction. The retort is built in sections with carefully calculated allowance for expansion and contraction.



Typical Installation of Combustioneer in a Cast Iron Sectional Boiler



Combustioneer Installed in a Firebox Type Heating Boiler

Quiet Operation

All moving parts of Combustioneer are enclosed in heavy housing for protection as well as quiet operation. The ball bearings and accurate alignment of parts insure smooth, quiet performance.

All parts are accurately made, some to 5/10,000 of an inch. In the fabrication of Combustioneers, there are more than 300 mechanical inspection operations. No effort is too great, no materials are too good, no inspection too rigid, no expense too large to make every Combustioneer which leaves the factory as near perfection as it can be made.

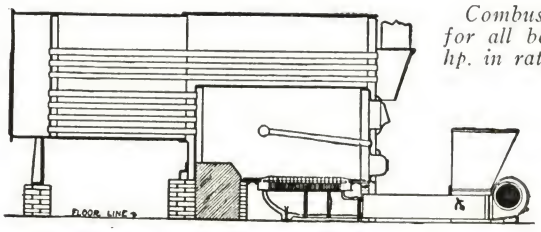
Approval

Combustioneer Anthracite Coal Burners are approved by the Anthracite Institute Laboratory.

Free Engineering Service

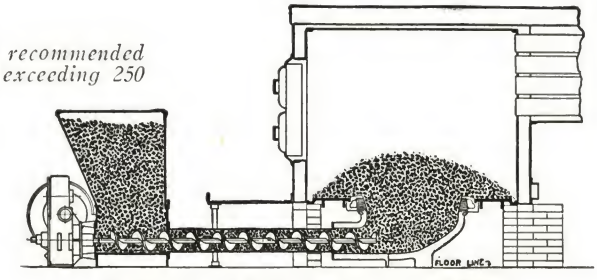
Our combustion and heating engineers will study your problems and make recommendations for consideration—without any cost or obligation to you.

Descriptive folders giving data about special installations in particular types of boilers may be secured by addressing COMBUSTIONEER, INC., Goshen, Indiana.



Combustioneer Applied to Down-draft Boiler

Combustioneer is recommended for all boilers not exceeding 250 hp. in rating.



Combustioneer Applied to Direct-draft Boiler

IRON FIREMAN MANUFACTURING CO.

Automatic Coal Burners

PORTLAND, ORE.

FACTORIES: PORTLAND, ORE.; CLEVELAND, OHIO; TORONTO, CANADA

RETAIL BRANCHES OR SUBSIDIARIES

CHICAGO, ILL. MILWAUKEE, WIS. ST. LOUIS, MO. NEW YORK, N. Y.

Dealers in Principal Cities and Towns in the United States and Canada

Product

IRON FIREMAN AUTOMATIC COAL BURNERS for industrial power and heating plants, and for homes.

"Forced Underfiring" Principle

Iron Fireman "Forced Underfiring" is based on the scientific principle of feeding fuel to the fire from below, under forced draft. From the conveyor screw, coal enters the firebox under the fire and is gradually forced upward into the flame. As the coal approaches the fire, it is gradually heated to the proper temperature for complete combustion. The volatile gases are distilled off in the presence of an excess of oxygen and as they pass upward through the incandescent fire bed they are completely consumed. The ash is fused into clinkers which are easily removed.

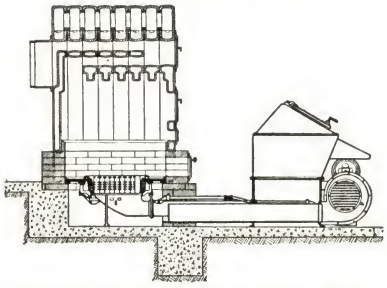
Advantages

Iron Fireman saves money and increases heating plant efficiency in four major ways: (1) Cuts fuel costs; (2) reduces labor costs; (3) provides steady, even heat or power; (4) eliminates the smoke nuisance.

Installation and Sizes

Iron Fireman is made in a range of sizes for commercial heating and power plants up to 250 h.p. boilers, and also for homes. It can be installed quickly in practically any solid fuel boiler or furnace, old or new. If necessary, the installation can be made with practically no interruption of the service from the boiler.

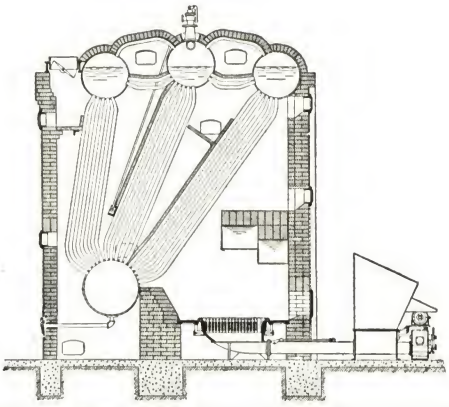
Machines are shipped complete from the factory. All parts are standard and interchangeable.



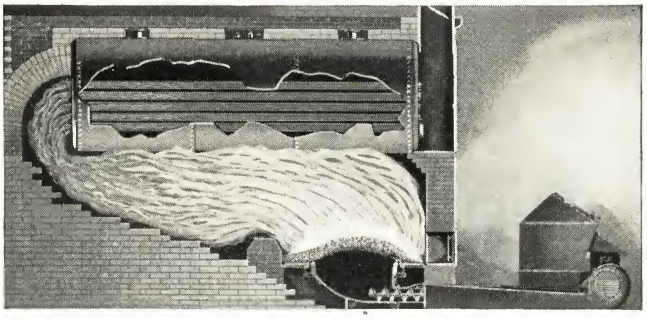
Typical Iron Fireman Installation Under Cast Iron Boiler

Features of Design and Construction

Construction and operation of the Iron Fireman are characterized by simplicity throughout. Outstanding features of design and construction are: (1) Pressed steel construction. (2) Gear shift for transmission—three speeds and neutral. (3) Continuous feed transmission. Gears run in bath of oil. (4) Electric motor—standard make. (5) V-belt drive. (6) Safety shear pin protects mechanism from damage. (7) Quiet ball bearing fan supplying forced draft to fire. (8) Automatic fire banking damper—conserves fuel and holds fire in proper condition when stoker is idle. (9) Positive pneumatic fume eliminator—an auxiliary air supply that insures positive movement of all gases through the fire. (10) Sectional retort especially designed to allow for heat expansion. (11) Dead plates of heavy iron and ribbed. (12) Sectional, self-cleaning tuyere blocks. (13) Conveyor screw cast from one-piece pattern. (14) Automatic electric controls, designed for and used exclusively on Iron Fireman.

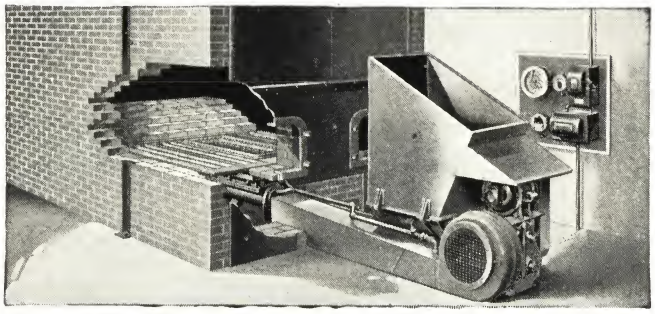


Typical Iron Fireman Installation Under Four-drum Water Tube Boiler



Iron Fireman in Operation

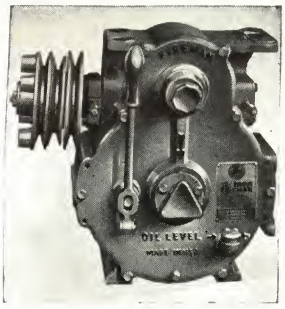
Installed under horizontal return tubular boiler. Low bridge wall. Hot "blast furnace" fire



Cutaway View, Showing Details of Typical Iron Fireman Installation

Transmission and Continuous Feed Principle

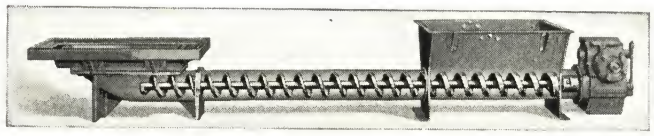
The Iron Fireman speed reduction unit and its patented speed-change gears are an exclusive Iron Fireman development. This transmission drives the conveyor screw at a constant speed which in turn feeds the coal to the fire in a slow, steady stream at the required rate for proper burning. As a result a steady, non-agitated fire is obtained. The Iron Fireman transmission has three speeds and three neutrals. The gears can be shifted while the stoker is in operation; in fact more easily than when the stoker is idle, and it is impossible to strip gears while shifting. All the gears operate in a bath of lubricating oil and the unit is most quiet. In design, materials and precision of construction, the Iron Fireman transmission is like that of a fine automobile.



Iron Fireman Transmission

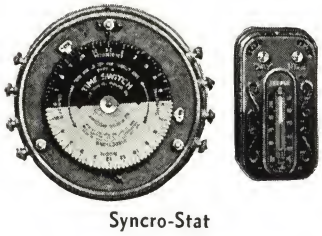
Iron Fireman Conveyor Screw

Made of special heat-resisting alloy steel by an exclusive Iron Fireman process. As true in size and shape as a fine carpenter's bit. Strength far in excess of any working requirements. Worm flights and core scientifically designed to feed coal evenly and with a minimum of expenditure of power.



Automatic Controls

Iron Fireman starts and stops at the command of sensitive, accurate automatic controls. Directing controls govern stoker operation according to demands of time, temperature, or pressure. An example of the superiority of Iron Fireman directing controls is the *"Syncro-Stat"* which provides automatic control of day and night temperature. It is powered by a Telechron motor, thus eliminating winding or setting, and making it an accurate all-electric temperature regulator. Other directing controls include pressure regulators, hot water and furnace regulators and the *"Timetactor"* a device which runs the Iron Fireman during pre-determined intervals in order to keep the fire alive during mild weather.



Syncro-Stat

The most important unit of the operating control system is the motor-driven relay switch. This device starts and stops the stoker motor at the command of the Syncro-Stat or other directing controls. In the case of the larger stokers a magnetic operating switch works in conjunction with the relay switch.

Constructed for Heavy Duty

The Iron Fireman is of durable construction—made for long, continuous, heavy duty service.

Today the Iron Fireman is being used for heat or power in practically every type of building or industry. Typical examples are factories of every description, office buildings, residences, churches, country clubs, schools, laundries, hotels, apartments, dairies and greenhouses.

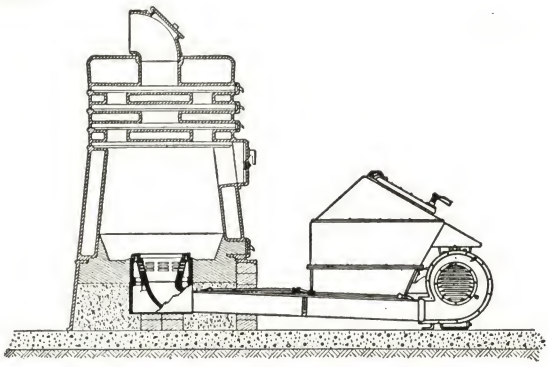
Important Factor in Plant Economy

The Iron Fireman brings fuel economy by burning lower priced, slack coal and less of it. Labor is reduced to a minimum—the only duty of the fireman is to fill the hopper occasionally and remove clinkers.

Iron Fireman users report savings of from 15% to 50% on fuel costs alone. In a recent investigation of 342 users, fuel savings alone averaged an earning of 39.44% a year on the total cost of their installations.

Iron Fireman for Homes

The Iron Fireman "De Luxe" model for homes can be installed quickly in practically any kind of a home furnace.



Iron Fireman Installed in a Domestic Boiler

Employs "Forced Underfiring" principle the same as larger machines, with simplified operation. The enclosed hopper accommodates sufficient small size coal for an ordinary day's consumption.

The Iron Fireman "De Luxe" burner can be recommended for any steam, hot water, vacuum or warm air furnace. Models for both bituminous and anthracite coal.

Engineering Service

The Iron Fireman organization is nation-wide. Trained men—backed by one of the largest manufacturing organizations in the field—are at your service to help you with the experience and practical heating information gained through servicing thousands of boiler rooms and heating plants in all parts of the country.

Any Iron Fireman Engineer will gladly call and submit any additional information requested.

Catalogue and Information

Catalogue No. 31 gives full information about the Iron Fireman. Descriptive folders give special data about installation in particular types of industries and in homes.

Secure them by addressing the factory or any Iron Fireman representative.

JOSEPH HARRINGTON, Engineer

JOSEPH HARRINGTON COMPANY

SUBSIDIARY OF WHITING CORPORATION

Engineers and Manufacturers of Whiting Automatic Stokers

15631 Lathrop Avenue, HARVEY, ILL.

(Chicago Suburb)

SALES OFFICES IN PRINCIPAL CITIES

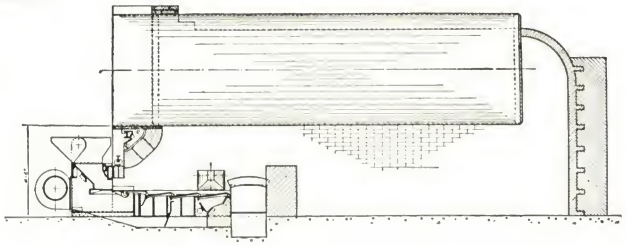
Product

WHITING AUTOMATIC MECHANICAL STOKERS for industrial power and heating plants—25 to 250 hp.

Principle

"Progressive Combustion." The Whiting is a horizontal compression feed type, designed by Joseph Harrington (eminent combustion engineer) for use under small boilers. The product of thirty years' combustion and stoker experience.

By means of movable grates, the coal moves along at an even rate (varied to suit conditions) from the hopper to the combustion zone, the ash being discharged automatically. No violent disturbance of the fuel bed—just a uniform progression, without clinkers or caking. Complete combustion, no waste.

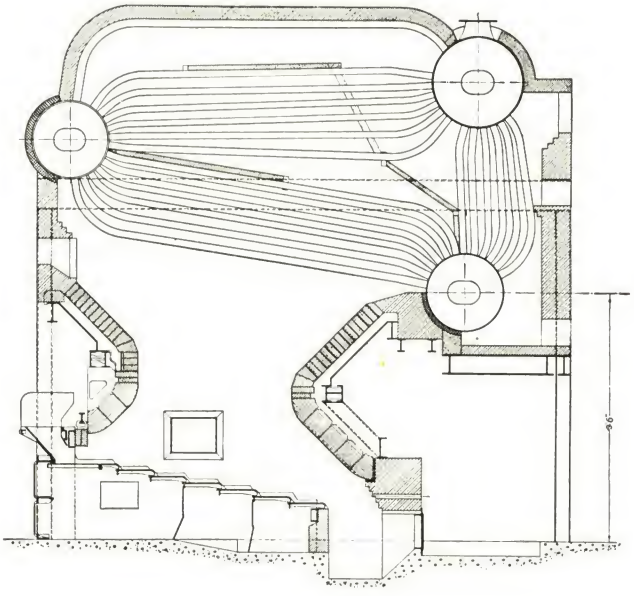


Scope

This stoker will burn all grades of bituminous or lignite coal with equal satisfaction, also anthracite or coke breeze, thus giving the user the advantage of buying coal at lowest price per B.t.u. Will burn without smoke up to 50 lbs. coal per sq. ft. of grate surface per hour.

Extensive tests recently completed at Purdue University on 4th and 5th Vein Indiana coals prove conclusively the suitability of Whiting stokers for burning high-ash coals, with relatively low power consumption, and capacity limited only by the coal-feeding ability. (Special bulletin on request.)

An ideal firing unit for industrial plants, schools, hospitals, apartments, etc.



Rugged Construction

Construction throughout extra rugged; designed to give long wear. Framework, doors, etc. made of good grade of gray iron castings of heavy section.

Two models—Type "A" (regular) and Type "C" (low-set), to suit any type of boiler.

Outstanding Features

Continuous and automatic ash discharge.

Even and controlled fuel bed—producing continuously highest quality of gas and ash.

Progressive combustion—assures a clean bright fire.

Guarantee 12% CO_2. Absolutely smokeless.

No clinkers.

Big saving in fuel because of complete combustion—no waste.

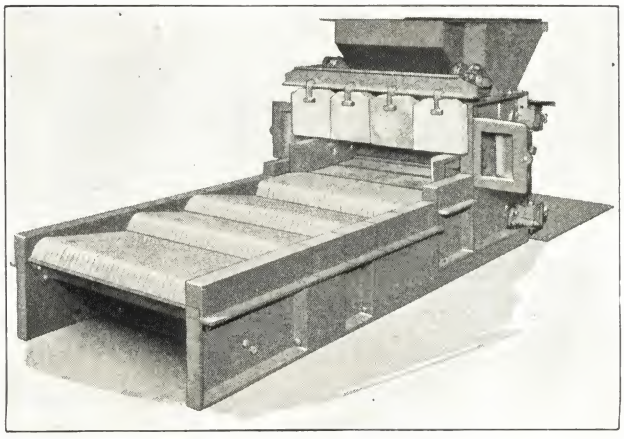
High efficiencies on low-priced fuels.

Easily installed under existing boilers, greatly increasing the efficiency of old boiler installations.

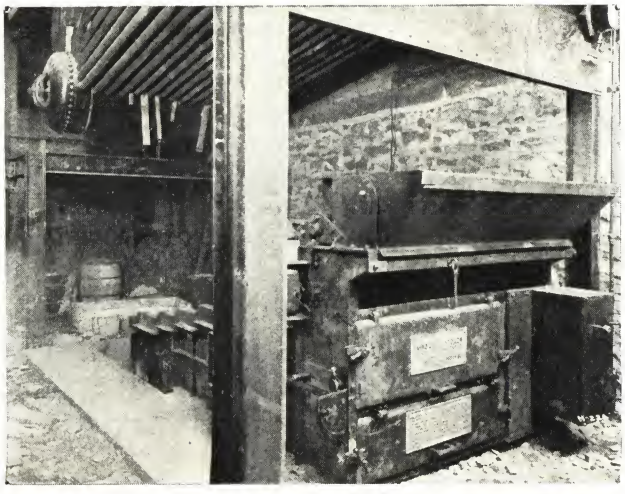
Low power consumption.

Bulletins

Write for bulletins to Whiting Corporation, JOSEPH HARRINGTON COMPANY, Subsidiary, 15631 Lathrop Avenue, Harvey, Ill. (Chicago Suburb).



Whiting Model-C (Low-set) Stoker



Whiting Model "A" Stoker Being Installed under Water Tube Boiler

THE ANTHONY COMPANY

Liquid Fuel Engineers

47-33 Fifth Street, LONG ISLAND CITY, N. Y.

Products

ANTHONY NEBULYTE OIL BURNING and GAS BURNING SYSTEMS for steam boilers, hot water heaters, hot air furnaces, cooking ranges, etc.

ANTHONY NEBULYTE SYSTEM for Heavy Gravity Oil.

ANTHONY SINGLE and DUPLEX STRAINERS.

ANTHONY STEAM and ELECTRIC FUEL OIL HEATERS.

TANK SUCTION UNITS.

Engineering Service

Anthony engineers are prepared to discuss all heating problems and design special oil, tar or gas fired apparatus for specific needs.

Having designed a great variety of successful industrial heat treating systems, they have wide experience in this field to place at a client's disposal.

THE ANTHONY COMPANY since its organization has dealt with every application as an individual combustion problem, appreciating, as few others have, its many sensitive and variable conditions and accurately meeting these by correctly utilizing essential principles.

They are pioneers in the development of mechanical nebulization as applied to the combustion of liquid fuel, as well as in the application of those combustion principles which effect the accurate control of heat quality.

Employment of their services leads to conservation of fuel, speeding up of heat cycles and better quality of results as 5000 clients will testify.

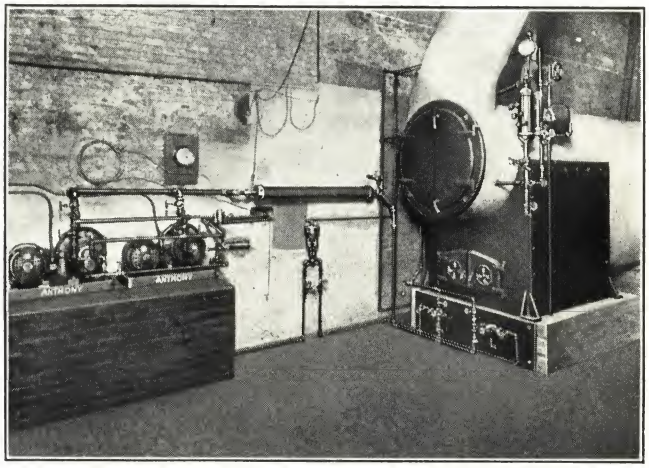
More than 24 years of record-smashing success.

Anthony Nebulyte System for Boilers

The Anthony is a mechanical nebulizing system for liquid fuel, which actually attains the perfection of radiant gas firing and normally produces 80% to 86% evaporating efficiency.

In this highly developed system of gas firing with oil fuel, an instantaneous conversion of liquid to gas is effected by correct combination of essential elements.

Performance—Every item of Anthony equipment has been selected and developed to meet exacting requirements, and is fully guaranteed to be free from defects in materials and workmanship. In spite of the severest operating conditions, the annual maintenance costs have averaged no more than 2% over a period of 10 years. A completely installed Anthony Nebulyte system is 100% assurance of successful operation.



Typical Installation of an Anthony Mechanical System
(Units in duplicate)

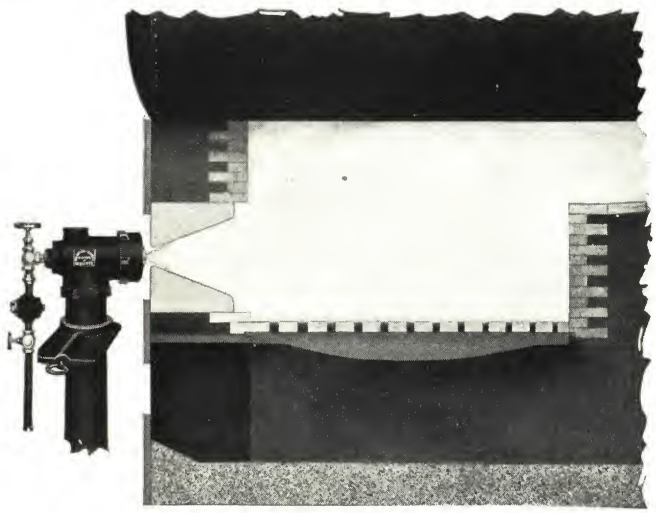
Equipment—This includes storage tanks and fittings, suction and discharge strainers, heaters, pumps, blowers, burner sets, valves, piping, gauges and thermometers, together with firing chambers and attachments.

Anthony oil heaters, for use with heavy gravity oils, are supplied to give the required temperature to the particular grade of oil specified. Complete with safety relief valve, thermometer and, where desired, with automatic temperature control. Either steam or electric.

Anthony strainers are made in both single and duplex patterns. In the duplex strainers, either side can be cut out of service by a single lever movement. They need never be taken apart for cleaning. They are easily applied to any pipe line. The cleaning operation is made so simple that there is no excuse for strainers ever becoming foul.

Control—Usually by hand, but automatic controls of proven reliability can be furnished, where specified, to maintain definite boiler pressure, water temperature, or both.

Application—The Anthony Nebulyte system is adapted for burning oil or gas under heating and power boilers in apartment houses, hotels, clubs, public buildings, etc. The combination oil and gas system offers special advantages in many instances.



Gas Firing with Oil Fuel

Anthony Nebulyte System for Heavy Gravity Oil

Heavy gravity asphaltum base oils cause many troubles and often condemn an oil burning system that is not installed to provide for all the necessary conditions. Yet the use of such oils at their lower prices is often necessary in order to show satisfactory operation figures in comparison with coal. The Anthony system can be installed to handle such oils equally as well as those of lighter gravity.

Changing Present Systems for Heavier Oils—The overcoming of existing troubles and improvement in the present operating conditions of other systems already installed, comprise a major portion of the work of THE ANTHONY COMPANY. Send us full details.

AUTOMATIC BURNER CORPORATION

Manufacturers of the ABC Rotary Type Oil Burners
1823 Carroll Avenue
CHICAGO, ILL.

BRANCHES
CHICAGO, ILL. DETROIT, MICH. NEW ROCHELLE, N. Y.
WASHINGTON, D. C. PHILADELPHIA, PA. BALTIMORE, MD.

FOREIGN REPRESENTATIVES:
ANTWERP, BELGIUM; LONDON, ENG.; AMSTERDAM, HOLLAND; GOTHENBURG, SWEDEN
DEALERS IN PRINCIPAL CITIES

ABC OIL BURNERS

General

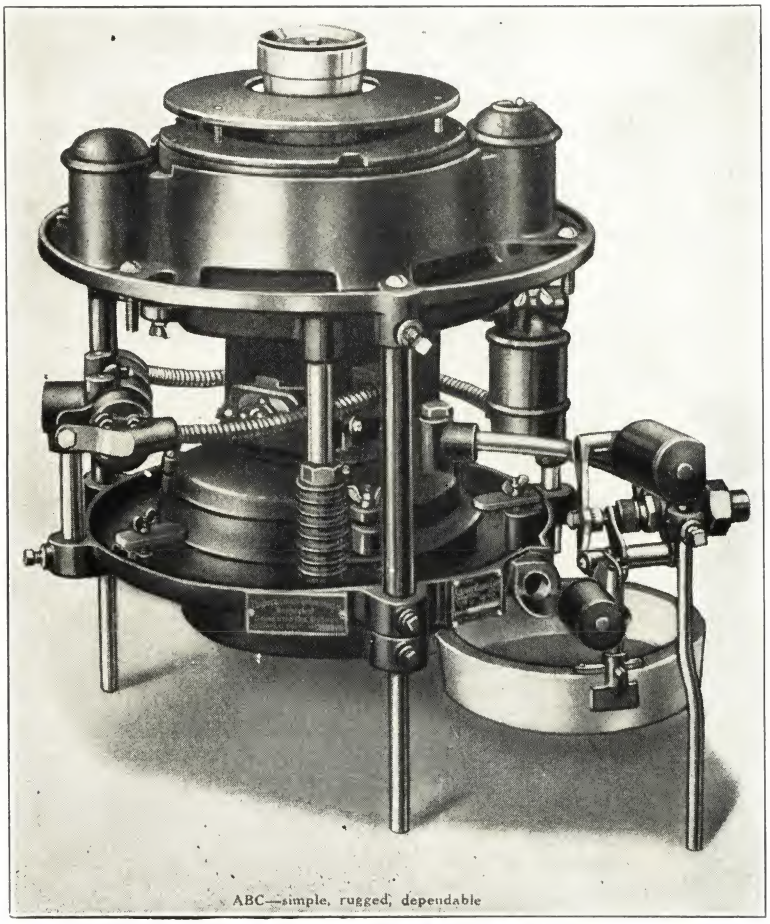
ABC Oil Burners range in capacity from 1 to 20 gallons per hour, affording a range of sizes that will successfully handle 99% of the heating jobs. ABC Burners can be installed in any type of boiler, with assurance of maintaining an even healthful temperature regardless of weather conditions. By eliminating dirt and ashes, ABC makes the basement as clean and useful as any other part of the building. It is unnecessary to plan storage space for bulky fuel. The dependability and economy of the ABC Burner is attested by thousands of letters received from users of ABC units.

ABC Oil Burners
REG. U. S. PAT. OFF.

ABC Burners are all of the vertical motor centrifugal type. The atomizers, being directly driven from vertical motors, require a minimum of power consumption.

In so far as possible, ABC Burners are built up of interchangeable units. Wherever possible, the same parts are utilized in all burners, so as to simplify manufacture and field service problems.

Efficiency tests have been conducted in many makes of standard and special boilers and heaters which prove, conclusively, that the ABC Burner will develop the highest possible efficiency from any heating plant.



Type E, ABC Oil Burner (Assembled)

Atomization and Combustion

The combustion principles embodied in the ABC design are based on the following fundamental laws:

(a) Oil must be mechanically atomized and mixed with the correct amount of primary air before combustion.

(b) For perfect combustion the primary mixture must be supplied with the proper amount of preheated secondary air and burned in the presence of, but not in contact with, a refractory hearth. (This prevents loss of heat from the flame before combustion is completed.)

(c) For efficient operation the heat from the flame must be applied to the lowest possible part of the fire-box.

HEATING CAPACITY OF ABC BURNERS

Type of burner	Total radiation load, sq. ft. (Standing radiation plus piping)		Equivalent B.t.u. per hour
	Steam	Hot water	
H	600	960	144,000
E 3	1200	1920	288,000
E 4	3000	4800	720,000
E 5	6000	9600	1,440,000

Selection of Burner and Boiler

Mechanical Design

Simplicity is the keynote to good mechanical design. The burner unit should be compact, accessible and preferably located entirely within the ashpit of the heater. All parts should be of unit construction, easily removed and replaced. The air and oil adjustments should be simple and positive. Materials and workmanship should be of the highest quality.

Type of Flame

The type, shape, size, temperature and color of flame produced by the burner is of vital importance as it governs the application of heat to the boiler or furnace. The following features are essential:

(1) The fire should be well distributed over the grate area, and as near the grate level as possible.

(2) The flame should not come into contact with the relatively cold walls of the firebox.

(3) The flame should "float," that is burn the atomized oil in suspension.

(4) Combustion should be in the presence of, but not in contact with, a refractory hearth.

(5) The temperature of the flame must be high enough to insure combustion of "free carbon."

(6) The flame must be of a "radiant" color in order to utilize the direct heating surface. A bright orange color is most effective. Blue or dark flames are least efficient in this respect.

Boiler Size

When selecting a boiler, it should be remembered that the burner is operated either "on" or "off"—therefore, the boiler size can best be determined by consulting the efficiency curve of the boiler to be used. As the oil burner flame must be adjusted to deliver the maximum demand for heat, this demand should correspond with an efficient operating point on the efficiency curve of the boiler.

Dimensions

After the correct boiler rating has been established, the dimensions of the boiler should be selected so that the width of the firebox will be no greater than necessary, the capacity of the boiler being built up by using a comparatively large number of sections.

Chimneys

It is advisable to install all chimneys strictly in accordance with best standard practice. New chimneys should be straight, tile lined, and of proper size and height. Old chimneys should be inspected to see that they are tight, clean and free of obstructions. The top of the chimney should be well above the peak of the roof and also above adjacent buildings to protect it from down-drafts. Round chimneys are most efficient, with square sections next in effectiveness. Chimneys of long narrow cross-section should not be installed.

A separate flue should be provided for the heating plant. No grates, stoves, incinerators, or other heaters should be connected to this flue. Each flue should have its own individual clean-out door near the floor level.

Draft Regulation

A constant chimney draft is desirable with any type of burner. Several draft regulators are on the market, the most satisfactory consisting of a balanced door which admits cold air into the smoke pipe as the chimney suction increases beyond the desired amount. These regulators are generally known as "Draft Regulators" although they are manufactured under various trade names.

Ignition

Gas is generally accepted as the most satisfactory type of ignition for ABC Burners. The ignition should be provided with a small permanent pilot and a large auxiliary jet, which is turned on during the ignition period only. These features should be incorporated in a single unit mounted as an integral part of the burner.

ABC Burners are supplied with electric ignition where a satisfactory gas supply is not available.

Oil Specifications

Standard specifications for fuel oil have been adopted by the National Board of Fire Underwriters, the American Oil Burner Association and the United States Bureau of Standards. The oils most commonly used for domestic automatic burners are designated as Nos. 1, 2, and 3. No. 2 oil is generally recommended in smaller installations carrying less than 600 ft. of steam radiation, and No. 3 oil for installations exceeding this figure.

Domestic Hot Water Supply

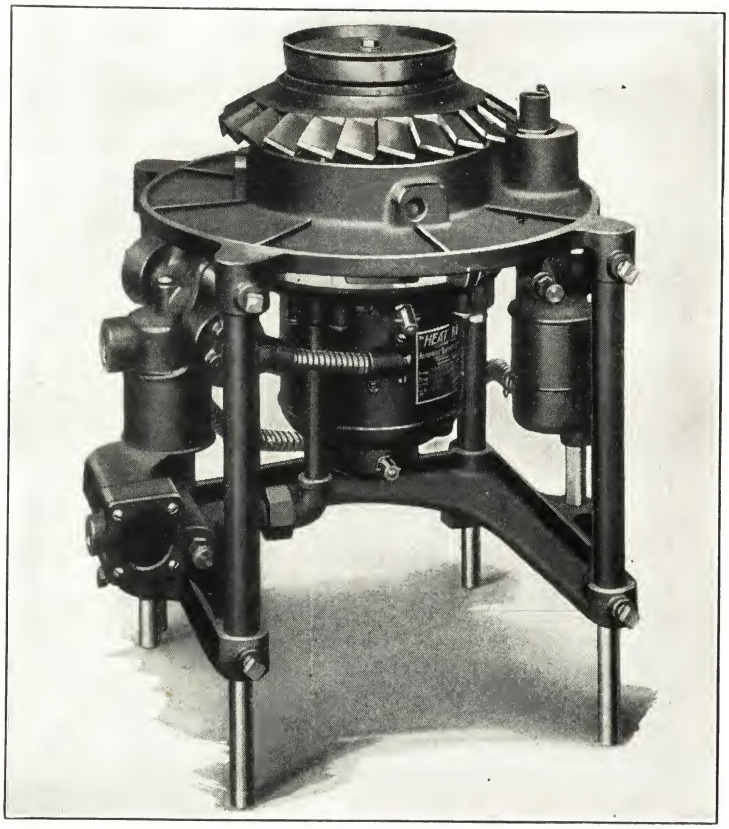
The domestic hot water supply can be heated from any Automatic Oil Burner installation through the use of an Excelso or Taco type of transfer heater of suitable size. In a steam heating system, a hot water boiler control, inserted in the heater below the water line, is connected in parallel with the room thermostat. The hot water control is set to maintain a water temperature of from 140° to 180°, which is sufficient for heating the domestic hot water, but of course does not furnish heat to the radiators, as no steam is produced. The room thermostat controls the burner in the usual manner when there is a demand for heat, steam being produced very quickly, due to the fact that the water is always maintained at a temperature close to the boiling point. It is necessary to have the boiler, storage tank and piping well insulated to prevent unnecessary radiation losses. This system can be adapted for use with hot water boilers by installing motor operated valves in the risers, these valves being operated from the room thermostat.

Separate Tank Heaters

Where the demand for hot water is exceptionally heavy, a separate boiler is often advisable. The water heating boiler should be of efficient design with a grate diameter not less than 16 in. Allow 2 sq. ft. steam rating for each gallon of hot water storage in selecting boiler. The installation of another burner for this purpose will cost very little, as no additional thermostat, pump or tankage is required.

Individual Thermostatic Control

It is often desirable to have separate temperature control in individual apartments or in the separate wings of a large residence where the exposures are quite varied. In such cases, it is perfectly practicable to have individual thermostatically controlled valves to supply heat to various sections of the building. Each valve is fitted with a switch which starts the burner when the valve is opened. The initial investment in controls will be offset by the saving in fuel and the better temperature control secured.



Type H, ABC Oil Burner (Assembled)

Mechanical Specifications of Type E Burner

General Description

A sectional view of the Type E Burner as it is installed in a boiler is shown below. The oil flows through the automatic trip valve, thence through the float operated check valve, which maintains a constant level in the oil container. The motor driving the atomizer is provided with a tapered hollow shaft with an adjusting needle at the lower end. When the motor is started the oil is drawn up through the hollow armature shaft into the atomizer where it is mixed with air and thrown out horizontally as a combustible mixture of finely atomized oil and air. The mixture is ignited by either gas or electric pilot.

Oil Feed

The method of feeding the oil is exclusive with ABC. It is simple, safe and positive. No oil can reach the fire-box unless the atomizer is running, making it unnecessary to use complicated valves and timing devices.

Oil Adjustment

The orifice at the lower end of the shaft, revolving about the stationary needle, provides a self-cleaning feature which effectually eliminates stoppages and changes in flow so common where fixed orifices and ordinary needle valves are used.

Frame

The burner frame consists of a neck ring (which also supports the refractory hearth) and a base plate joined by three pipe legs with adjustable extensions. The baffle plates around the atomizer not only protect the motor from radiated heat, but assist in properly preheating and distributing the natural draft secondary air required for combustion.

Trip Valve

The trip valve consists of a weight-operated valve held open by the latch on the trip bucket handle. The small weight on the bucket handle counterbalances the weight of the bucket, holding the valve securely latched in the open position until oil overflows into the bucket and releases the latch, thereby permitting the weighted valve to close. This valve shuts off the supply of oil to the burner until the bucket is emptied and the valve reset.

Oil Container

The oil container consists of a cast-iron shell with a removable cover to which is attached the float and valve mechanism for maintaining the oil level constant. Three springs on the cover serve as supports for the burner motor and prevent transmission of vibration.

Motor

The Type E motor is of the universal type, running on either 110-120 volt D. C. or 110-120 volt, single-phase, A. C. of any standard frequency. As the motor uses only 60 to 100 watts, it can be connected with any one phase of a 2- or 3-phase circuit.

The armature is dynamically balanced and runs on ball-bearings. The bearings are completely enclosed to protect them from dirt and grit, and automatically lubricated.

Lubrication

A chamber in the head of the motor is packed with lamb's wool, saturated with a special lubricating compound called ABC Motor Lubricant. A similar, though smaller chamber, is provided for the lower bearing. The lubricant from these chambers is fed to the shaft above each bearing through felt wicks, and after passing through the bearing is drained back into the lamb's wool, thereby providing *continuous and thorough lubrication*. Resaturation of the lamb's wool in the upper chamber each season is sufficient. The surplus lubricant from above will drain into the lower reservoir.

Adapting the Burner to Special Current Specifications

Where the A. C. voltage exceeds 120, a 1000-watt step-down transformer of suitable voltage must be used to step it down to 110 volts. If the D. C. voltage exceeds 120, a rotary convertor of suitable specifications should be used to convert the D. C. to 110 volt, 60 cycle, A. C.

All electric ignition equipment requires A. C. Where D. C. only is available, a rotary convertor must be used to supply A. C. for the burner.

Ignition Systems

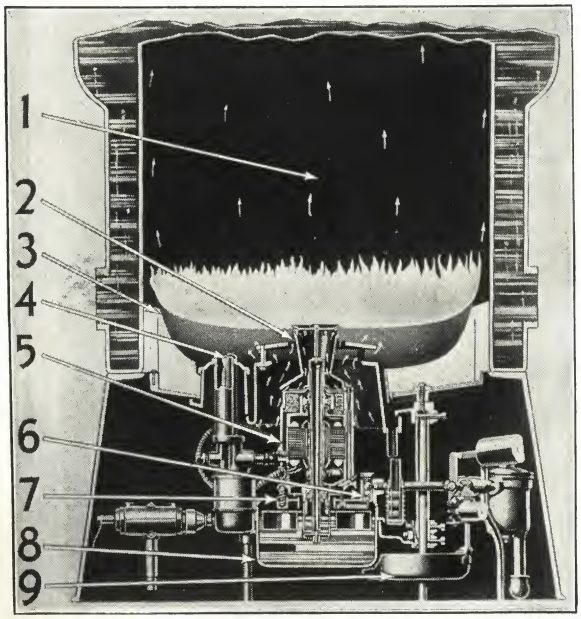
Two systems of ignition are furnished as standard equipment—magnetic gas ignition and straight electric spark ignition.

Control Systems

Accordng to local conditions and the preference of the dealer, we will supply ABC Burners with either Minneapolis-Honeywell or General Electric control systems. These controls incorporate the latest safety features and are dependable in operation.

Marine Type Burners

ABC Type E Burners, with special accessory equipment, are being successfully used for heating some of the finest yachts afloat. Complete mechanical details with quotation will be furnished on request.



Type E Installed Showing Outstanding Features

1. THE HEAT IS APPLIED EVENLY ALL AROUND THE BOILER—This is important for two reasons: (a) Longer boiler life—a flame that is not concentrated increases a boiler's life. (b) Quicker, more economical heat. Starting at the lower section of the boiler, or water legs, the heat rises evenly under natural drafts.
2. ATOMIZER—The whirling of the atomizer cup automatically breaks up the oil and mixes it with the proper amount of air. It is thrown horizontally into the boiler, quietly, as an instantly inflammable vapor.
3. OIL BURNED IN SUSPENSION—The circular flame heats from the grate, the only way your boiler was designed to receive heat. The heat is not blown through the boiler and out of the chimney by a fan; rising slowly the heat is efficiently absorbed by the boiler.
4. MAGNETIC GAS PILOT—Very economical. Also furnished with combination gas and electric ignitor and straight electric ignitor.
5. MOTOR—Made by the foremost manufacturers of high-speed electric motors. It never gets too warm to touch with a bare hand. Air currents cool it.
6. THREE-BALL CHECK VALVE—Prevents oil leakage.
7. SPRING SUSPENSION—The motor rests on three springs, assuring correct alignment, absence of vibration, and quiet operation.
8. OIL RESERVOIR—Holding 1 pt. of oil.
9. TRIP BUCKET—An additional safety feature. One cup of oil in the bucket will instantly stop the burner. An oil flood is unknown to ABC.

Mechanical Specifications of Type H Burner

General Description

The ABC Type H Burner produces a fire similar to the the Type E. The Type H Burner motor runs at a constant speed of 3400 r.p.m., whereas the Type E runs at 10,000 r.p.m. The decrease in speed is compensated for by using a propeller fan, which builds up an air pressure within the neck ring beneath the baffle plate and atomizer and increases the velocity of air through these parts.

Oil is supplied to the Type H Burner from a constant level device, or an automatic pump connected to the storage tank, thence through a magnetic oil valve direct to the atomizer. The magnetic oil valve is wired in parallel with the burner motor, so that it opens when the motor starts and closes when the motor stops. This provides a rich mixture for ignition as the oil reaches the atomizer before the motor comes to full speed, and as the oil is cut off before the motor stops revolving, the oil is cleared from the atomizer.

Frame

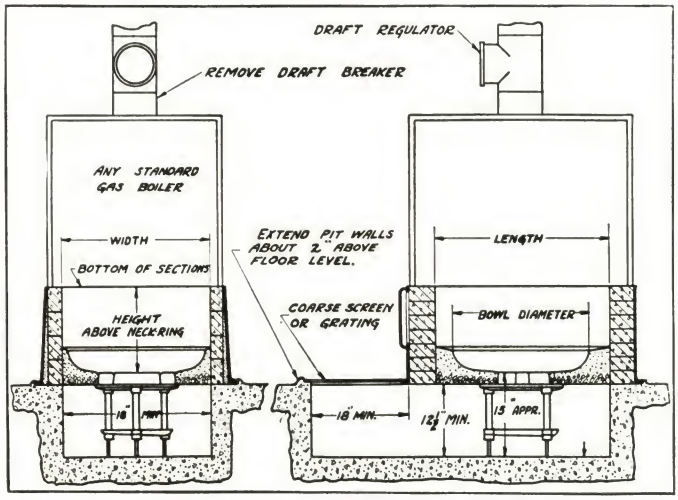
The burner frame consists of a "neckring" and "accessory support" casting joined by four pipe legs with solid extensions for height adjustment.

Motor

1/20 hp., 110 volt, d-c. or a-c. 60-cycle (no odd cycles available), 3400 r.p.m. alternating-current motors are split phase type and have no commutators and no brushes. Direct-current motors are shunt field type and have brushes and commutators. The power consumption is 70 watts at full load. The motor has a 4½-in. shaft extension on which is mounted the atomizer cup and propeller fan. Alemite fittings are provided for lubricating both the upper and lower bearings.

Air Adjustment

The air adjustment consists of a sheet steel shutter on a cast iron air deflector and motor support. The motor is suspended from this casting and mounted between steel springs, which prevent transmission of vibration.



Special Boiler Installation

ABC Oil Burners are adaptable for installations under practically all types of special boilers. The illustration shows an ABC Burner installed under a typical gas burning boiler. This diagram shows a pit below the floor level to provide proper combustion space under the boiler.

Magnetic Oil Valve

Special Type H design with "built-in" strainer and oil adjustment. 110 volt d-c. or a-c. 60-cycle. Current must be specified. The junction box is combined with this unit, which simplifies wiring connections.

Ignition

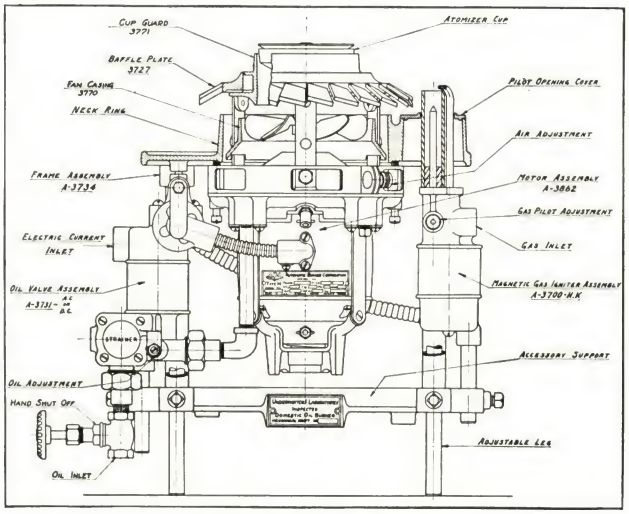
The Type H Burner is furnished with "magnetic gas" ignition as standard equipment.

Controls

Either standard Minneapolis-Honeywell or General Electric control systems are furnished as standard equipment.

Radiation Capacity

The Type H Burner is rated to carry a total radiation and piping load of 600 ft. steam or 960 ft. of hot water radiation.



Details of Type H Burner

ABC BURNER RATINGS AND FIREBOX DIMENSIONS

Diameter of combustion bowl, in in.	Maximum load steam radiation sq. ft. (*Add 60% for hot water*)		Minimum firebox dimension, width, length or diameter, in.
	Type E	Type H	
16	500	400	18
18	700	500	20
20	900	600	22
22	1100	(Not rated over 600 ft.)	24
24	1300		26
26	1500		28
28	1750		30
30	2000		32
32	2250		34
34	2500		36
36	3000		38
38	3500		42
40	4000		44
42	4500		46
44	5000		48
46	5500		50
48	6000		52

NOTES

Maximum ratings given above include total load of standing radiation and piping.

Combustion bowls should be formed with standard ABC Bowl Forming Tools.

Instructions for making installations in special boilers will be furnished on request.

RECOMMENDED LOADS FOR ABC BURNERS IN SQ. FT. OF STEAM RADIATION

Type of burner	Minimum load	Maximum load
H	300	600
E3	300	1200
E4	1000	3000
E5	2000	6000

Installation of ABC Oil Burners

Piping

We recommend pipe not smaller than ¾-in. standard pipe size for underground work, and ½-in. pipe for inside basement use. 1-in. pipe is generally used for return lines from pumps to tanks to insure free passage of oil in case pumps should overflow. For short runs between burner units and for short gas connections, ¼-in. pipe is satisfactory.

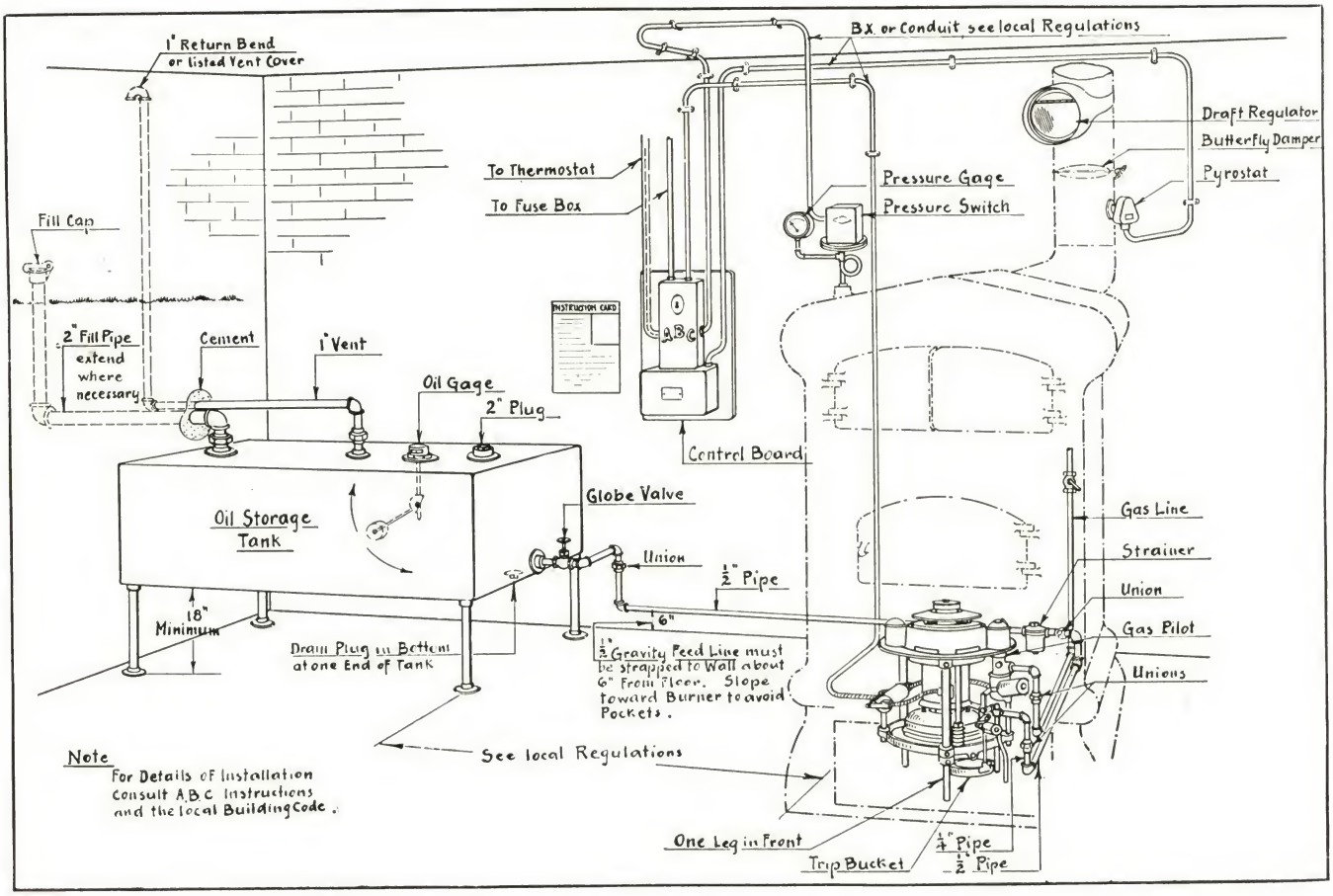
Oil Pumps

ABC Burners are so designed that they can be supplied either direct from a gravity tank or from an underground tank through the use of an automatic pump. Any well made pump listed by the Underwriters' Laboratories such as the Teesdale or Cook Type R may be used. These pumps are mounted on the basement wall above the level of the outside tank, which eliminates the use of an anti-sylphon valve and provides sufficient head for feeding the burner.

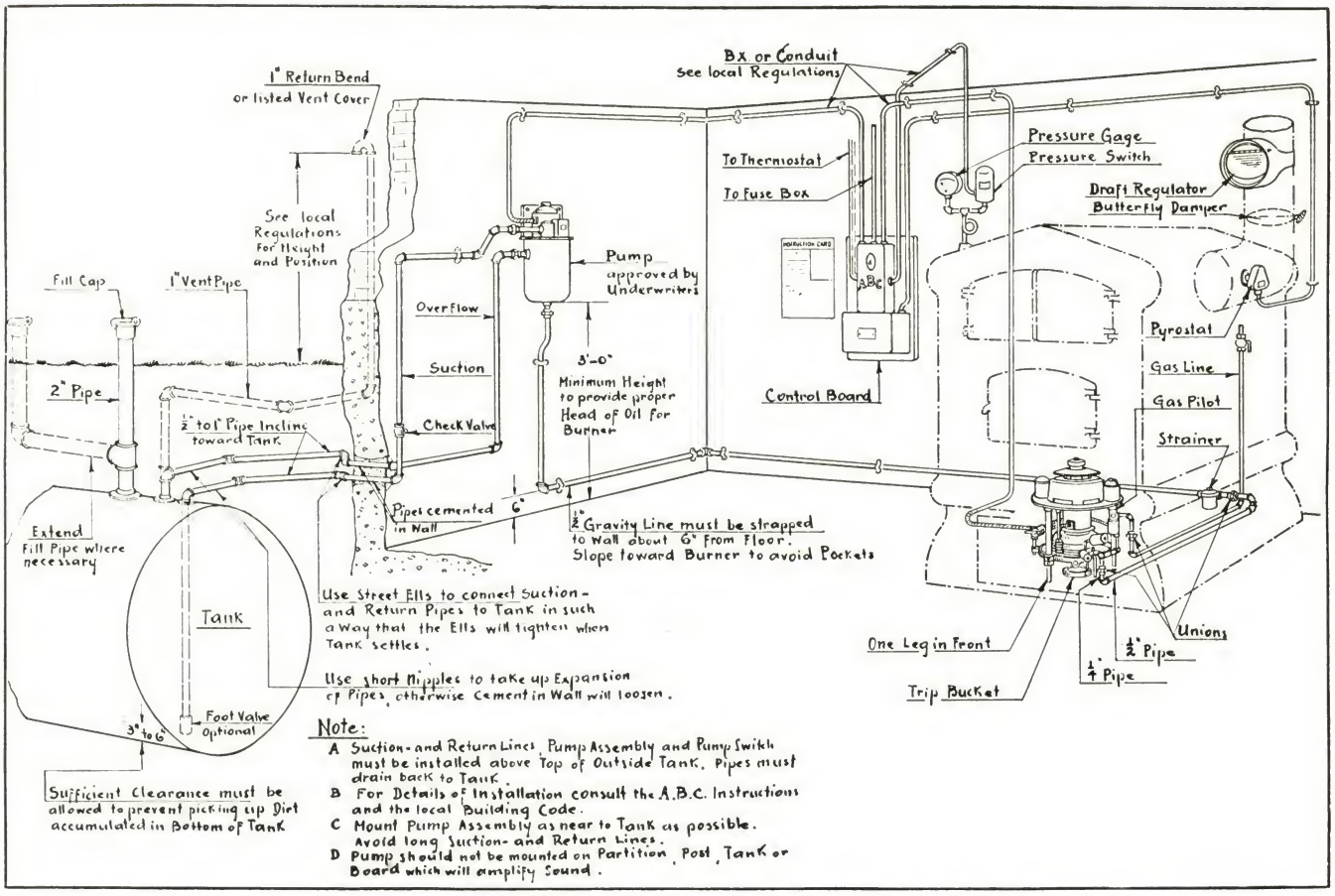
Oil Storage Systems

Basement Tanks—Oil storage tanks located in the basement are usually limited to a capacity of 275 gallons or less. Most cities permit the installation of two 275-gallon tanks. With such installations it is generally required that a three-way valve be placed between the tanks and the burners, so that *either* of the tanks, but not both, may be connected by direct gravity feed to the burner. The detail on this page illustrates a typical gravity feed installation with basement tank.

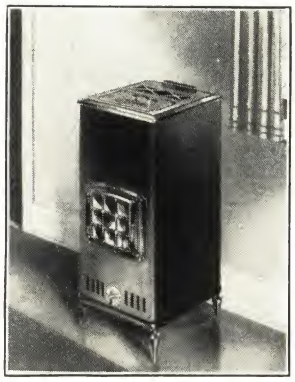
Underground Tanks—Tanks used underground should be of the best quality. They should bear the Underwriters' label and be well painted. For domestic use, tanks usually vary in capacity from 500 to 5000 gallons. They must be placed a minimum distance from any basement wall or property line as specified in local regulations. All connections must be made through the top of the tank. Top of tank must be at least two feet below surface. Gravity feed from an underground tank is not permissible either to the burners or to the under storage tank.



Typical Basement Tank Installation



Underground Storage Tank Installation



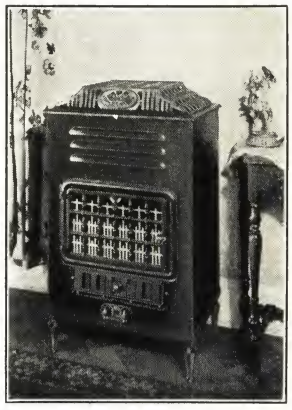
Model 1, ABC Oil Heater

ABC STOVE BURNERS

The AUTOMATIC BURNER CORPORATION also manufactures a full line of stove burners ranging in capacity from ½-pint to ½-gallon per hour. These burners are of the vaporizing type, and are simple to install and operate. They are suitable for installation in cook stoves, garage heaters, circulating heaters, hot water supply systems and similar uses where central heating plants are not available.

The AUTOMATIC BURNER CORPORATION also manufactures a complete line of stoves, circulating heaters and hot water systems.

Full information will be furnished on request.



Model 3, ABC Circulating Oil Heater

4-in. Burner

6½-in. Burner

Double 6½-in. Burner

9-in. Burner

ABC Stove Burner Units

CRYSTAL OIL BURNER CORPORATION

GENERAL OFFICE AND FACTORY

211 Coit Street, IRVINGTON, N. J.

DEALERS IN ALL PRINCIPAL CITIES

Product

CRYSTAL BLUE FLAME OIL BURNER for installation and automatic operation in any type heating plant of residence, school, church or small public building.

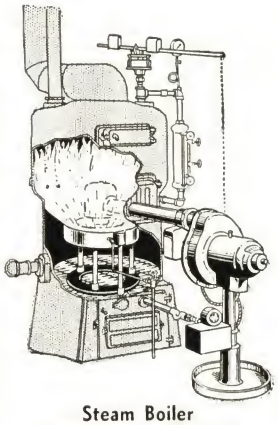
Crystal Blue Flame Oil Burner

The Crystal Blue Flame Oil Burner has been manufactured, and in successful operation for the past ten years.

It is fully automatic; thoroughly efficient; clean and perfect combustion; and is made in four sizes covering a range of from 350 to 5000 ft. of steam radiation.

Approvals

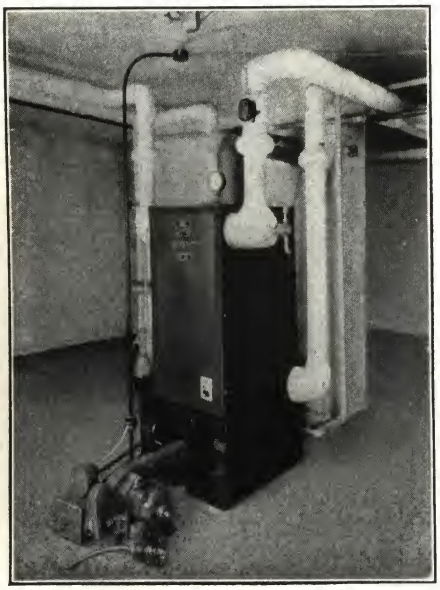
Listed and labeled by the Underwriters' Laboratories, Inc. Approved by the Board of Standards and Appeals of New York City, and fire prevention bureaus of principal cities. Member of Oil Heat Institute and The American Oil Burner Association.



Steam Boiler Installation of Crystal Oil Burner

Fuel Burning Feature

The outstanding feature of the Crystal Blue Flame Oil Burner is the method of burning the oil. The blue flame which is produced by the Crystal is accountable for Crystal efficiency. This blue flame is the result of converting the oil into a gas and then burning the gas. This is accomplished by carrying the air and oil through the carburetor with a fan and passing the mixture of air and oil through the cracking chamber to the burner. Passing through the chamber the mixture turns to a thin vapor. Upon reaching burner it has become a gas.



Left:
Crystal Blue Flame Oil Burner Installed in Gas-fired Boiler

Note that no changes have been made in boiler setting or piping system

Contact and Safety Switch

The flame of the Crystal Blue Flame Oil Burner gives immediate and direct heat contact with the entire surface to be heated.

The gas is ignited by a still gas pilot direct from city gas lines.

The pilot uses .6 cu. ft. gas per hour.

Safety switch controls the burner, automatically shutting off current and burner in case of overflow or failure of pilot.

Throttle Control

The Crystal automatic control gives positive control of the flame, thus assuring that the burner will carry the predetermined load without needless use of fuel.

Without any change in fuel adjustments a range of 50% in capacity can be attained by automatic control alone.

Construction

Rugged construction, simple in operation, no moving parts inside furnace. The only mechanical operating part in the entire burner is the motor and fan mounted on one shaft which is located outside the furnace.

Installation

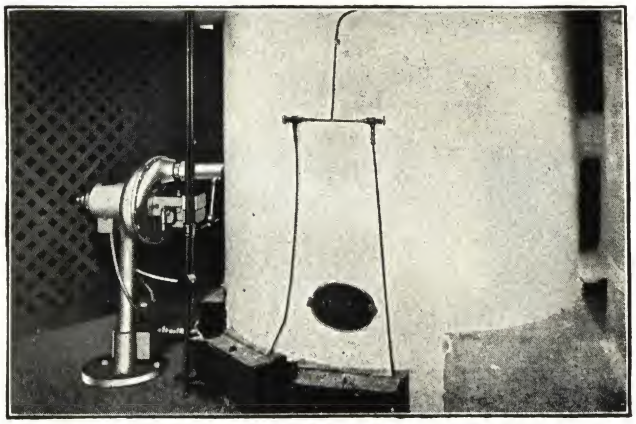
Quickly installed in any type heating plant without removal of grates, alteration or change of any part of furnace or flues.

This important feature includes gas-fired plant without any changes to boiler setting or piping system

CAPACITIES, HORSEPOWER AND OIL CONSUMPTION OF CRYSTAL BLUE FLAME OIL BURNERS

Model	Steam radiation capacity, ft.	Motor hp.	*Oil consumption per hour, gal.	
			Minimum	Maximum
A	350	1/6	3/4	1 1/2
B	600	1/6	1 1/2	2 1/2
B-1	1000	1/4	2	3 1/2
C	3000	1/4	3 1/2	7
D	5000	1/4	7	11

*Controlled by Crystal Automatic Throttle Control.



Crystal Blue Flame Oil Burner Installed in Warm Air Furnace

ENTERPRISE OIL BURNER COMPANY

2902 Nineteenth Street, SAN FRANCISCO, CAL.

DISTRIBUTERS IN PRINCIPAL CITIES

Products

ENTERPRISE FULL AUTOMATIC FUEL OIL BURNERS for Domestic Use, known as Type "A" as listed by Underwriters to burn 18°-20° Baumé oil.

ENTERPRISE ROTARY FUEL OIL BURNERS for all Industrial Purposes, such as heating boilers, furnaces, bake ovens, ranges, etc., known as Type "E" as listed by Underwriters.

Also Steam and Air Atomizing Oil Burners; Oil Burner Governors; Boiler Feed Water Regulators; Reducing Valves; Thermostats; Oil Pumps, electric or steam driven.

Experience

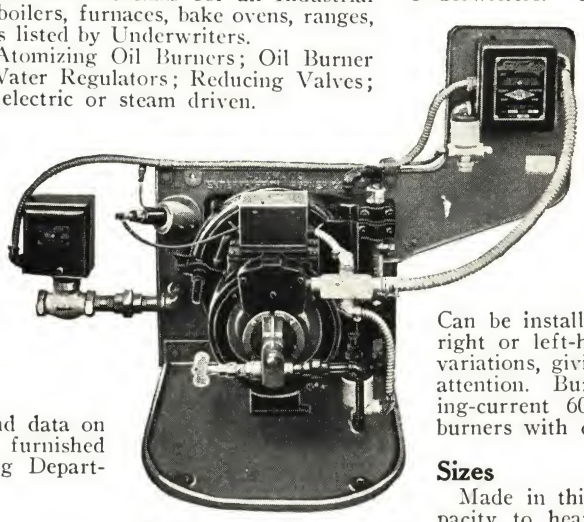
The ENTERPRISE Oil Burner is the product of engineers with 25 years of combustion experience, is durable in construction and its simplicity of design guarantees long, satisfactory operation with the minimum amount of attention.

Engineering

Engineering service and data on any oil burning problem is furnished by the factory Engineering Department upon request.

Insurance Approval

ENTERPRISE Oil Burners are approved by the National Board of Fire Underwriters, Chicago Laboratories, New York Board of Standards and Appeals, the Commonwealth of Massachusetts Department of Public Safety, and the Hydro Electric Power Commission of Ontario, Canada.



Combination Gas and Oil Burner

Fully automatic for either gas or oil.

Listed by Underwriters for: No. 5 oil when fully automatic, No. 6 oil when manually controlled

Use

ENTERPRISE Oil Burners are adaptable for most any problem where heat is required. They have proven their performance on ranges as well as on big power boilers, small home heating furnaces or big rotary kilns.

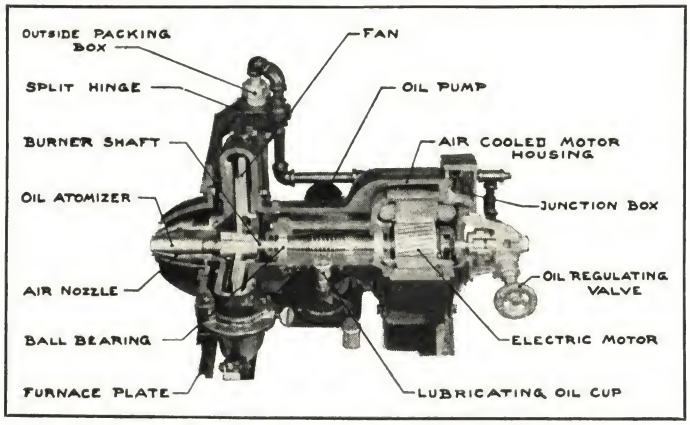
Types and Operation

Made in *two types*—pump and non-pump (gravity) for the industrial (Type "E"), as well as the automatic (Type "A") burners. Operated by an electric motor, mounted on same shaft with fan, one single, compact unit, producing necessary air for atomizing and burning oil. Hinged either on a furnace plate or on a refractory tile lined door, giving easy access to furnace at any time.

Fuel oil is supplied from an outside storage tank and brought in through the burner hinges, either fed by gravity or drawn in by a small oil pump driven by a worm and gear off the burner shaft. The oil enters at rear into the shaft and later into atomizing cup where it is thrown off in a fine mist by centrifugal force of 3500 r.p.m., and forced into the firebox by air blast from the burner fan, producing a very hot, soft, and smokeless flame.

Motor is entirely enclosed, dustproof and cooled by the suction air from the burner fan. Air and oil supply regulated manually or automatically from boiler controls, giving high efficiency and close regulation for any boiler load.

There is only *one place to lubricate and this has a large oil well to obviate frequent oiling.*



Sectional View of Enterprise Rotary Fuel Oil Burner

Type "A" Automatic Burner

Made in sizes AA to H. Ideal for heating small homes as well as large apartment houses, schools, offices, churches, etc. Built and installed according to standards and rules of the Fire Underwriters. Controlled by a thermostat for heat or an aquastat for hot water. Burns the cheapest grade of fuel without smoke or carbon. Installation is simple and can be made in a few hours regardless of the type of boiler, heater or furnace. Automatic burners are furnished with gas ignition.

Type "E" Industrial Burner

Made in all sizes. Suitable for any type of heating problem, furnished either in the pump or pressure type, burns any oil which can be pumped, regulated either manually or automatically on low and high pressure boilers, Can be installed either singly or in batteries, made either right or left-hand swing, easy to operate, flexible in load variations, giving highest efficiency and requiring very little attention. Burner is equipped with Westinghouse alternating-current 60-cycle motors in single or polyphase, also burners with direct-current motors furnished on request.

Sizes

Made in thirteen different sizes, the smallest with a capacity to heat a five or six-room home, the largest to develop 600 b-hp.

"Pump" type burners are marked "P" and made in sizes AA to K. "Gravity" (non-pump) type burners are marked "G" and made in all sizes.

Burners Nos. A, B and C are furnished in single phase; polyphase motors furnished for an additional charge.

Burners Nos. D, E, F and G furnished in single or polyphase motors.

Burners Nos. H, J, K, L and M furnished in polyphase only.

RATINGS OF ENTERPRISE ROTARY FUEL OIL BURNERS

Burner size	Gals. per hr.	Max. boiler hp.	Max. steam radiation, approx., sq.ft.	Max. water radiation, approx., sq.ft.	Motor hp.
AA	½–3	8	1000	1700	¼
A	1–5	15	2000	3200	¼
B	2–8	20	2700	4400	⅓
C	2–10	25	3500	5500	⅓
D	3–15	35	5000	7300	½
E	4–20	55	7500	12000	½
F	6–30	75	10400	16000	1
G	8–35	100	13900	22000	1
H	45	125	17500	27000	1½
J	70	200	27000	43000	2
K	100	300	40000	60000	3
L	135	400	55000	85000	5
M	200	600	80000	130000	7½

Note: ENTERPRISE Rotary Oil Burners are rated conservatively, oil consumptions are approximate and based on normal draft and furnace conditions.

Burner capacities are based on 60-cycle current; when using 50-cycle current, the next size larger burner should be used.

Guarantee

ENTERPRISE Rotary Oil Burners are manufactured by the finest precision methods and guaranteed to be free from defects in material and workmanship for a period of one year.

Catalogues

Catalogues and operating instructions, containing the necessary information for installing ENTERPRISE Oil Burning Equipment, will be furnished upon request.

ELECTROL INCORPORATED

MEMBER OF THE OIL HEATING INSTITUTE

Manufacturers of Electrol Quiet, All-electric Oil Burner

MAIN OFFICE
227 East 45th Street
NEW YORK, N. Y.

FACTORY: 170 Dorcas Street, ST. LOUIS, MO.

BRANCHES
SEATTLE, WASH. CHICAGO ILL. BOSTON, MASS. ST. LOUIS, MO. MINNEAPOLIS, MINN.

The Company

ELECTROL INCORPORATED has been established for fourteen years and is a pioneer in domestic oil burner manufacturing.

During this time it has developed, perfected, manufactured and installed many thousands of automatic oil burners, through a nation-wide distributing system.

The company is alert in adopting the latest methods of manufacturing and produces a quality burner which is quiet, all electric and automatic. The company's only product is automatic oil burners. It is well financed and possesses ample capital to carry out its undertakings.

ELECTROL
The OIL BURNER *with The Master Control*

Distribution

The Electrol Oil Burner is sold and installed through branch offices at New York, St. Louis, Boston, Chicago, Minneapolis and Seattle, and through hundreds of qualified dealers located in almost every state in the Union, and in the principal cities of Canada, Europe and South America.

Each branch office is a distributing point for the adjacent area, and is provided with full stocks of burners, parts and accessories.

Engineering information can be had from each branch office and from all dealers.

Guaranty

ELECTROL INCORPORATED warrants each new Electrol Oil Burner, manufactured by it, to be free from defective material and workmanship under normal use and service, and will make good at its factory any part or parts which shall, within the first year after installation, be returned to its factory with transportation charges prepaid, and which its examination shall disclose to have been defective; this warranty being expressly in lieu of all other warranties, and all other obligations or liabilities on its part.

Service

ELECTROL INCORPORATED maintains skilled engineers and mechanics at its factory and branches, available for consultation at all times.

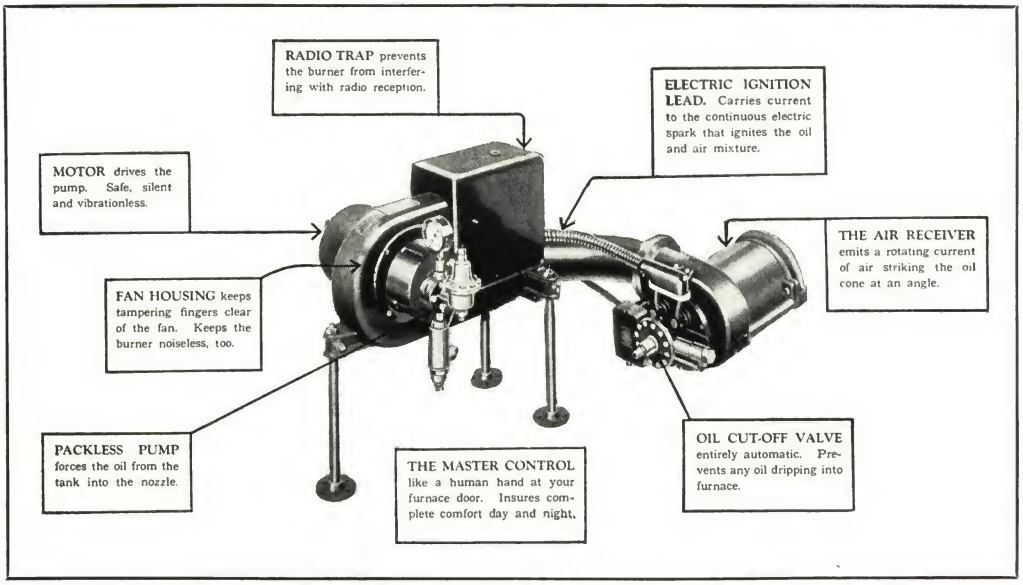
Electrol service and installation men are factory-trained through the medium of a well-equipped mechanical school maintained in St. Louis, regional schools which are conducted from time to time, and Electrol engineers who are stationed at the various branch offices and who travel through the territory as their services are needed by dealers or customers.

Listed by Underwriters' Laboratories, Inc.

The Electrol Burner was the first automatic oil burner having electric ignition to be listed as standard by the Underwriters' Laboratories, Inc.

Each Electrol Oil Burner has also been approved by the Board of Standards and Appeals of the City of New York; the Commonwealth of Massachusetts, Department of Public Safety; and the Department of State Police, Connecticut.

It has also been approved by practically all municipalities which require special listing.



Model TU—Electrol Quiet, All-electric Oil Burner

THE ELECTROL OIL BURNER

The Electrol automatic burner is of the mechanical atomizing type, employing a motor directly connected to a fan and pump and obtaining atomization on the mechanical principle by ejecting oil under pressure through a stationary nozzle. Ignition is electric, of the arc type, with the electrical flame blown into the oil spray so that the electrodes are free from oil contact. The control and safety systems are integral with the burner.

In general, the outstanding characteristics are sturdy construction and finished design resulting from years of continuous development, complete accessibility, interchangeability of parts permitting late improvements to be applied on older models and a high degree of combustion efficiency.

There are four principal functions in the modern automatic oil burner. The oil handling and atomizing system, the air system, the ignition and the control and safety system. The latter is described on the second page following. The first three are illustrated on this page.

Fig. 1
Electrol Air System Providing Flexed Air

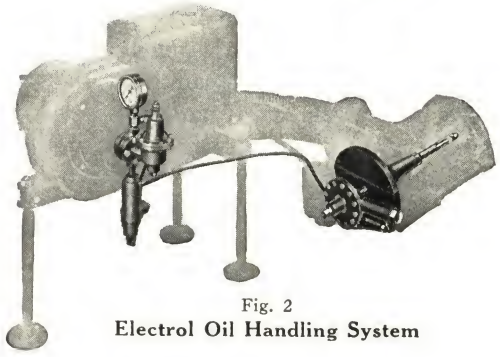


Fig. 2
Electrol Oil Handling System

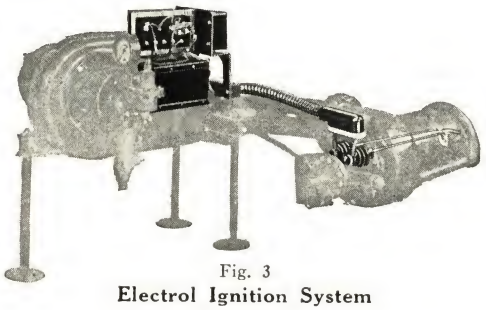


Fig. 3
Electrol Ignition System

Electrol Air System—Fig. 1

It will be noted that the air leaving the blower housing passes through a curved duct and tangentially into an air receiver, thus being forced to rotate. It is emitted from the receiver through deflectors which turn it into and across the oil spray at an angle. The combination of rotation and deflection produces a turbulence that insures the intimate mixture of finely atomized oil and air, necessary for complete combustion. Moreover, the manner in which the mixture is accomplished also results in the ball-like flame, which is an outstanding feature of the Electrol burner.

The flame actually rotates in the combustion chamber, so that each particle of oil is forced to whirl in the flame until it is entirely consumed before leaving the hot combustion space. Ask an Electrol representative about the balloon test, which clearly illustrates the unusual air handling method used in the Electrol burner.

The amount of air needed for a particular load is accurately adjusted at the fan intake.

Oil Handling System—Fig. 2

The Electrol oil handling and atomizing system is distinguished by its simplicity. A single pump directly connected to the motor serves to provide the pressure for atomizing and also to bring the oil from the storage tank to the burner. Any excess oil is returned to the storage tank, so that only a very small amount is contained in the burner at any time. Operating pressures are adjusted and controlled by a pressure-regulating valve and a shut-off valve, both described on the following page, as is the atomizing nozzle.

Ignition System—Fig. 3

Electric ignition for oil burners has proved to be the most practical means yet discovered for the purpose. Electricity is more widely distributed than gas, and as applied in the Electrol, is more dependable and less costly. Electrol was the first burner with electric ignition listed by the Underwriters' Laboratories, Inc.

Reference to the illustration will show the simple design and rugged construction employed in the Electrol ignition system. The transformer is enclosed in a stout steel box, from which the high tension cables are conducted through a flexible steel tube to an outlet box. (Extra heavy porcelain insulators shield the leads passing through the combustion head.) The wires leading from the outlet box to the electrodes are so spaced as to prevent any possibility of the current shorting. The electrodes are of monel metal and are welded to the leads. They terminate above and behind the oil spray, so that the arc between the points is blown deeply into the oil spray without the points coming into contact with it. Thus they are kept clean and cool, with no possibility of carbonization.

Electrol ignition is constant while the burner is in operation.

Fits All Boilers

Electrol design permits easy and efficient application of the burner to practically any make or type of heating plant. The combustion chamber, which is applied to the ash pit section of the boiler or furnace, is designed to suit the particular plant in which it is installed, thus assuring the best possible results in each case. This combustion chamber construction also gives the additional cubic capacity which oil firing requires over that needed for coal.

It should also be noted that the burner is entirely out of the boiler, with no wearing part exposed to the heat.

PRINCIPAL PARTS OF THE ELECTROL OIL BURNER

Blower Unit—Fig. 1

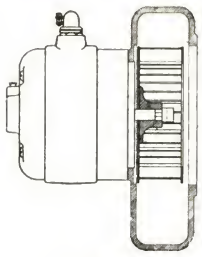


Fig. 1

The motor is of special design, embodying characteristics particularly adapted to automatic oil burner service. It operates at slow speed and is directly connected to a Sirocco fan. The blower housing is so designed as to permit ready removal of either motor or fan for examination or replacement.

Pump—Fig. 2

The pump, probably the most vital part of the burner, is an Electrol design and has been perfected through nearly ten years of continuous development. It is of the gear type, with steel and iron helical gears placed in a close-grained bronze housing. It is self-oiling, being lubricated by the fuel it pumps, and is provided with a self-sealing feature that eliminates packing, with its troubles and friction losses. The pump is directly connected to the motor shaft through a fibre coupling, no belts or pulleys being required. All pumps are factory-tested.

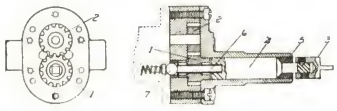


Fig. 2

Pressure-regulating Valve—Fig. 3

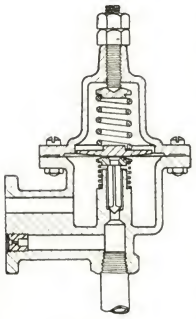


Fig. 3

The pressure-regulating valve is a bronze-bodied diaphragm-operated regulating valve, with an adjustment screw on the top which permits a very accurate setting of the required pressure of oil for atomization. This valve permits the return of unused oil back to the tank, and in conjunction with varied nozzle sizes is the means of adjustment to the quantity of oil required to carry a given load.

Shut-off Valve and Nozzle Assembly—Fig. 4

This assembly consists of an adjustable spring-loaded monel metal needle valve seating on tobin bronze, a monel metal strainer, a bronze diaphragm housing and a brass tube fitted with a seat, into which the nozzle is screwed.

The valve is normally set to open when the pump has built pressure exceeding thirty pounds, thus assuring good atomization at the instant oil reaches the combustion chamber. Conversely, as the burner shuts down, the shut-off valve will close tightly as the oil pressure drops, insuring a sharp cut-off of the oil supply, and preventing after-drip or dribbling in the furnace. The entire assembly can be readily removed for inspection or cleaning without dismantling any other parts of the burner.

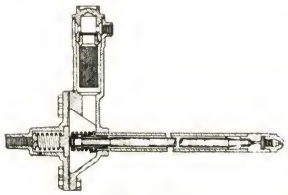


Fig. 4

Suction Line Strainer—Fig. 5

This strainer is constructed from non-corrosive metal. It is so desgined that the strainer elements can be cleaned by the movement of an external handle, without dismantling any part of the oil line or strainer. There is ample sediment collection space which may be drained once or twice a year by the removal of a conveniently located plug.

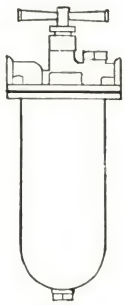


Fig. 5

Atomizing Nozzle—Fig. 6

The Electrol nozzle was developed from designs employed in the U. S. Navy and other large users of oil-fired boilers. It is constructed with accurately formed slots, permitting oil to pass, under pressure, tangentially into a cylindrical chamber, where it whirls at high speed and is emitted through an orifice in a finely divided fog-like mist.

There are no moving parts in the Electrol nozzle.

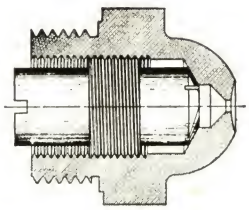


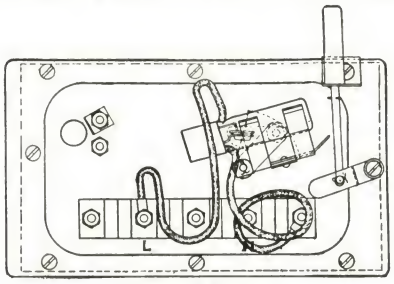
Fig. 6

Nozzles are made in various sizes to suit different loads, and with the fine adjustments obtained with the pressure-regulating valve, permit a quick and easy setting of oil flow to exactly suit the heating load.

THE ELECTROL CONTROL SYSTEM

The Electrol Master Control

When the Electrol Burner was conceived, the necessity for a device to make oil burning automatic and safe was one of the first problems. Many devices were tried out—starting with the old trip bucket and other elaborate devices that were complicated and costly to manufacture, until the safety control system now called the Electrol Master Control was developed and patented by Electrol engineers. This control system makes Electrol absolutely safe and it will shut down the burner and place it in a non-operative condition if any abnormal condition occurs in the firebox. In conjunction with and a part of this control system is the



Control Panel

safety switch, which is a part of the burner unit, for it is the flame of combustion that controls the action of the Master Control.

The safety switch as used in the Electrol Burner is very sensitive, however, not affected by basement temperature, and is automatic in its action. The Electrol safety switch active element cannot become covered with soot, which is a heat insulator, and therefore this switch does not become sluggish, resulting in a longer safety setting.

This safety switch is actuated by fresh clean air taken from the air receiver which passes through a nickeled heat loop in back of the flame, thence to the safety switch. The nickeled heat loop will absorb heat from the flame, heating air that passes through it. The warm air passing through the safety switch holds that switch in position so that the burner may operate. However, should there be no flame, the air going through the nickeled heat loop will cool, which would cause the safety switch to remain open and stop the burner. A mercury tube is used to make or break the connection in the safety switch as well as all other Electrol controls. Electrol was the first burner to use mercury tube switches, but now many other burners are using them as parts of their electric circuit. The mercury control tube prevents corrosion of contact points. It will function continuously without failing.

The Electrol control system of the Electrol Burner eliminates the combustion control that is commonly called the stack control. The Electrol safety control has been used for many years. The control system of the Electrol Burner will not permit the burner to operate under any of the following conditions:

(1) Retarded fuel delivery through feed line.

(2) A break in the electric wiring, short circuit or ignition failure.

(3) Any condition which prevents motor from operating at normal speed.

(4) Operation of burner without oil.

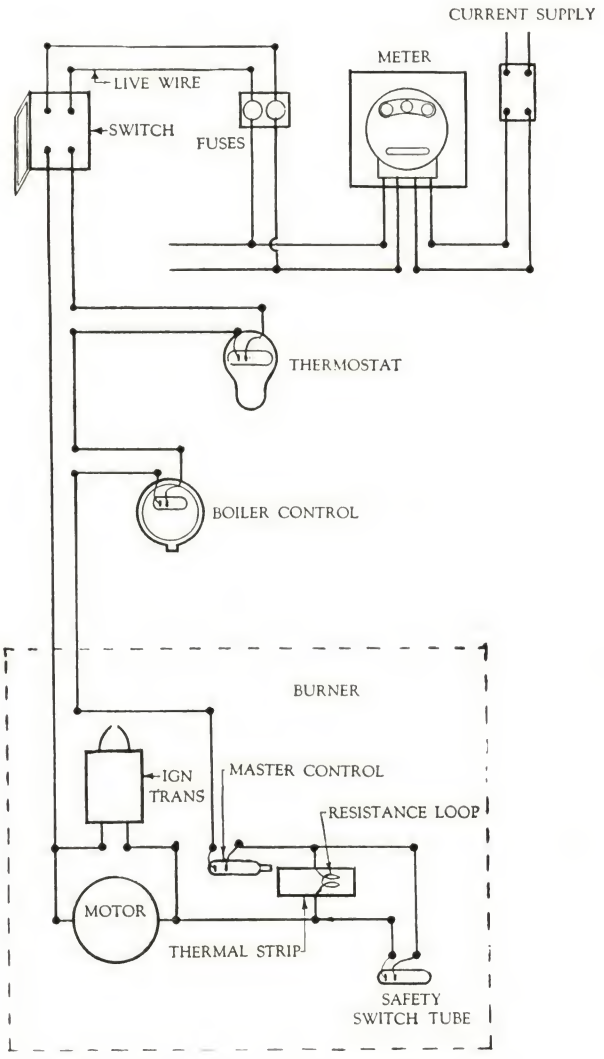
(5) No flame of burning oil.

(6) Any abnormal condition in the combustion chamber.

Wiring Diagram of Control System

The wiring diagram on this page clearly indicates that all of our controls are on the live or hot side of the power line. Also note that all controls are 110 voltage which is the usual line voltage, and that no secondary low voltage controls are used in our standard installations. By using (110-volt) high voltage controls we eliminate a great many extra parts, relays and transformers. No relays or transformers are required to reduce the high voltage to a low voltage. However, we are in a position to furnish low voltage control systems on Electrol Burners where customers specify that type of control system. The control panel and the wiring diagram shown on this page clearly illustrate the simplicity of the Electrol control system.

The dotted line in the wiring diagram indicates that the wiring shown within the dotted line is part of the burner wiring. When you look under the hood of an Electrol Burner your eye takes in at a glance the neatness and simplicity of our control system.



Wiring Diagram of Control System

OIL BURNER CONTROLS

(1) Thermostats—All automatic oil burner systems should have a room thermostat to control operation and insure the maintenance of the desired temperature. We furnish high voltage thermostats as standard equipment. We are in a position to furnish low voltage clock thermostats if they are desired.

(2) Steam System Controls—In addition to a thermostat, a steam system should be provided with an automatic limiting device, which will shut down the burner whenever the pressure in the boiler rises above a predetermined point. We furnish a high voltage limiting device as standard equipment with every installation.

(3) Vapor System Controls—High voltage vapor controls are furnished for the most sensitive vapor or vacuum systems where working pressure is below atmospheric pressure.

(4) Hot Water Controls—Hot water systems are controlled by a hydrostat attached to a riser or in the boiler. The hydrostat operates to shut off the burner when the temperature of the water rises above the temperature for which the hydrostat is set, regardless of the action of the room thermostat.

(5) Warm Air Furnace Controls—The warm air furnace control operates to shut off the burner when the temperature in the hood rises above a predetermined figure, usually 250° to 300° F.

(6) Low Water Cut-off—The use of a low water cut-off is an additional safeguard recommended for steam and vapor systems. The cut-off operates to shut down the burner if the water level in the boiler should drop below a fixed level. The low water cut-off and pressurestat may be obtained in one unit called a duplex switch.

(7) Boiler Feed Controls—Several companies make automatic boiler feeders which will maintain the boiler water at a constant level. Where the city water pressure is greater than the pressure maintained in the boiler, a boiler feeder may be used (see Underwriters' Rules). However, a closed system with no steam leaks rarely requires this type of control.

(8) Oil Line Controls and Accessories—The installation of an antisiphon valve in the oil line in order to prevent flooding in case of a broken pipe, is obligatory if the tank is installed above the level of the burner. When an inside storage tank feeding by gravity is used no antisiphon valve is required.

Note: Fuel oil gauges are not compulsory, but they are a great convenience to the owner of the heating plant. There is generally an extra charge made for installing an oil gauge. Their use is recommended if the owner does not wish to gauge the tank periodically by means of the measuring stick ordinarily provided.

Garbage Incineration

The intense heat of the flame from an oil burner is ideal for incinerator operation. Complete combustion is assured and smoke and odor are virtually eliminated.

Some incinerators are designed to burn the garbage and utilize the heat given off to heat domestic hot water. For installations of this type, the oil burner operation should be controlled by the temperature of the domestic hot water. A hydrostat connected to the storage tank will make the operation entirely automatic.

When incineration is conducted in a specially constructed furnace, using an oil burner for the heat, the burner should be controlled manually or by means of a special furnace control. Even where the furnace control is used, it is advisable to have an attendant on hand to turn off the burner when incineration is completed.

Domestic Hot Water Control

(a) Indirect Water Heaters—The oil burner may be advantageously used for economical heating of domestic hot water during the summer months as well as in winter. In the steam or vapor boiler the installation is simple, requiring only the addition of an oversize* indirect water heater and a boiler thermostat, ordinarily called an aquastat, which is set at a predetermined temperature of about 190° and so connected to the burner that the boiler water temperature is maintained at that point. This boiler thermostat works independently of the room thermostat to maintain only the proper temperature of the boiler water to supply sufficient heat for domestic hot water. When heat is required the room thermostat will, of course, control the burner.

Some engineers require a second aquastat installed in the domestic tank, about three-quarters of the way down, in series with the operating aquastat, to prevent operation of the burner when the domestic tank is three-quarters hot. A measure of economy is thereby obtained.

In the case of a hot water boiler a slightly different application of the same method is used. The oversize indirect water heater is connected in practically the same manner. The burner in this case, however, is controlled exclusively by the boiler thermostat. When heat is needed in the house the room thermostat starts a separate control motor which is connected to quick-closing valves installed in each riser. When the desired temperature is reached in the house the separate motor closes the valves and the circulation stops.

The constant maintenance of the boiler water at approximately 190°—is of real advantage in the operation of the heating plant. Circulation of hot water begins *immediately* upon the opening of the valves in the risers. For entirely satisfactory operation under all conditions, the boiler, whether steam or hot water, should have a capacity slightly exceeding that required for maximum requirements of the standing radiation. Some boiler companies desire two square feet additional boiler rating for each gallon of hot water heated per hour.

Experience of users has shown that economy of operation is effected by indirect heating of domestic water by oil in comparison with the cost of heating the same water by gas. Cost of installation is extremely moderate in cases where a hot water storage tank is already in use.

During the winter heating season there is but slight expense for hot water service. In summer the very limited operation of the oil burner to provide hot water is inexpensive. Furthermore, the use of the burner during the summer months keeps both burner and boiler in good operating condition.

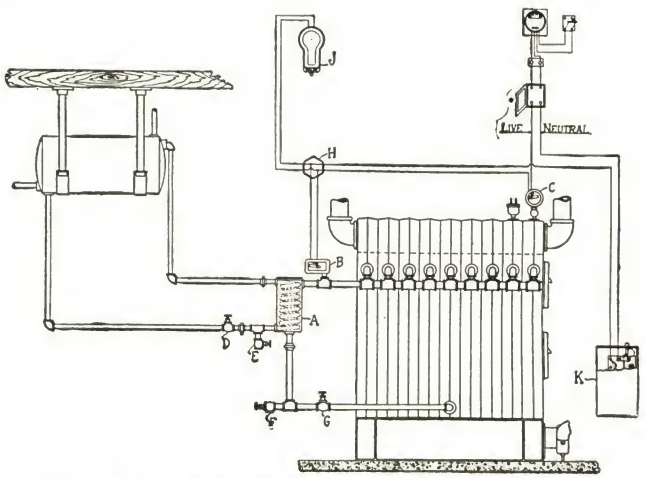
When a burner is in constant use supplying domestic hot water, a sudden cold snap will put the room thermostat in action and thus provide heat without attention from the owner.

(b) Direct Method of Heating Domestic Hot Water—When the domestic hot water requirements exceed the limitations of a 300-gallon storage tank, the indirect method is not recommended, due to the fact it would require an excessively large boiler to handle the combined load of heating the home and supplying domestic hot water.

When a storage tank of 300 gallons or greater capacity is required, a separate hot water supply boiler should be installed.

An oil burner installation in a hot water supply boiler is entirely automatic, operating through a hydrostat connected to the storage tank, maintaining a constant supply of hot water and, when the maximum temperature is reached, the hydrostat automatically cuts off the burner, saving fuel during the period when the domestic hot water is not required.

For most satisfactory operation with an oil burner, a hot water supply boiler should have at least a 15-in. diameter grate.



Summer Hot Water Hookup with a Steam Heating Plant

*Oversize heating coils are recommended because of the intermittent operation of the oil burner and because most manufacturers' ratings are based upon steam temperatures.

TANKS

UNDERWRITERS' LABEL TANKS WITH APPROXIMATE DIMENSIONS AND WEIGHTS

Capacity, gal.	Diameter, in.	Length, ft.	Length, in.	Weight, lbs.
275 (oval)	28x42	5	6	400
275	35	5	6	500
550	48	6	0	800
1000	48	10	10	1250
1500	48	15	10	1900
2000	65	11	10	2000
2500	65	14	10	2380
3000	65	17	8	2800
4000	72	18	8	4775
5000	72	23	8	6000

The first tank listed in the table (275-gal. capacity) is an obround tank usually supplied for inside basement installation. Tanks of 550 gal. or over can be supplied in two diameters. We give here a table of tank sizes with over-all dimensions listing the standard Underwriters' label tanks.

All tanks have standard openings (five 2-in. pipe thread) for pipe connections, but additional openings may be ordered.

When used with Electrols these tanks do not require manholes; we provide, however, a clean-out pipe, which should be sufficient.

In New York City any tank over 1000-gal. capacity must be provided with a manhole. Consult local ordinances on the subject.

Oil tanks and outside underground piping should be painted with asphaltum paint to preserve the steel against rusting by underground water.

Under no conditions should the inside surfaces of a tank be painted, for the action of the fuel oil will peel off this paint and cause suction line and strainer stoppage. Fuel oil itself will preserve the inside surfaces of the tank.

When choosing the size of a storage tank for oil, a number of things must be considered, for the size of the storage tank will greatly affect the cost of an oil burner installation. In most cities oil deliveries are sufficiently reliable to allow the inside 275-gal. storage tank to be used. Where inside storage tanks are used, a fill line is run to the outside of the building so that the delivery of oil can be easily made. A vent line to the outside of the building is also installed. The advantage of the small inside storage tank is that it reduces the initial cost of an installation.

The difference in cost between a 550-gal. and a 1,000-gal. storage tank is very little. Therefore, if an outside storage tank is required, the 1,000-gal. tank gives more storage space at very little additional cost. The 1,000-gal. tank is of ample capacity for any residence where the roads are clear during the winter months. Larger tanks should be used where buildings are inaccessible in snowy winter weather.

A 1,000-gal. tank is ample capacity for any building where the standing radiation is not over 1,000 sq. ft. of steam. A 1,500-gal. tank is suitable for buildings that have between 1,000 and 2,000 sq. ft. of steam radiation. Where buildings have over 2,000 sq. ft. of radiation, a 2,000-gal. tank may be used. Beyond these figures special consideration should be given to fuel delivery and the unusual conditions that may exist locally.

The Underwriters' rules require that a tank be installed 2 ft. under the ground, so long as this tank is below the burner pump inlet. If the tank is installed above the burner pump inlet, it will be necessary to install an antisiphon valve in the line, or install a wall tank.

When making calculations on the amount of excavation necessary for a tank, allow 1 ft. extra on all sides of a tank, to permit a man, when making inspection, etc., to work past the sides of the tank.

PIPING AND VALVES

General Specifications—Standard iron, brass pipe or copper tubing should be used for all oil lines. Galvanized pipe for oil lines is unsatisfactory because of scaling. For the vent pipe galvanized is recommended.

Valves and fittings should be the best obtainable, sufficiently rugged to stand jarring. Shut-off valves, if used, should have a good packing gland, in order to be sure that no leakage occurs.

Sizes—Pipe for suction and return lines should be of the same size.

The following sizes should be specified according to the installation:

For 275-gal. inside tank, ⅜-in. pipe.

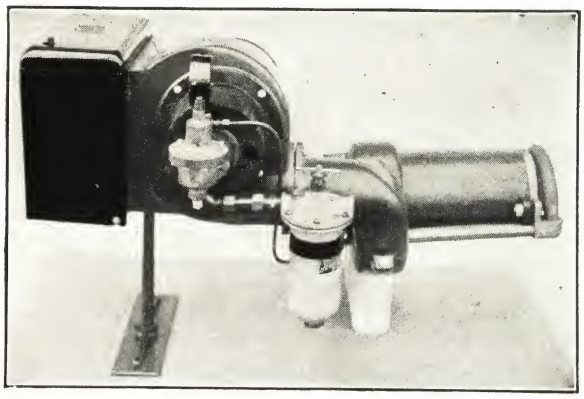
For 1,000-gal. or larger tank underground installation, ¾-in. from tank to building wall; ½-in. from wall to burner. Where the location of the tank is 50 ft. or more from the wall, ¾-in. pipe should also be used from the wall to the burner.

Swivel Joints—Where suction, return, vent and fill pipes emerge from underground tank, swivel joints or copper tubing should be installed as a safeguard against leakage in the pipe caused by settling of tank.

General—Copper tubing for the suction and return lines of oil burners is coming into greater use. Copper tubing will give a more secure oil tight line and is more readily installed than standard pipe.

There are two types of antisiphon valves on the market, which should be used when specified by the Underwriters' rules and installed in a high point in the oil line just as it enters the building. The first type is a weighted bellows type and will not pass oil through it unless there is a definite vacuum on the suction line created by the burner pump. This type will not place any load on the pump. The second type is simply a fusible link type similar to a sprinkler head, but inverted, which, when it comes in contact with heat or a fire, will open this line and cause air to enter the high point of the line, thus destroying any siphon action. In a great many cases instead of installing antisiphon valves when the tank is above the burner, a wall tank may be used, which tank has a motor and pump in it that draws oil into a small reservoir, feeding the burner by gravity. This, however, will entail additional cost.

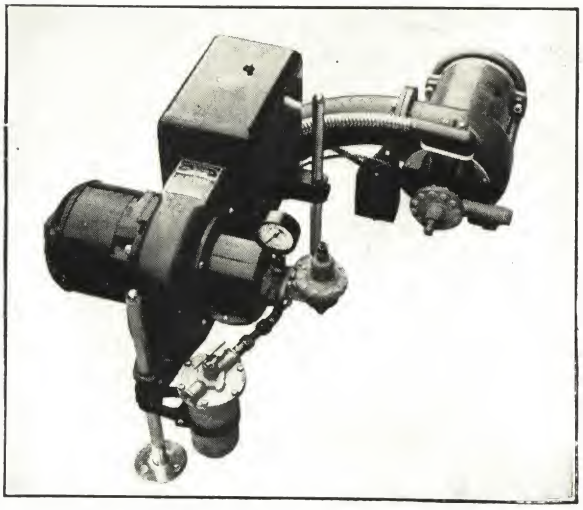
FOUR SIZES OF ELECTROL BURNERS



Model TJ Burner

(Illustrated at left)

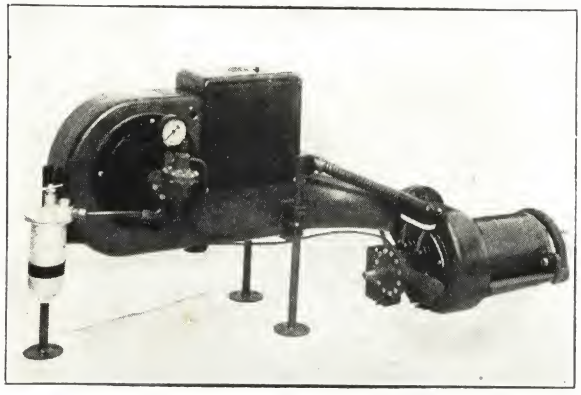
This burner has been constructed in a compact form for use in smaller heating plants, and also for use under domestic hot water tank heaters requiring automatic operation.



Model TU Burner

(Illustrated at right)

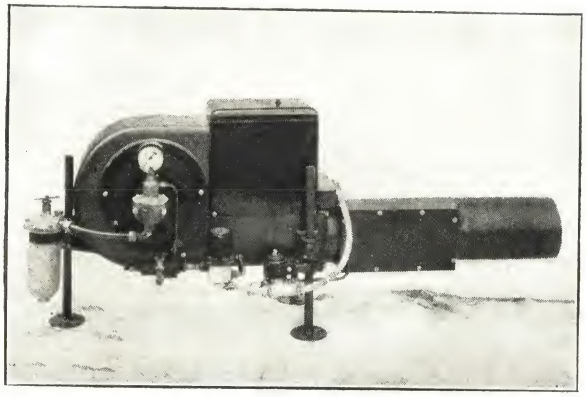
The TU burner is constructed to handle automatically the heating requirements of the larger home.



Model TL Burner

(Illustrated at left)

The TL burner has been constructed to provide double the capacity of the TU burner; and will handle the heating requirements of the largest houses, medium sized commercial buildings, theatres, etc., requiring automatic heat.

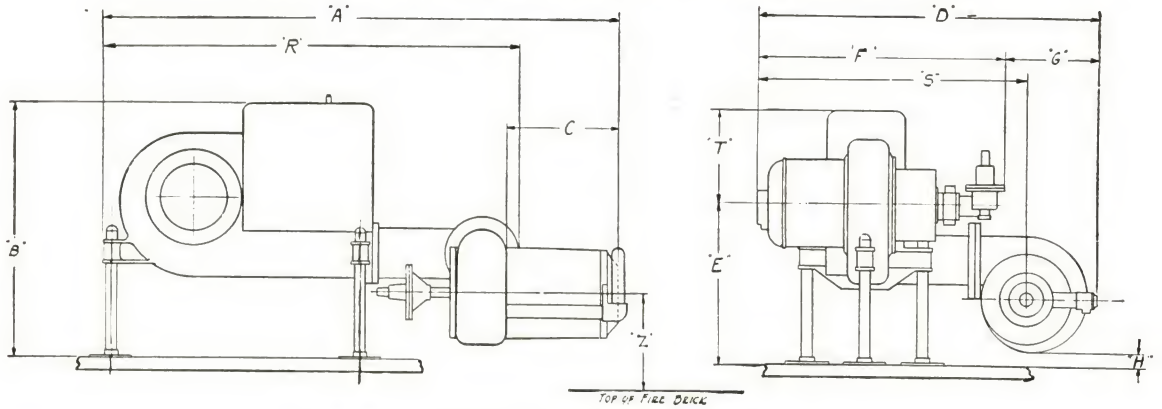


Model TM Burner

(Illustrated at right)

The TM burner has been constructed to provide ample capacity for large applications of automatic heat, including most commercial buildings.

FITTING THE BURNER TO THE BOILER



ELECTROL BURNER DIMENSIONS AND CAPACITIES

Model sizes	Dimensions, in.									Gallons per hour		Capacity standing cast iron radiation	
	A	B	C	D	E	R	S	T	Z	Min.	Max.	Steam	Hot water
TJ	32½	18	10	22	12	24	15	6	6½	1	2½	200–800	350–1300
TU	40¾	20	8½	27¼	12½	33	23½	7½	7	2	9	600–3000	1000–5000
TL	44¼	19¼	8½	33¾	11¾	36½	27	7½	15	9	18	3000–6000	5000–9600
TM	47½	17½	6	28	9½	44	26	8	10	12	24	4000–10,000	6500–16,000

Capacities given in square feet of direct cast iron radiation are based upon including piping and risers which must be added to the net radiation on any specific job to determine required burner capacity. If there is any doubt, consult nearest Electrol representative.

Boilers, Furnaces and Oil Burning

It may be generally said that the Electrol burner can be successfully applied to any good boiler or furnace. Heating plants will differ in efficiency when fired with oil just as they do when fired with coal, but due to the fact that Electrol burners fire automatically at the best efficiency practicable in any given plant and reproduce the same conditions at each operation, economical results may confidently be expected.

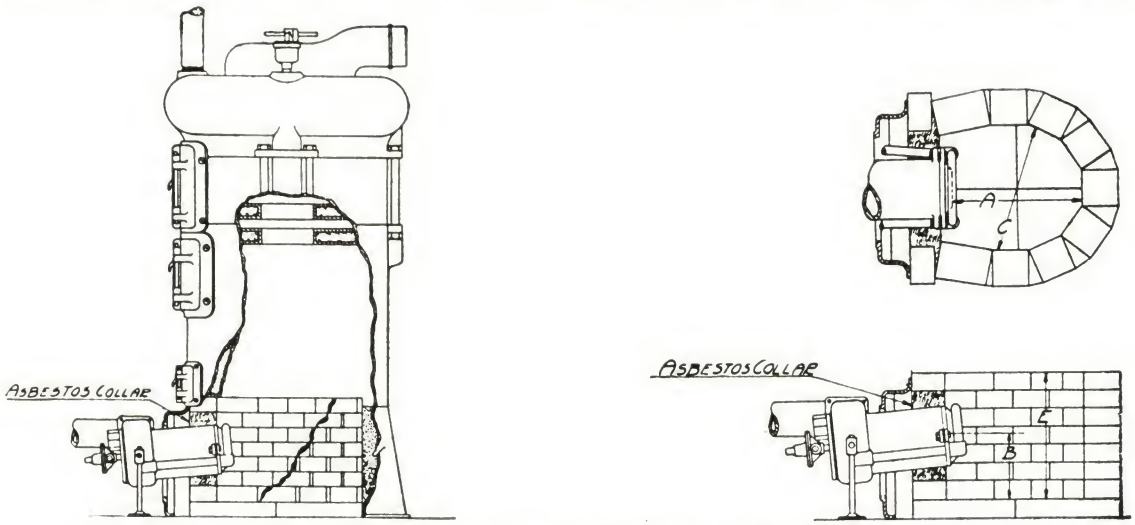
Care should be taken in choosing the boiler to be sure of ample heating surface in proportion to radiation load. If oil is specified, grates and fire tools are not needed, although many manufacturers now furnish boilers particularly fitted for oil firing. There are also steel and copper tube boilers on the market which have been designed especially for oil burning and which have developed remarkable efficiencies. Thousands of warm air plants are being fired with Electrol burners to the entire satisfaction of their owners. Obviously care must be taken to insure that the furnace is tight but this same precaution is needed when using coal.

Combustion Chambers

A properly designed and constructed combustion chamber placed in the ash pit section of the boiler is an essential part of each Electrol installation. This chamber serves two important purposes:

First—To maintain the burning mixture of oil and air at a temperature that will insure complete combustion.

Second—To direct the slowly moving clean hot gases resulting from combustion through the boiler in



A Typical Combustion Chamber Applied to a Round Boiler

Electrol combustion chambers are made in a variety of shapes and sizes, each designed to suit the particular plant in which it is built

FITTING THE BURNER TO THE BOILER (Continued)

such manner that the greatest proportion of useful heat can be transferred to the water.

Electrol Engineers and installers are skilled in combustion chamber designs and proportions to insure the best possible results.

Larger Heating Jobs

The various methods of automatic operation possible with the Electrol oil burner are found to be useful in many applications other than residential heating.

The field of automatic oil firing may be said for practical purposes to be up to 10,000 ft. of steam radiation or its equivalent. This includes many apartment houses, churches, theatres, factories, institutions and other buildings wherein the labor saving, cleanliness and uniform temperatures resulting from Electrol heating are of particular advantage.

Multiple Installations

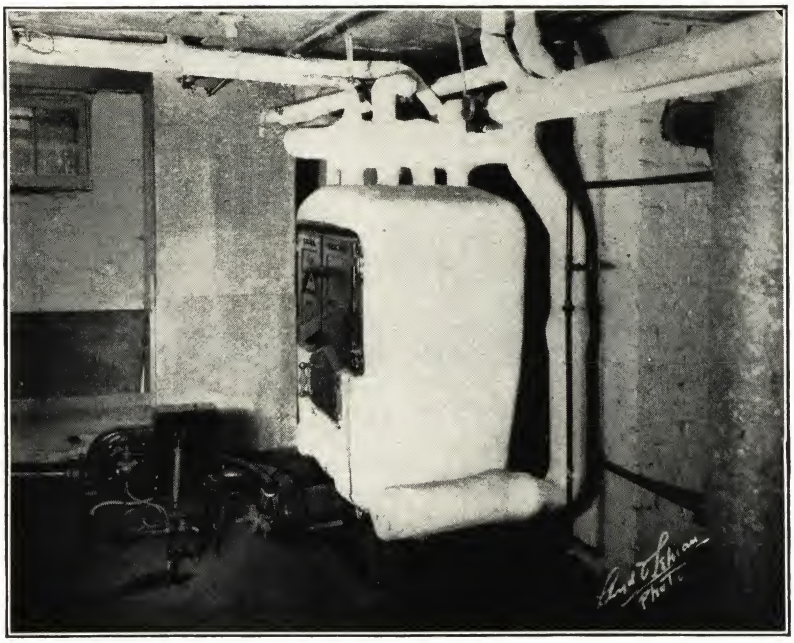
It is sometimes advisable to install two burners in a single large boiler, rather than one large burner in this boiler. The installation of two burners in one furnace is permissible, provided each burner has its own safety device. The Electrol burner is a complete unit with its own safety device, and when installed in this manner a certain flexibility is obtained, for in moderate weather one burner may be used to supply what heat is required. We will gladly supply data covering any specific project.

Electrol Dealers

Electrol dealers are chosen with care and thoroughly instructed in the proper application and installation of the equipment which they handle. Moreover, in case of need, they are free to call upon factory-trained engineers for advice or help. Work can be entrusted to an Electrol Dealer with full assurance that it will be carried out in complete accordance with specifications and with entire satisfaction to the client.

Industrial Uses

There is also a large field for this equipment in laundries, bakeries, dairies, dyeing establishments, newspaper plants and the hundreds of other plants of similar nature, not only for heating the building, but for various industrial processes where accurate temperatures are desired.



A Typical Installation Showing How the Electrol Burner Operates Entirely Outside the Heating Plant

Unusual Installation Conditions

Unusual installation conditions sometimes are met, due to special local ordinances, as are found in New York City, or topographical variations in individual sites. In either case, the local Electrol representative is well versed in the problems involved, and will gladly give any information required. He is also familiar with local oil suppliers, and is competent to recommend those most suitable for the burner and the individual installation.

Oil Burners Affect House Design

Conditions following the use of oil burners in residential heating permit many interesting and useful variations in house designing. The cleanliness of the oil burner-equipped basement makes it practical to consider using this space for amusement rooms, laundries, children's playrooms, living quarters, servants' quarters, etc.

In some cases the area of the basement excavation may be reduced. If it be unnecessary to provide access for coal and ash trucks, it may be possible to modify or eliminate driveways, in that oil fill lines may be carried to the curb. In small houses, an outdoor entrance to the basement may be dispensed with, if there be no need for ash removal.

OPERATING COSTS

The Electrol Burner, because of its high pressure atomization, presents an advantage in its ability to successfully burn a wider range of fuel oils.

It is designed to burn an oil showing a 28° Baumé gravity which is known to the trade as No. 3. Also, on the Pacific Coast, Diesel oil not heavier than 25° Baumé when viscosity is not more than 54 sec. (Saybolt-Universal at 100° F.)

Methods of Estimating Operating Costs

Where coal consumption is not known *as in a new heating plant* the estimation of oil consumption requires a sufficient knowledge of local conditions and of oil burner operatings to be able to estimate, first, the length of the average heating season and, second, the per cent. of the heating season during which an oil burner is actually operating. The steps in the calculation are the following:

(1) Calculate the number of hours in the heating season.

(2) Multiply the figure by the total radiation.

(3) Multiply the product of 1 and 2 by the radiation constant (240 for steam, 145 for hot water, etc.) for the kind of heating system.

(4) Multiply the product of these operations by the per cent. of time during which the burner is actually operating.

(5) Divide the product of these operations by the B.t.u. content for one gallon of oil multiplied by the operating efficiency of the heating plant.

If for example the heating season were 7½ months, or 5,400 hours, and an oil burner is in operation 33⅓ per cent. of the time, and that oil of 140,000 B.t.u. content will be burned at 65 per cent. plant efficiency, the amount required for heating a building containing 500 sq. ft. of steam radiation would be obtained as follows:

$$\frac{5{,}400 \text{ hr.} \times 500 \text{ sq. ft. rad.} \times 240 \text{ rad. constant} \times .33\frac{1}{3}}{140{,}000 \text{ B.t.u.} \times .65 \text{ efficiency}}$$

equals 2373 gal. of oil per season.

When Past Coal Consumption Is Known

To determine the amount of oil that will be consumed, multiply the B.t.u. content of 1 lb. of coal by 2,000 (lb. per ton), by the number of tons consumed, by the efficiency of operation of a coal-fired heating plant and divide this figure by the B.t.u. content of 1 gal. of the oil to be used, multiplied by 65% (average efficiency in oil consumption). This will give the gallons of oil that will be consumed, per ton of coal.

For instance, if the B.t.u. content of the coal was 12,000 (which is average for anthracite coal), and the B.t.u. content of the oil 140,000 (average for 1 gal.), and the amount of coal consumed in the house was 20 tons for the heating season, the number of gallons of oil required would be:

$$\frac{12{,}000 \text{ (B.t.u. coal)} \times 2{,}000 \text{ (lb. per ton)} \times .50 \text{ (efficiency with coal)}}{140{,}000 \text{ (B.t.u. oil)} \times .65 \text{ (efficiency with oil)}}$$

This is 131.8 gal. per ton of coal, or approximately 132 gal. per ton. This figure will hold for continuous operation of the burner. Due to intermittent operation and a heavy load imposed on the plant each time the burner starts, this figure should be increased by at least 10%, resulting in a figure of 145 gals. per ton of coal. Thus, 145 gals, multiplied by 20 tons gives an estimated consumption of 2900 gals. for the season.

The same method may be used for estimating oil consumption as compared with *gas*—except that it is necessary to obtain the B.t.u. content and the efficiency of the gas produced in the particular locality, there being considerable variation.

Proportionate amount of oil required for different months of the heating season may be generally accepted from the following chart which has been compiled from the experience of several miscellaneous installations covering an average heating season:

Month end	Oil consumed	
	% of years total	% for month of years total
Oct.	8.8	9.2
Nov.	20.0	12.7
Dec.	38.0	19.9
Jan.	59.0	18.2
Feb.	74.2	15.6
March	86.8	12.9
April	97.8	9.4
May 15	100.0	2.1

There has been prepared and appended hereto another table showing cost comparisons, taking into consideration the number of tons of coal burned per season as compared with the number of gallons of oil required to produce the same B.t.u. and the number of cubic feet of gas that would be required, assuming that the gas was of a quality equal to 420 B.t.u. per cu. ft.

COST COMPARISON PER SEASON
Based on Data from U. S. Bureau of Standards

Number tons coal burned per season	Number gallons oil required		Gas, cu. ft.
	U. S. gal.	Imperial	
5	670	555	191,000
6	804	666	230,000
7	938	777	268,000
8	1072	888	306,000
9	1206	999	350,000
10	1340	1110	383,000
11	1474	1221	421,000
12	1608	1332	460,000
13	1742	1443	498,000
14	1876	1554	536,000
15	2010	1665	574,000

Note: From your yearly coal consumption find at the right the corresponding oil consumption in gallons. Multiply by gallon cost of low-priced heavy domestic fuel oil in your locality—and you have approximate cost figure. However, these figures are general—usually Electrol will show substantial savings over them. Table based upon the following values:

Coal—11,765 B.t.u. per U. S. pound. Oil—141,000 B.t.u. per U. S. gallon or 169,200 B.t.u. per Imperial gallon. Gas—420 B.t.u. per cubic foot.

Efficiencies used are averages obtained in practice.
Larger tonnages are in proportion.

In presenting this data the variables of installation must be taken into consideration. Every installation must be made according to the circumstances which must be determined by a study of the problem at hand—the fluctuating heating seasons in the different parts of the country—the class of building to be heated—the exposures to which it is subjected, go to compile the manifold ramifications of a complete heating problem.

GENERAL OIL BURNER SPECIFICATIONS

Scope of Work

These specifications cover the installation of an oil burning system, including burner, combustion chamber, tank, controlling and limiting devices, necessary pipe, fittings, fill-box, vent and electric connections, including all material and labor to make a complete automatic oil burning system. The burner shall be installed in a boiler supplied by others. The entire fuel oil burning system, when completely installed, shall comply with the rules of the National Board of Fire Underwriters and also any local fire and electric rules and ordinances that are in force.

Burner Guarantee

The burner must be guaranteed by the manufacturer, for one year against failure of any parts, due to defective material or workmanship.

Burner

The burner shall be an Electrol as manufactured by ELECTROL INCORPORATED, 227 East 45th Street, New York City, and approved by the Underwriters' Laboratories, Inc., for burning fuel oils that are designed as Nos. 1, 2 and 3 by the Bureau of Standards C.S. 12-29. The master safety device shall be actuated by the direct action of the flame of combustion and automatically stop the burner and render the installation inoperative, in the case of failure of normal operation of any part of the oil burning system. A suitable radio trap or filter shall be provided to eliminate radio interference.

Boiler

The burner must operate at full rated capacity of the boiler with an 80% free swinging damper or with damper removed from flue in a (Name of Boiler) Boiler which is rated at ..... square feet to carry an actual load of ..... square feet of actual standing radiation, which includes the indirect domestic hot water load. This boiler will operate to supply (vapor, steam, hot water, warm air) to the heating system at a maximum pressure of (ounces, degrees, Fahr., lbs. per sq. in.) and be so controlled as described under controls.

The base below the level of the heat absorbing surfaces of the boiler, shall be lined to the floor level with No. 1 Standard Firebrick and the floor within the combustion chamber shall be covered with a layer of asbestos on which shall be laid flat, No. 1 split firebrick.

Controls

The main control shall be a ..... thermostat adjustable to a temperature range of approximately 55° F. minimum to 85° F. maximum and located where determined by the oil burner company's engineer and the architect, to maintain an average temperature. A limiting device set to cut off the burner at the maximum operating pressure or temperature mentioned herein, shall be installed in the main electric circuit.

Low Water Cutoff

A standard make of low water cutoff shall be supplied and installed in the main electric circuit, to prevent operation of the burner when the water in the heating boiler is at a dangerous level.

Domestic Hot Water Control

A submersion type of Aquastat shall be supplied and installed below the water line of the boiler and so connected in the electric circuit to operate the burner and maintain the heating boiler water temperature at approximately 180° F. for the control of indirect hot water heating.

Electrical Work

An electric outlet having a capacity of approximately 600 watts at 110 volts of 60-cycle single-phase a-c. shall be provided by others, located in close proximity to the boiler room. A main control switch shall be installed in the burner electrical system and arranged to shut down the burner, when desired. All wiring shall be done with BX or conduit as required by local ordinance and in accord with The National Board of Fire Underwriters Regulations.

GENERAL OIL BURNER SPECIFICATIONS (Continued)

Tanks

Supply and install a standard *steel tank of ..... gals. U. S. capacity bearing the Underwriters' Laboratories, Inc., label with the required number of openings to accommodate the piping system. In all respects the tank installation must conform to the requirements of the local authorities as well as the National Board of Fire Underwriters. **Any necessary excavation, backfilling and resurfacing of the top soil and carrying away of surplus soil shall be completed by the oil burner contractor. Quote separately a unit price for rock excavation.

Specify in this paragraph the type of tank gauge required.

Piping

All piping necessary shall be supplied and installed by the oil burner contractor in accordance with the standard practice as laid down by the oil burner manufacturer and according to the National Board of Fire Underwriters Regulations.

Note: Architect should state at this point if he wishes iron, brass or copper suction and return lines.

All underground piping and the tank shall be painted on the outside only, with one coat of black asphaltum paint.

Fireproofing

If required, architect should specify here what is required by local authorities and what the oil burner contractor shall do if this work will be done by others. Include here fire extinguishers when required.

Permits

All necessary permits that must be obtained from local governing boards shall be provided by the oil burner contractor, except that a recurring periodic charge by any governing board will be borne by the owner.

Service

The oil burner contractor shall inspect and adjust the burner after same has been put in operation, and thereafter furnish free service for twelve months after installation of equipment.

*N. Y. City tank as per Board of Standards and Appeals and over 1000 gals. specify a manhole.

**Or at this point architect should state if this excavation work will be done by others.

OIL BURNER SERVICE FOR ARCHITECTS AND ENGINEERS

For complete understanding of any mechanical device, it is advisable to see it in actual operation. Therefore, Electrol dealers place their facilities at the architect's and engineer's disposal. The Electrol dealer will gladly make arrangements for you to see one or more of his installations, at any time which will suit your convenience. He will be glad to consult with you on any problem relating to the installation of oil heat in a particular building, or to give you information on any problem in which his experience may be of value.

Electrol Engineers are always at the service of architects and engineers. Their services in laying out systems or in devising means to overcome unusual conditions are available at any time. For this service there is neither charge nor obligation.

Local Sales and Service Organizations

We refer you to the local Classified Telephone Directory for the name and address of the local Electrol Dealer.

GILBERT & BARKER MANUFACTURING CO.

Manufacturers of Oil Burners

SPRINGFIELD, MASS.

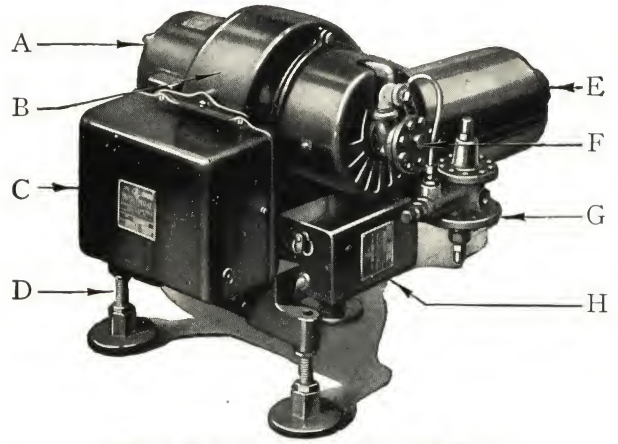
DEALERS IN PRINCIPAL EASTERN CITIES

The Company

Established in 1865, the GILBERT & BARKER MANUFACTURING CO. of Springfield, Mass. (with plants in Canada and Australia) is one of the oldest and largest manufacturers of oil burning and handling equipment in the world. Gilbert & Barker industrial fuel oil burning systems are in use in some of the largest industries. Under the boilers in its own power plant, the GILBERT & BARKER MANUFACTURING CO. burns three million gallons of fuel oil per year through burners designed and patented by G&B engineers. The Gilbert & Barker Flexible Flame Domestic Oil Burner, installed in thousands of homes, has given perfect satisfaction. The long experience, high standing and permanence of the GILBERT & BARKER MANUFACTURING CO. is a particularly desirable asset to the architect in the specification of oil burning equipment.

Description of Burner

The Gilbert & Barker Flexible Flame Oil Burner is of the dependable, pressure atomizing type. It is clean-cut, simple and compact in design and attractively finished in black and red enamel. It is all-electric, completely automatic and absolutely safe. Installation is made outside the boiler where parts are away from heat and corrosion and readily accessible for inspection. The burner uses low cost No. 3 oil fuel, is exceptionally quiet and efficient in operation. There are 3 sizes of Flexible Flame Burners; one handles up to 800 ft. of steam radiation, one up to 3500 ft. and one up to 12,000 ft. The exclusive patented combustion head on the G&B Flexible Flame Burner enables the shape and size of the flame to be exactly fitted to the firebox in which it is used. This feature is largely responsible for the amazing economy and efficiency which proves so satisfactory to owners of these burners.



Gilbert & Barker Flexible Flame Oil Burner

A—Quiet, dependable motor
B—Housing for fan blower
C—Protectorelay automatic control
D—Adjustable legs
E—Patented combustion head
F—Direct driven oil pump
G—Pressure regulating valve
H—Radio interference eliminator

The burner carries an inbuilt radio filterette, guaranteeing against radio interference. The satisfactory operation of the Gilbert & Barker Flexible Flame Oil Burner in every installation is assured by the individual fire-test of each burner before it is shipped from the factory.

Fits All Heating Plants—The Gilbert & Barker Flexible Flame Oil Burner fits any type of heating plant, whether steam, hot air, hot water or vapor, and operates with equal efficiency in round or horizontal boilers.

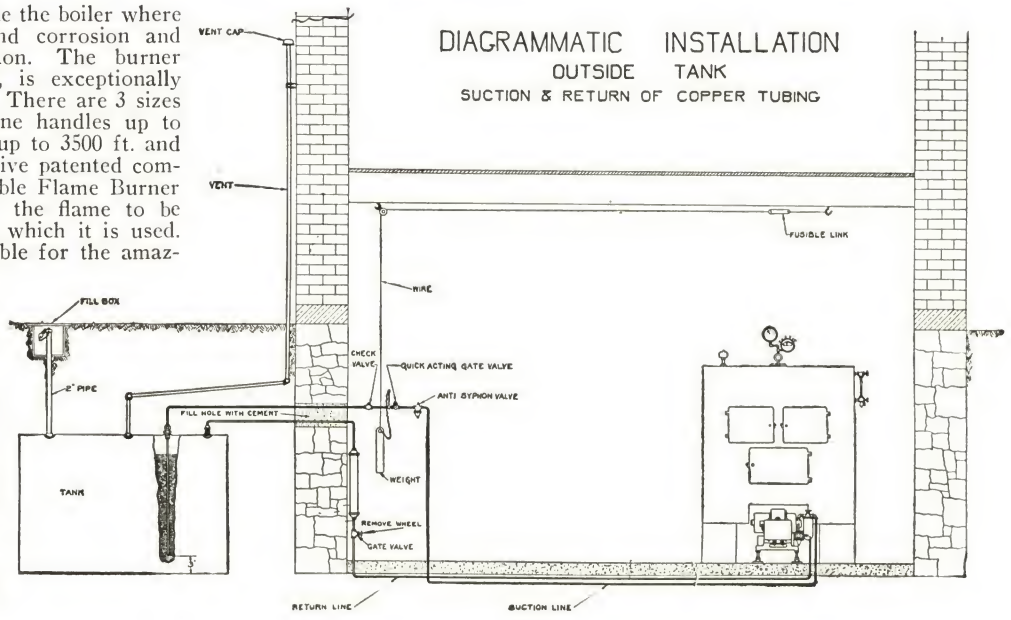
Approval—The Flexible Flame Burner is listed as standard by the Underwriters' Laboratories, Inc., approved by the Massachusetts Department of Public Safety, also the Department of State Police, Connecticut, and carries the approval of practically every municipality which requires special listing.

Careful Dealer Selection Assures Proper Installation—In keeping with the high standards set by the Gilbert & Barker organization for the manufacture of this burner, the franchises for its installation have only been awarded to the highest type of substantial local dealer organizations who are well qualified to render expert service whenever required.

Architects' and Engineers' Service

The Gilbert & Barker Flexible Flame Oil Burner is on permanent display at the Architects Samples Corporation, New York. In other localities the burner may be seen on display at the local G&B dealer's showroom, or the dealer will be glad to make arrangements for you to see local installations at any time to suit your convenience. Some of the most competent and experienced oil combustion engineers in the country will be found in the G&B factory and dealer organizations, and these engineers are always at the service of architects and engineers for consultation on any unusual problem involving the proper use of oil heat.

Architects' and Engineers' specification manual of the Gilbert & Barker Flexible Flame Oil Burner may be had on request.



ESTABLISHED 1922

THE NU-WAY CORPORATION

Manufacturers of Automatic and Manually Controlled Oil Burners

ROCK ISLAND, ILL.

Product

NU-WAY "GENII" AUTOMATIC OIL BURNERS.

"Nu-way" Genii

Range of Application

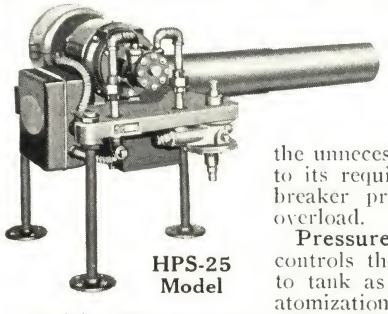
All solid, liquid and gas fuel type boilers and warm air furnaces: for generating steam up to 50 hp. boiler capacity; for converting domestic hot water supply boilers to an automatic system.

Mechanical Description

Nu-Way "Genii" Burners are complete units, requiring no separate pump equipment.

Complete automatic control protects against ignition or flame failure; thermostat regulates house temperature, boiler control regulates steam pressure or water temperature, furnace control prevents overheating of furnace.

Pump—Dual purpose, internal gear type, self-lubricating; vacuum pull 25 ins. while developing 100 lbs. pressure. (Tanks may be placed not more than 100 ft. from burner nor more than 12 ft. below burner level.) Direct drive with a member which breaks at less than motor overload and which protects motor against overload, on all models larger than 15. Model 15 is equipped with a belt driven pump reducing pump speed and the unnecessary excess of oil in ratio to its requirement. Overload circuit breaker protects the motor against overload.



HPS-25 Model

Pressure Regulating Valve—controls the amount of oil returned to tank as well as the pressure for atomization.

Ignition Transformer—Non-radio interference type; 2-pole assuring positive circuit; produces a high voltage electric flame with intermittent operation, since with the perfectly supported Nu-Way Radiant Combustion constant ignition is unnecessary.

Electrical Current Requirements

110 volts, 60-cycle is standard on Models 15, 25, and 35.
220 volts, 60-cycle is standard on Model 55.

All models will be furnished with any frequency or voltage on order.

LISTED AS STANDARD BY THE UNDERWRITERS LABORATORIES

Oil Specifications

Nu-Way "Genii" Burners are listed for A.O.B.A. No. 3 oil. Any 28-32 baumé gravity oil within No. 3 specifications is satisfactory. Where these grades are not available gas oil or distillates may be used.

Pressure Atomization

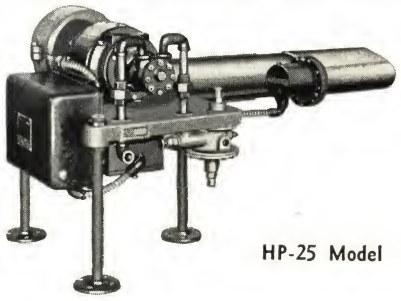
Pressure, ranging from 90 to 150 lbs., forces oil through the nozzle orifice, spinning and breaking it into fine particles which are readily mixed with the air supplied by a Sirocco noiseless type fan through the Nu-Way Air Director. This causes the air and oil to be mixed at the proper location in the combustion chamber, producing a low velocity character flame of high radiant energy value. All combustion takes place in the combustion chamber and permits the boiler or furnace to absorb the major portion of the heat from the radiant waves thrown off by the radiant energy of the combustion, reduces stack loss and assures economy and *quiet combustion.*

Quietness

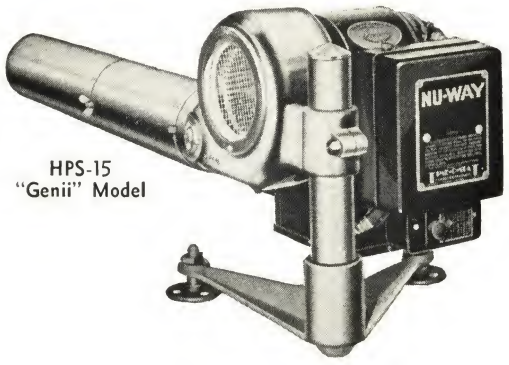
Nu-Way "Genii" Radiant Combustion, owing to its better balance of oil and air, is quiet.

Installation

Grates are removed and a Nu-Way "Genii" combustion-form combustion chamber is built in the ash pit of a suitable high grade refractory (brick and refractory bond or plastic refractory). Specifications and diagrams of combustion chambers furnished on request. No part of the burner is inside of the firebox.



HP-25 Model



HPS-15 "Genii" Model

Oil Storage

When possible, install tanks for gravity feed to the burner in which case only a feed line is necessary.

1000-gal. capacity storage or more, underground, is most desirable. When tank is installed below burner level both a suction and return line is required.

Service

Nu-Way "Genii" Burners are sold and serviced by carefully chosen dealers under factory supervision in all parts of the United States.

Approval

All Nu-Way "Genii" Burners carry the Underwriters' Label.

SIZES AND WORKING DATA

Model Nu-Way	Fuel cap., g.p.h.	Steam radiation, sq. ft.	Hot water radiation, sq. ft.	Warm air grate size, in.	Motor hp.	Controls, voltage
HPS 15	1½ to 2	200 to 500	320 to 800	14 to 24	1/10	High
HPS 25	1¾ to 3	500 to 1000	800 to 1600	24 to 28	1/8	High
HPS 35	3 to 7	1000 to 3000	1600 to 4800	28 to 32	1/4	High
HPS 55	7 to 19	3000 to 8000	4800 to 12800	36 to 40	3/4	High
HP 25	1¾ to 3	500 to 1000	800 to 1600	24 to 28	1/8	Low
HP 35	3 to 7	1000 to 3000	1600 to 4800	28 to 32	1/4	Low
HP 55	7 to 19	3000 to 8000	4800 to 12800	36 to 40	3/4	Low

Electric ignition furnished as standard equipment but gas and electric will be furnished on request.

110 or 220-volt motors and controls furnished as standard equipment. Direct-current or odd frequency motors and controls furnished upon request.

S. T. JOHNSON CO.

Oil Burners for Every Heating and Power Purpose Listed as Standard by the Underwriters' Laboratories, Inc.

940-950 Arlington Street, OAKLAND, CALIF.

BRANCHES

SAN FRANCISCO, CALIF. SACRAMENTO, CALIF. STOCKTON, CALIF. SAN CARLOS, CALIF. PHILADELPHIA, PA.

Architect and Engineer Service

26 years' experience in the manufacture and installation of oil burning equipment is at your disposal through our Engineering Service Department.

Without obligation, your more difficult heating problems will be gladly studied, and our assistance given in preparing layouts and estimates.

LOCAL REPRESENTATIVE

JOHNSON OIL BURNERS®

For 26 Years

As four of the Johnson oil burners (Types 28, 30-A and 30-H for large buildings, large homes and industrial heating systems, and our latest Centri' Burner for small homes) are adaptable to a wide range of utility, and appeal particularly to the readers of this catalogue, they are briefly described in the following.

JOHNSON BURNERS FOR THE LARGER INSTALLATIONS

Type 28 Semi-automatic Rotary Burner

Is designed for large building and industrial heating systems. Obtainable in 6 sizes, up to 41,700 sq. ft. steam radiation. Manually ignited; in gravity or pump feed. Constructed to burn industrial fuel oil Nos. 4, 5 and 6.

New Automatic Type 30-A and 30-H Burners

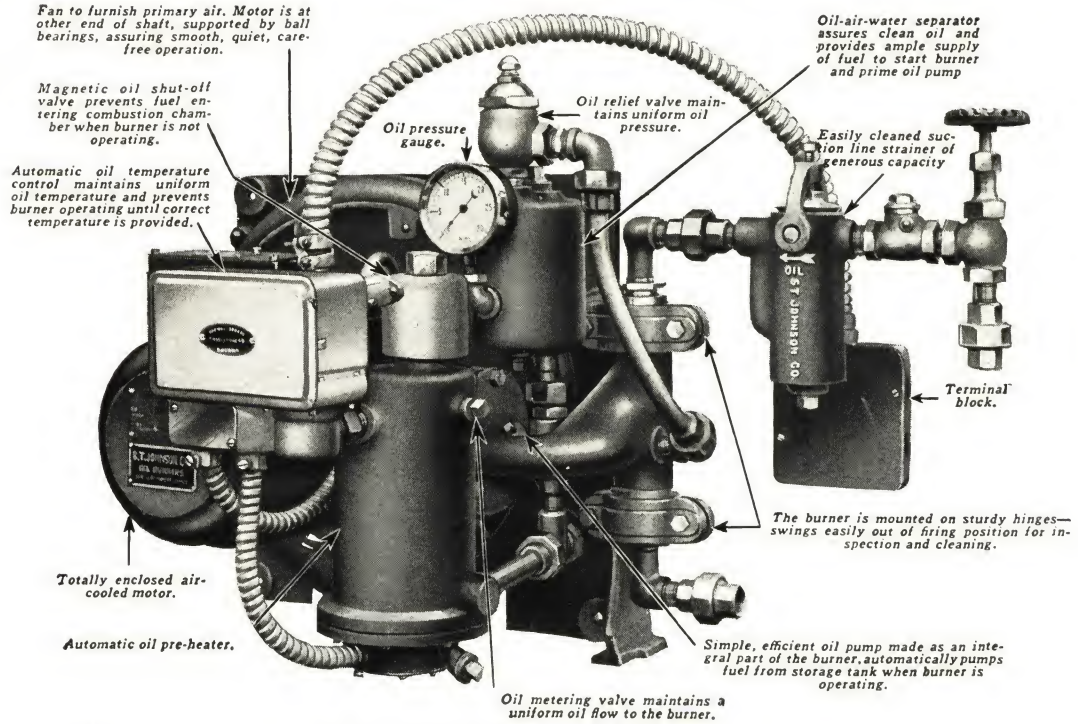
Are also designed for all sizes of buildings and large homes in heating boilers up to a steam radiation of 27,800 sq. ft. They are made in 5 sizes and automatically ignited by expanding gas pilot. Type 30-A is constructed to burn industrial fuel oil as heavy as No. 5; Type 30-H burns industrial fuel oil as heavy as No. 6. Electric ignition can be supplied, if desired, on Type 30-A only, in sizes up to No. 3½ (rated at 6950 sq. ft. of steam radiation) *provided fuel oil not heavier than No. 3 is to be burned.*

Simplicity

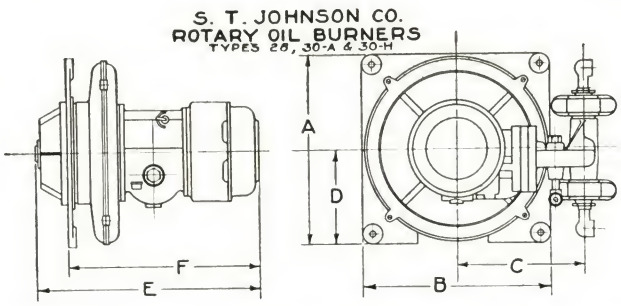
All 3 types of the above mentioned Johnson Rotary Burners are of the same basic construction, consisting of motor, fan, housing and firehole plate concentrically mounted in a compact unit.

Principal dimensions, steam ratings, shipping weights and other important data covering all of the sizes, are given in the table on the following page.

The illustration on this page shows the very latest Type 30-H Johnson Rotary Burner. In this illustration we have clearly shown the thermostatically controlled oil heater, and other important features that make the burning of heavy No. 6 fuel oil with full automatic operation possible—controlled either by room thermostat, steam pressure or process temperature. This automatic burner-heater combination maintains warm oil ready to start instantly.



Johnson Type 30-H Automatic Fuel Oil Burner



BURNER SIZE No.	CAPACITY STEAM ★ RADIATION MIN.	MAX.	BOILER H.P. RATING	GALLONS OIL PER Hr. MIN.	MAX.	SIZE MOTOR H.P.	LBS. APPROXIMATE SHIPPING WEIGHT 28	30-A	30-H	DIMENSIONS IN INCHES A	B	C	D	E	F
1	550 Sq Ft.	1385 Sq Ft.	10	1¼	3¼	¼	175			12¾	12¾	9½	7 1/16	16½	14½
1½	550 "	1385 "	10	1¼	3¼	¼	200	255	265	12¾	12¾	9½	7 1/16	16½	14½
2	825 "	2775 "	20	2	6½	⅓	195			13⅜	13⅜	9½	6 5/16	17	15
2½	825 "	2775 "	20	2	6½	⅓	220	275	285	13⅜	13⅜	9½	6 5/16	17	15
3	1400 "	6950 "	50	3¼	16	½	225			16⅛	15⅞	10¼	8¼	17½	15½
3½	1400 "	6950 "	50	3¼	16	½	250	300	320	16⅛	15⅞	10¼	8¼	17½	15½
4	2775 "	13900 "	100	6½	32	¾	350			17	19½	12½	9 3/16	21	19¼
4½	2775 "	13900 "	100	6½	32	¾	400	470	505	17	19½	12½	9 5/16	21	19¼
5	5550 "	27800 "	200	13	64	2	450			21½	21½	13	11	24	20
5½	5550 "	27800 "	200	13	64	2	475	540	575	21½	21½	13	11	24	20
6	11100 "	41700 "	300	25	96	2	500			21½	21½	13	11	24	20

★ Boiler Output.

(½ sizes include built-in oil pumps)

Important Features of Types 28, 30-A and 30-H

Installation—Our burners are easily installed on any make of boiler. No change is necessary, except to remove the grates and provide refractory lining. They can then be attached to the boiler or furnace through our specially constructed firehole plate.

Air and Water Separator—The air and water separator, or pressure equalizing tank in the Types 30-A and 30-H, provide protection against foreign matter entering the fuel . . . assuring a constant oil pressure and flow to the burner as well as an emergency supply of fuel under all conditions.

Air and Oil Regulation—The exact amount of air necessary for perfect atomization is supplied by a motor driven fan and adjusted by a butterfly valve.

The oil regulating valve once properly set assures a fixed and constant quantity of fuel.

Atomization—These burners advantageously burn the cheaper grades of fuel oil because of the complete combustion secured through the Johnson method of centrifugal atomization.

The combination of air and centrifugal force, atomizes the oil into minute particles from the rim of a revolving atomizing cup. The impact of the surrounding air discharged in an opposite direction insures complete atomization.

The atomized fuel is then burned in suspension, creating a soft, clean flame evenly distributed throughout the firebox . . . a Johnson feature assuring the maximum amount of heat from every particle of fuel.

THE CENTRI' BURNER FOR THE SMALLER HOME

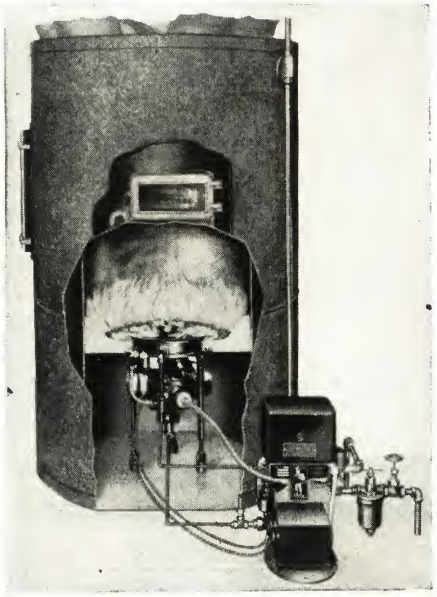
The latest addition to the Johnson line. For heating warm air furnaces, hot water or steam boilers to a steam radiation up to 550 sq. ft. or equal. Is made in one size and two styles: Style GrM is manually ignited, while Style GrA is automatically ignited by electric-gas pilot, and controlled by a room thermostat.

Through our exclusive method of centrifugal atomization, economically accomplishing complete combustion, the Johnson Centri' will efficiently burn Pacific Coast Diesel, or fuel oil No. 3.

Installation—The vertically constructed Centri' is easily installed to quietly operate on hot water or steam boilers and warm air furnaces. No change is necessary within the furnace, except to remove the grates and provide a refractory hearth of Centri' firebox tile. The burner, as one complete unit is then placed in the center of the combustion chamber.

Feed and Atomization—The fuel is automatically supplied from the storage tank to the burner by either gravity or auxiliary pump . . . completely atomized by centrifugal force and mixed with the proper amount of pre-heated, primary and secondary air to create complete combustion.

Ignition and Flame—The atomized fuel is then manually ignited, if the Centri' Style GrM is used, or automatically ignited by electric-gas pilot, if the Centri' Style GrA has been installed. In either event, a clean, hot gaseous flame is produced.



Johnson Centri' at Work in a Warm Air Furnace

MAY OIL BURNER CORPORATION

Manufacturers of Quiet May Automatic Oil Burners

FACTORIES AND GENERAL OFFICES

BALTIMORE, MD.

MAY OIL BURNER OF CANADA, LTD.
TORONTO, CANADA

NEW YORK, N Y., 6 East 39th Street — CHICAGO, ILL., 35 East Wacker Drive — PHILADELPHIA, PA., 717 No. Broad Street
BUENOS AIRES, ARGENTINE, Edificio Banco Boston — PARIS, 15 Rue de la Paix

Description of the Quiet May Automatic Oil Burner

QUIET MAY AUTOMATIC OIL BURNER

The Quiet MAY Automatic Oil Burner is a fully automatic oil burner suitable for either domestic or commercial installation with steam, hot water, vapor or warm air heating plants.

The Quiet MAY is of the pressure atomizing, mechanical draft type. Low velocity air is provided in proper proportion to a measured amount of finely atomized oil as it enters the combustion chamber. This proven method produces absolutely quiet and economical operation.

There is only one pump on the Quiet MAY which serves the double purpose of bringing the fuel from the storage tank and developing pressure for atomization.

The Quiet MAY is listed to burn the heavier or "high heat content" fuel oils which not only cost less, but yield more heat per gallon than the lighter grades.

Electrical Ignition—The fuel oil is ignited by an electric arc (when starting only) and requires no other auxiliary ignition whatsoever, eliminating the cost and disadvantages of constantly burning or expanding gas pilot.

The flame may be adjusted for size and shape so as to conform with the requirements of the boiler or furnace.

Installation—Grates are removed from boiler and the combustion chamber is lined with refractory material, which is part of the standard installation work.

Triple control is provided by means of the thermostat or room temperature control—the boiler or furnace control, and the combustion control are synchronized into automatic operation through the Quiet MAY Control Panel, which is either mounted on the burner or on a laminated board for wall mounting. Alternating or direct-current motor driven.

The Company Behind the Quiet May

The entire time and resources of the MAY OIL BURNER CORPORATION are devoted to the manufacture of one product—The Quiet MAY Automatic Oil Burner.

Executive offices, laboratories, and factories are in Baltimore, Md.

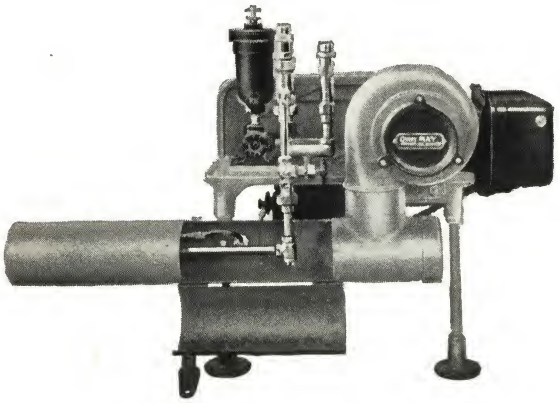
A staff of engineers are constantly observing the performance of Quiet MAY Automatic Oil Burners in operation in order to anticipate any possible improvement. Proof of the correctness of original design is demonstrated through the fact that the Quiet MAY Automatic Oil Burner of today embodies the same basic principles and design as the first Quiet MAY marketed. And the constant and uninterrupted performance of the Quiet MAY for eight consecutive years has placed the product beyond the realm of speculation or experiment, into the category of a tried and proven staple.

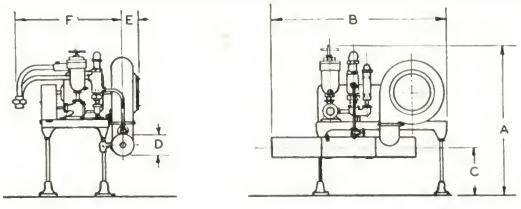
Further proof of this are the many thousands of Quiet MAY Automatic Oil Burners operating successfully and satisfactorily in residential and commercial installations throughout the United States and Canada, and in foreign countries, such as England, Belgium, Germany, Holland, France, Japan, China, Australia, Russia, etc.

The Quiet MAY Automatic Oil Burner is sold and installed only by authorized Quiet MAY dealers who are required to maintain at all times one or more individuals who have successfully completed a rigid factory training course in installation and maintenance.

Dealer and factory service representatives are established and maintained in principal cities throughout United States, Canada and the world.

Measurements and Capacities of the Quiet May Automatic Oil Burner

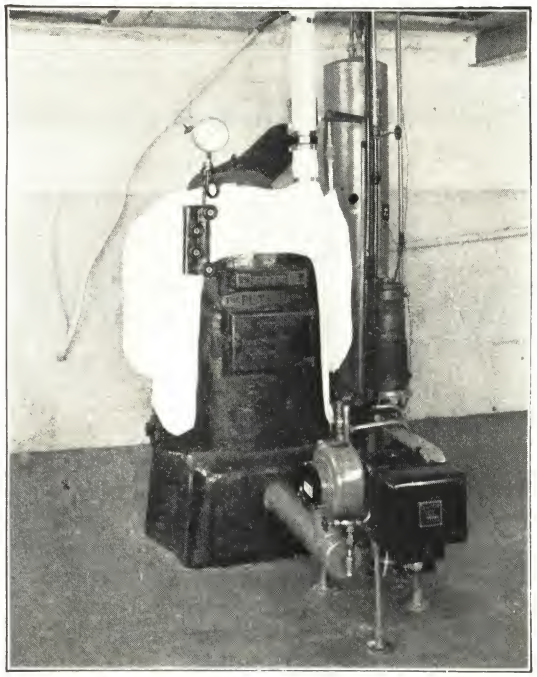




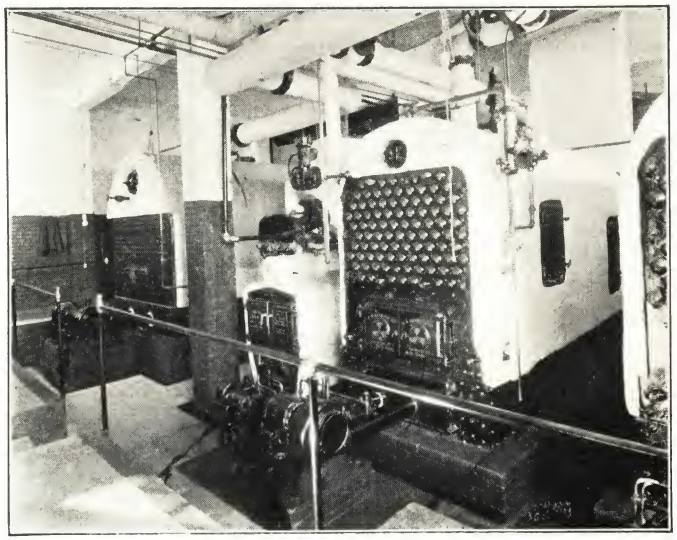
ELEVATION MEASUREMENTS

TYPE	A	B	C	D	E	F	MOTOR R.P.M.	MOTOR	PUMP R.P.M.	MIN. GAL PER HOUR	MAX GAL PER HOUR
A	26"	32"	9 1/2	4 1/4	3 1/2	14 1/2	1725	1/8 H.P.	900	1 1/2	2 1/2
L	27"	32"	9 1/2	4 1/4	3 3/4	18 1/4	1725	1/4 H.P.	900	2 1/2	7 1/2
C	27"	50"	14 3/4	6 1/4	20 1/2	4 3/4	1725	1/2 H.P.	1100	7 1/2	25
R	28"	56 1/2	15 3/16	6 1/4	24 1/4	5 1/4	1725	1 1/2 H.P.	1100	25	45

	TYPE "A"	TYPE "L"	TYPE "C"	TYPE "R"
STEAM CAPACITY	750 SQ. FT.	2400 SQ. FT.	8400 SQ. FT.	16000 SQ. FT.
HOT WATER CAPACITY	1250 SQ. FT.	4000 SQ. FT.	14000 SQ. FT.	28000 SQ. FT.



Quiet May Domestic Installation



Quiet May Commercial Installation

Quiet May Engineering Service to Architects

The Quiet MAY Engineering Staff holds itself in readiness to co-operate promptly with architects on any Quiet MAY specification or installation problem that may arise.

Improvements or refinements that are demonstrated by Laboratory and Field tests to be valuable in furtherance of Quiet MAY durability and economical operation are immediately incorporated in Quiet MAY construction. Therefore, we cordially invite the architect to request any further information or data desired.

A Partial List of Architects Who Have Installed Quiet May Automatic Oil Burners in Their Own Homes or Offices

Bellmain
Rue Vendoine
Lyon, Rhone, France

Wesley B. Bessel
Beacon Hill
Port Washington, L. I., N. Y.

Frank Harper Bissell
Silvermine Avenue
Norwalk, Conn.

John Bruecker
347 East Carlisle Avenue
Milwaukee, Wis.

H. M. Burnham
1467 Vance Street
Memphis, Tenn.

Geo. R. Callis, Jr.
Melvin Avenue
Catonsville, Md.

Will Alban Cannon
730 Maple Avenue
Niagara Falls, N. Y.

J. E. R. Carpenter
Sands Point
Port Washington, L. I., N. Y.

Mr. Dubois
Biel, Switzerland

E. Slater Eiqert
Moreland Court
Finchley Road
London, N. W. England

W. S. Ferguson
26151 Ake Shore Boulevard
Euclid Village, Ohio

J. J. Furrey
28th Street and 15th Avenue
Beechurst, L. I., N. Y.

J. J. Gaffney
437 So. Second Street
Louisville, Ky.

A. M. Githens
623 No. Columbus Avenue
Mount Vernon, N. Y.

Thomas Saum
7514 Wydown Boulevard
St. Louis, Mo.

D. G. Tanner
Westfield Road
Birmingham, Eng.

Louis Moss
Kenwood,
North Bethesda, Md.

K. Grosz
3981 Saxon Avenue
New York, N. Y.

Herbst & Kuenzl
653 Franklin Place
Milwaukee, Wis.

Raymond M. Hood
Southfield Point
Stamford, Conn.

J. M. Howell
Kittery Point, Me.

Willis Irvin
Kalmia Hill
Aiken, S. C.

Bernard E. Jamme
26 Tulip Street
Summit, N. J.

M. C. Johnston
West Hampton
Richmond, Va.

Gilbert Karges
1426 Aiken Drive
Evansville, Ind.

W. E. King
1544 Goodrich Avenue
St. Paul, Minn.

Jens Frederick Larson
Hanover, N. H.

Ritchie Laurie, Jr.
110 Shamokin Street
Harrisburg, Pa.

Lawson W. Oakes
Glendale, N. H.

Pring & Lessing
605 Market Street
San Francisco, Calif.

M. Rateau
11 Opuai de Conti
Paris, France

PETROLEUM HEAT AND POWER COMPANY

MANUFACTURERS OF

Petro-NoKol Oil Burner Equipment, Petro Automatic Boilers for Oil or Gas, Oil Burner Accessories

Distributors of Fuel Oil

FACTORY: STAMFORD, CONN.

OFFICES IN

NEW YORK, N. Y.
BOSTON, MASS.
PROVIDENCE, R. I.
PORTLAND, ME.
NEWARK, N. J.
PHILADELPHIA, PA.
BALTIMORE, MD.
WASHINGTON, D. C.
CHICAGO, ILL.
LOS ANGELES, CALIF.
PORTLAND, ORE.

SUBSIDIARY COMPANIES

BOSTON HARBOR OIL CO.
EAST COAST FUEL OIL CO.
POWER PLANT ENGINEERING CO.
PETROLEUM HEAT & POWER CO. OF CALIF.

Over a Quarter Century of Oil Burner Experience

PETROLEUM HEAT AND POWER COMPANY experience goes back twenty-eight years—to California where oil was first used for heating. Since then this company has built practically every type of equipment justified by conditions or the trend of oil burner development. Today the PETROLEUM HEAT AND POWER COMPANY probably ranks as the leading manufacturer of oil burners, with its equipment in over 70,000 buildings—ranging from modest homes to many of the largest commercial buildings in the country.

A Special Model for Every Type of Domestic, Commercial, and Industrial Heating Plant

Heating engineers and even mechanically inclined laymen have for some time recognized that though a certain type of oil burner functions perfectly in one type of heating plant under certain conditions, operating results are often quite the contrary when this same burner is employed under other conditions or installed in another type of heating plant. To provide for the widely varying conditions encountered in the field, the PETROLEUM HEAT AND POWER COMPANY manufactures a complete line of oil burner equipment, specifically designed for every operating condition. The recommendation of a PETROLEUM HEAT AND POWER COMPANY representative therefore can be relied on—for it will be the result of an impartial, unbiased analysis of the specific peculiarities of each heating or power problem.

A Public Service Enterprise—Undivided Responsibility

The PETROLEUM HEAT AND POWER COMPANY is also one of the largest distributors of fuel oil in the country. Serving as a public service enterprise, the company's responsibility is undivided where the installation of its equipment is combined with its fuel oil service.

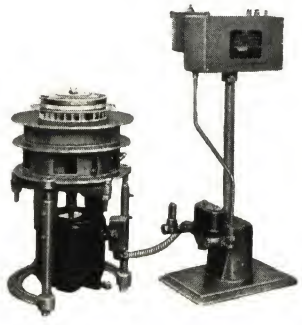
A National Engineering Service—for Architects, Engineers, and Dealers

The PETROLEUM HEAT AND POWER COMPANY maintains a special staff of oil heat experts to cooperate with architects, engineers, and its dealers. This group functions as consultants in analyzing the requirements of each installation, specifies the equipment, makes a complete layout of the job, and makes a detailed inspection of the installation when completed. This service is available at all times.

PETRO-NOKOL OIL BURNERS AND PUMPS

Model "R" Rotary Type Burner (Domestic)

The Model "R" is a fully automatic, forced draft, centrifugal atomizing burner for the small round boiler or furnace. Its design provides for complete control of the air for combustion over the oil consumption range. This assures maximum operating efficiency. The air and oil are delivered through a rotary head assembly revolving at a speed of 1750 r.p.m. Air and oil are thoroughly mixed in their passage across the deck installed to cover the grate area. Ignition, either gas or electric, takes place slightly above the base of the sections of a refractory ring provided to aid combustion. Model "R" produces the brilliant luminous flame, characteristic of all Petro-NoKol Burners. It provides the radiant heat which most boilers are designed to take advantage of. This flame is concentrated at the grate level—where the coolest water absorbs the maximum heat. Model "R" burners are built for operation with No. 2 oil or lighter, and have a capacity up to 7 gal. per hour.



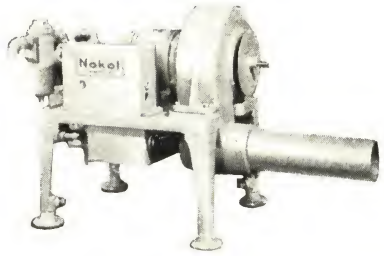
Model	Grade oil	Ignition	Motor h. p.	Gal. per hr.	Round boiler or warm air furnace, in.	Sq. in., hot air	Radiation* Sq. ft. Steam	Radiation* Sq. ft. Hot water	Max. gal. hot water per hr.**
R-1	No. 1	Gasor	1/20	½	17 to 23	452	408	653	117
R-2	or	elec-	1/20	to	17 to 26	656	543	865	157
R-3	No. 2	tric	1/20	3¾	22 to 30	807	725	1,160	210
R-4			1/20		22 to 30	1,414	1,300	2,100	375

*Total equivalent cast-iron radiation measured at the boiler outlet.
**60% Efficiency, 100° temperature rise per hour.

Model "G" Pressure Type Burner (Domestic)

The model "G" burner is of the pressure atomizing, mechanical draft type, equipped with full automatic controls for operation on alternating current of commercial voltages and frequencies. The oil discharged from the pump passes through a Duplex Regulating Valve and is delivered to the atomizing nozzle at a constant pressure. As the finely atomized oil leaves the nozzle it mixes with the air from the fan to form the combustible.

The ignition system is designed to provide entirely dependable operation. The full electric, constant spark, maintained at the proper location with respect to the atomized oil assures the elimination of all trouble due to failure of the oil to ignite. Model "G" is designed for use with No. 3 oil or any lighter oil.



MODEL "G" BURNER

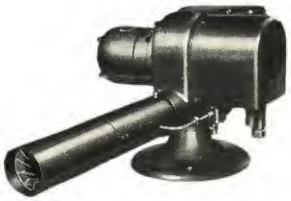
Model	Grade oil	Ignition	Motor, h.p.	Gal. per hr.	Radiation,* sq. ft.		Max. gal. hot water per hr.**
					Steam	Hot water	
G-1	No. 3	Electric	⅙	1 to 3	1,050	1,680	300
G-2	No. 3	Electric	¼	2 to 7½	2,400	3,850	700
G-3	No. 3	Electric	½	7½ to 15	5,000	8,000	1,450

*Total equivalent cast-iron radiation measured at the boiler outlet.
**60% efficiency, 100° temperature rise.

Model "P-2" Advanced Pressure Type Burner (Domestic)

A fully automatic, forced draft, pressure atomizing burner. Design provides complete control of the air required for efficient combustion over the oil consumption range assuring maximum operating efficiencies. The air is delivered to the combustion chamber through vanes arranged tangentially to the flow of air in the tube which impart to the air a centrifugal motion. This swirling stream of air mixes thoroughly with the oil atomized from the nozzle to form a lightly combustible compound. The quantity of air is regulated by means of the fan intake shutter.

The Model P-2 burner is designed for electric ignition operation and for use with No. 3 fuel oil or any lighter oil.



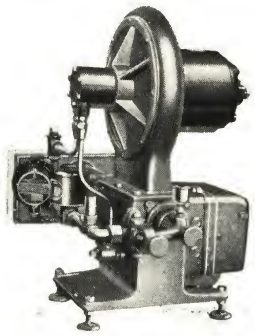
MODEL "P-2" ADVANCED PRESSURE TYPE BURNER

Model	Grade oil	Ignition	Motor, h.p.	Gal. per hr.	Radiation,* sq. ft.	
					Steam	Hot water
P-2	No. 3	Electric	¼	2 to 8	2,700	4,320

*Total equivalent cast-iron radiation measured at the boiler outlet.

Model "D" Air Turbine Driven Cup Type Burner (Domestic and Commercial)

Model "D" burners are the distinctive "air driven" rotary cup type burners, fully automatic, and intermittent firing. Model "D" burners are designed to burn commercial fuel oils No. 4 and No. 5. Ignition is accomplished by means of a gas-electric type of ignition. Model "D" is available in six sizes with capacities ranging from 2½ to 52 gal. per hour.



MODEL "D" AIR TURBINE DRIVEN CUP TYPE BURNER

Model	Grade oil	Ignition	Motor, h.p.	Gal. per hr.	Radiation,* sq. ft.	
					Steam	Hot water
D-10	No. 3	Gas-electric	⅙	2.5	750	1,200
D-11	No. 3	Gas-electric	⅙	5.0	1,750	2,800
D-12	No. 5	Gas-electric	⅓	10.0	3,500	5,600
D-13	No. 5	Gas-electric	½	20.0	7,000	11,200
D-14	No. 5	Gas-electric	1	42.0	14,500	23,200
D-15	No. 5	Gas-electric	1½	52.0	18,000	28,800

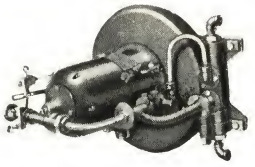
* Total equivalent cast-iron radiation measured at the boiler outlet.

Model "W" Direct Driven Rotary Cup Type Burner (Commercial-Industrial)

The Model "W" is equipped with full-automatic controls for use with No. 5 oil or lighter. It may be used as a semi-automatic unit with No. 6 oil.

The weight of the burner is not carried on oil piping. Service and mechanical attention has been minimized by design of burner. The model "W" is most advanced development of this well known type of oil burner and is adaptable to every industrial or commercial oil burning requirement.

Burners W-3 and W-4—single phase and polyphase.
Burners W-5, W-6 and W-7—polyphase only.



MODEL "W" DIRECT DRIVEN ROTARY CUP TYPE BURNER

Model	Grade oil	Ignition	Motor, h.p.	Gal. per hr.	Maximum boiler h.p.	Radiation,* sq. ft., steam
W-2	See note below	Gas-electric	¼	1 to 6	19	2,620
W-3		Gas-electric	½	5 to 20	63	8,750
W-4		Gas-electric	½	15 to 25	78	10,940
W-5		Gas-electric	1	20 to 30	94	13,128
W-6		Gas-electric	1½	25 to 45	141	19,692
W-7		Gas-electric	2	25 to 60	188	26,250

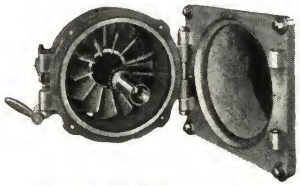
(All Model W burners use No. 5 oil or lighter when operated manually, automatically and semi-automatically. No. 6 oil when desired is used with pre-heaters for manual and semi-automatic operation.)
* Total equivalent cast-iron radiation measured at the boiler outlet.

Model "A" Air Turbine Driven Cup Type (Commercial-Industrial)

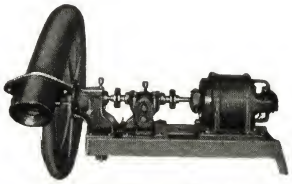
The Model "A" is designed to burn oils as heavy as No. 6 or Bunker "C." Model "A" burners are of the air driven rotary cup type and have registers through which secondary air for combustion is admitted and controlled as to volume and direction. No boiler plant equipped with Model "A" oil burning system need be shut down through failure of burner equipment, for every system can be provided with standby combination fan and pump sets and spare burner assembly. Due to the simplicity of its operation, a complete changeover of fan and pump sets and burners can be effected without any loss of boiler steam pressure.

Any Model "A" burner gun requiring inspection can be removed from its register and replaced in thirty seconds with a clean, spare gun furnished for just such purposes. All guns of the same size are interchangeable.

Capacities of from 50 to 175 b.hp. may be obtained from one burner under natural draft conditions. By the use of forced draft this capacity may be increased to 330 b.hp. Model "A" Burners can fire any boiler of any size with multiple burner installations.



Model "A" Burner and Register Assembly



Combination Fan and Pump Set

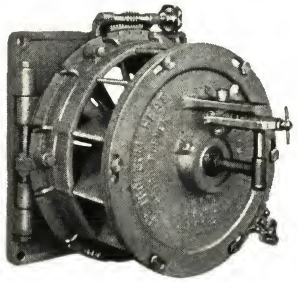
CAPACITIES OF MODEL "A" BURNERS

Model	Capacity, b.hp.	
	Minimum	Maximum
1-A	15	36
2-A	36	140
3-A	100	180
4-A	120	330

Mechanical Type (Commercial-Industrial)

Atomizes the oil by pumping it at a relatively high pressure through an atomizing nozzle. The oil is forced through the grooves in the atomizer disc toward the center where it enters tangentially by means of which a rotary motion is imparted to it as it expands through the orifice.

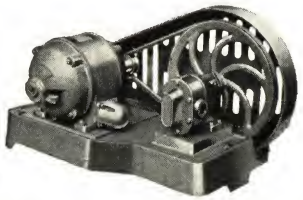
Pumping and heating equipment may be located at some distance from the boiler or in a separate room.



Boilers of any rating may be fired. Capacities of from 50 to 175 b.hp. may be obtained from one burner under sufficient natural draft conditions. By the use of forced draft this capacity may be increased to 300 b.hp. per burner assembly.

Petro-Nokol Belt Driven Pump

This pump meets the most exacting needs of present day power plants. The motor operates at a full load speed of 1,500 r.p.m. and is of ample capacity to meet load demands. Motors are available for use with any standard alternating or direct current. Pump speed is 220 r.p.m. Bunker "C" oil may be handled as readily as furnace oil.



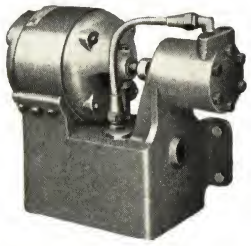
PETRO-NOKOL BELT DRIVEN PUMP

Number	Rating, gal. per hr. No. 6 oil	Motor, h.p.	Suction and discharge pipe connections, in.
012065	60	¼	½
012066	180	½	¾
012067	300	1	1¼

Belt drive pumps are designed for operating pressures up to 200 lb. per sq. in.

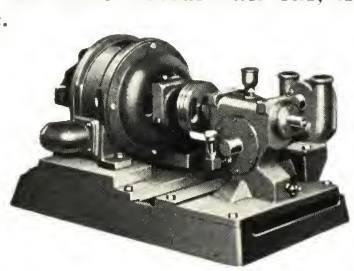
Petro-Nokol Domestic Wall Pump

This pump is especially designed for installations where fuel oil is fed to the burner by static pressure created by a column of oil. The reservoir maintains a steady head of oil. Available in two sizes, rated at 10 and 20 gallons of No. 3 oil per hour.



Petro-Nokol Worm Drive Pump

This heavy duty pump is designed for installations where regulations impose the most exacting requirements. The reduction gear transmission, which imparts the power from the motor to the fuel oil pump and reduces the speed of the pump within limits commensurate with the handling of the most viscous fuel oils, is of precision manufacture.



PETRO-NOKOL WORM DRIVE PUMP

Number	Pump	*Capacity, gal. per hr. No. 6 oil	Inlet and outlet pipe size, in.	Width of gears, in.	Pump Speed r.p.m.	Motor h.p.	Motor r.p.m.
	L-1¾x1	105	1	1⅜	166	½	1750
	L-2x1	155	1	2	166	½	1750
	L-3x1	255	1½	3	166	¾	1750

*Capacities are based on full load motor speeds of 1750 r.p.m. and No. 6 oil at a temperature of 80° F.—10 in. vacuum—50 lb. pressure.

Minimum suction pipe size for No. 6 oil—2 in.—reduced at pump.

For operation with 50 and 25 cycle motors deduct 17% from above ratings.

Pump sets are available with motors for 115 and 230 volt direct current and for 110, 220, 440, and 550 volts, single and polyphase alternating current at frequencies of 25, 50, and 60 cycles per second.

(Information on the complete line of Petro-Nokol Oil Burning Accessories will be supplied on request.)

PETRO AUTOMATIC BOILERS—FOR OIL OR GAS

The Petro Automatic Boiler is the first combination of oil burner and boiler in one handsome, automatic, self-contained unit. A highly efficient Petro-NoKol Rotary Burner is completely concealed within. Because of the fact that the burner is constructed especially for use with the boiler, efficiencies of from 20% to 30% higher are obtained than are usually found with regular conversion jobs.

Where gas is more economical than oil, the oil burner unit may be removed and a gas burner unit quickly substituted.

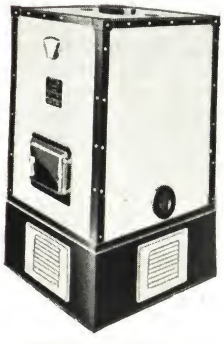
The Petro Automatic Boiler is regularly finished in tangerine or cardinal and black or in two shades of green or blue.

Equipment Includes—Burner with all fully automatic boiler and burner controls. Temperature and pressure Gauges. Boiler relief valve. Water level indicator. (Steam) Connections for Taco or similar domestic hot water supply heaters. Loop connections for standard heater.

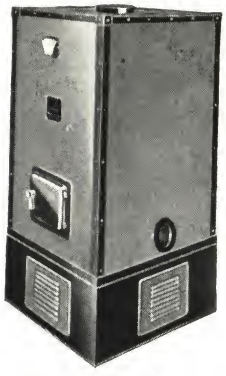
Ignition—Gas ignition for No. 3 oil. Electric ignition for No. 2 oil.

PETRO AUTOMATIC BOILERS

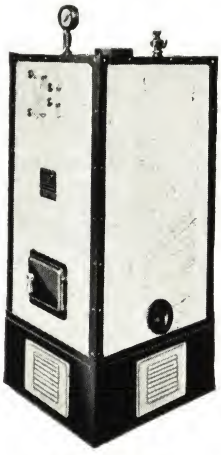
Model (S—steam) (W—water)	Radiation sq. ft.		Gal. of water per hr., (100° F. rise)
	Steam	Water	
T-S-11	285		
T-W-11		456	82
T-S-12	390		
T-W-12		564	112
T-S-13	495		
T-W-13		624	142
T-S-14	600		
T-W-14		960	173
T-S-2	800		
T-W-2		1280	230
T-S-3	1200		
T-W-3		1920	345



Model T-W-11



Model T-W-12



Model T-S-13

Model T-S-14

SUGGESTED SPECIFICATIONS FOR THE INSTALLATION OF PETRO-NOKOL OIL BURNERS

The following specifications are prepared to simplify the writing of specifications for any standard type of oil burning equipment.

The Specification Form, which embraces all parts of, or accessories to, the oil burning system is completed by the insertion of required detail regarding the particular equipment or oil burner system being specified.

All specification detail desired regarding any burner models, parts of the installation or accessories will be found in the Appendixes which follow.

Scope of Contract—These specifications cover the complete installation of oil burner apparatus and fuel oil storage system for the boiler(s) installed in.....Building at..... ..... St. ..... City.

The apparatus shall consist of.....oil burner(s) fuel oil storage tank, refractory, all necessary piping, switches, wiring and automatic controls. As required, only equipment approved by the National Board of Fire Underwriters shall be employed.

The installation shall be made in a manner which complies with the regulations of the National Board of Fire Underwriters and with regulations of local authorities having jurisdiction.

The oil burner(s) shall function to burn efficiently fuel oil of uniform and standard specifications within the scope for which the burner(s) is (are) designed, and to fire the boiler(s)—furnace(s) at the proper rating.

Liability—The contractor shall assume, etc.

Completion of Work and Payment—The work is to be completed, etc.

Materials—All materials, etc.

Cutting and Patching—The contractor shall do all, etc.

Cleaning Up—The contractor shall promptly, etc.

Additional Data—All exposed piping, conduit, and scratched places shall be painted to match other new similar adjacent material.

Oil Burner Apparatus—See Appendix A.

Combustion Chamber—The combustion chamber shall be formed of high grade hard baked or plastic refractory and shall conform to the burner manufacturer's specifications for the oil burning equipment installed. All grates and other boiler or furnace appurtenances removed for the installation of the burner(s) shall be stored in the basement where directed.

Fuel Oil Storage—See Appendix B.

Piping *(Domestic)*—All piping required for the operation of the oil burning equipment shall be installed. Materials and workmanship shall be of the best quality and shall conform in every detail to standard specifications.

The fill line shall consist of 2-inch standard black steel pipe, equipped with a suitable lock type fill box properly located for the delivery of fuel oil to the tank.

A separate sounding line shall be provided where necessary.

A vent pipe terminating in an approved screened vent cap shall be installed.

The suction line(s) shall consist of standard weight steel or wrought iron pipe or approved copper tubing of size suitable for burner(s) installed. Iron or steel suction piping installed underground or exposed to moisture shall be galvanized. A separate suction line shall be provided for each burner installed and the installation and equipment shall conform to the specifications of the burner manufacturer for the particular class of oil burning equipment employed. All suction piping shall be submitted to a vacuum test before being placed in service and shall be absolutely tight.

Return line(s) shall be not less in size than suction line(s) or, provided a single return line is employed for a multiple burner installation, the size of the return pipe shall be not less in area than the aggregate size of the several suction lines.

All black iron or steel piping installed underground or in any way exposed to moisture shall be painted with two coats of asphaltum or equal rust preventative.

Piping installed through building walls shall be suitably sleeved and packed to prevent injury from vibration or entry of water through wall.

All piping shall be rigidly supported and protected in so far as possible from mechanical injury.

Suction and return piping shall not be installed on ceiling or on rafters or studdings where vibration may prove objectionable.

When practicable, piping should be installed in a trench where crossing basement floors.

Commercial—Industrial—There shall be installed a complete system of piping to enable pump(s) to draw oil from (either) tank(s) (to independent suction line) and deliver same to the burners. Suction line to be.....black iron pipe. A..... return line shall be run from the fuel oil pump back to the tank. A vent line shall be run from the oil storage tank to a point outside the building. A.....fill line shall be run from the tank to an approved fill box. Fill line shall be terminated inside the tank with a return bend to form a liquid seal.

To be specified if desired by the architect (a) scavenging or sludge removal lines; (b) steam smothering lines.

Pipe Covering *(Commercial—Industrial)*—All hot oil, steam and drip lines and heaters shall be covered with a 1-inch thickness of 85% magnesia covering. Pipe covering to be canvas covered, banded or sewed to match pipe covering used on the heating system.

Wiring—All wiring shall comply with the National Electric Code. The burner wiring shall be run from service box independent of all other wiring.

Thermostat Control *(Domestic)*—The thermostat shall be installed in the ..... room, 5 ft. from the floor, removed as far as is practical from any and all warming influences, such as radiators, hot water pipes, etc., or possible cooling drafts.

Limiting Control *(Domestic)*—A maximum (pressure) (temperature) control shall be installed on the boiler or furnace in accordance with the manufacturer's printed instructions. This control shall be wired so as to automatically prevent creation of excessive (pressure) (temperature) in the boiler or furnace.

Regulators *(Commercial—Industrial)*—Contractor shall furnish and install at (each) boiler(s) an oil flow regulator valve actuated by steam pressure to automatically control burner(s) operation so as to maintain a constant steam pressure.

In General—The omission from these specifications of any minor detail of construction, installation, material, specialties, etc., shall not relieve the contractor from furnishing same in place complete and such omissions shall not entitle contractor to make claims or demands for extra materials or labor. However, in the event that unusual water is struck or if quicksand, rock or other unusual obstructions are encountered, the contractor shall proceed with the necessary special construction that is involved, for which the contractor will receive a sum equal to the actual cost of such special work plus.....per cent. The word "cost" as hereinabove used shall be understood to consist of actual field cost and overhead.

The contractor shall obtain and pay all necessary inspection fees and permits required to place this equipment in operation.

The contractor shall operate this oil burning system in the presence of and to the satisfaction of the architect, owner and consulting engineer.

The owner shall furnish all fuel, water, apparatus and connections required to make operating tests.

Adjustment—The contractor shall agree to provide free inspection and adjustment of the oil burner installation for the first heating season during which the installation is made. The heating season shall be considered as beginning September first for installations made during the summer.

Guarantee—The contractor shall guarantee to make good by replacement or repair any original defects in parts, material or workmanship previously specified or described; provided that this obligation is assumed only in event that written notification of such alleged defect be given the contractor within a period of one year after said equipment has been installed.

Appendix A

Oil Burner Apparatus—*Use when specifying Model R*—The contractor shall furnish and make all necessary changes in the boiler fire box, and install, completely equipped, an oil burner of the type known as Model R, as manufactured by the PETROLEUM HEAT AND POWER COMPANY; equipped with gas or electric ignition.

The oil burner shall consist of a motor, fan, and atomizing assembly.

The burner is to be installed in a (manufacturer's name) No.....rated at.....sq. ft. (steam) (hot water), which is to be connected to.....sq. ft. of equivalent cast-iron radiation measured at the boiler outlet.

Use when specifying Model G or P—The contractor shall furnish and make all necessary changes in the boiler fire box, and install, completely equipped, an oil burner of the type known as Model (G) (P), as manufactured by the PETROLEUM HEAT AND POWER COMPANY; equipped with continuous electric ignition.

The oil burner shall consist of a motor, fan and oil pump assembly, which operates as an integral unit; equipped with oil pressure regulating device which prohibits the admission of fuel oil to the atomizing nozzle until or unless adequate pressure to produce proper atomization at the nozzle has been generated by the burner.

The burner is to be installed in a (manufacturer's name) No..... rated at.....sq. ft. (steam) (hot water), which is to be connected to.....sq. ft. of equivalent cast-iron radiation measured at the boiler outlet.

Use when specifying Model D—The contractor shall furnish and make all necessary changes in the boiler fire box, and install, completely equipped, an automatic oil burner of the type known as Model D equipment, manufactured by the PETROLEUM HEAT AND POWER COMPANY; equipped with gas-straight electric ignition apparatus.

The oil burner shall consist of a motor, fan and oil pump assembly, which operate as an integral unit; and an air driven rotary cup type of fuel oil atomizing mechanism, which operates as an independent, easily removable part of the burner. The oil burner shall be of a type which mechanically generates all the air required for the clean and efficient combustion of fuel oil consumed at the burner's maximum rate of operation.

The burner is to be installed in a (manufacturer's name) No.....rated at.....sq. ft. (steam) (hot water), which is to be connected to.....sq. ft. of equivalent cast-iron radiation measured at and from the boiler outlet.

Use when specifying Model W—The contractor shall furnish and make all necessary changes in the boiler fire box, and install, completely equipped, an oil burner of the type known as Model W, as manufactured by the PETROLEUM HEAT AND POWER COMPANY; equipped for (manual operation and control) (semi-automatic operation) (full automatic) (full automatic with high-low).

The oil burner shall consist of a motor, fan, oil pump and rotary cup atomizer, which are all combined as one integral mechanical unit. The oil burner shall contain an oil adjustment or regulating valve of a type which permits temporary manual adjustment or operation without changing the burner's permanent or fixed air and oil adjustments, and shall further provide control of the primary air generated by the burner so as to produce the movement of air and oil in opposite directions off the edge of the atomizing cup, to facilitate the clean, efficient combustion of heavy fuel oils.

The oil burner system shall be of sufficient capacity to fire, with clean, efficient combustion, the.....boiler(s) at .....% of the boiler(s) rating.

The burner is to be installed in a (manufacturer's name) No. ..... rated at.....sq. ft. (steam) (hot water), or boiler horse power based on 1 boiler hp. per 10. sq. ft. of heating surface, which is to be connected to.....sq. ft. of equivalent cast-iron radiation measured at and from the boiler outlet.

Use when specifying Model A industrial equipment—The contractor shall furnish, make all necessary changes in the boiler fire box, and install, completely equipped, an oil burner system of the type known as Model A industrial equipment, as manufactured by the PETROLEUM HEAT AND POWER COMPANY.

The system shall consist of.....motor, fan and pump set(s) installed in the boiler room and an independent oil and air control assembly or register mounted on the boiler.

The oil atomizer shall be the air driven rotary cup type of mechanism, designed and constructed so as to be an independent, easily removable unit; the air control or register mechanism shall be of the type that permits complete control of all the air required for clean, efficient combustion at each burner's maximum rate of operation.

The oil burner system shall be of sufficient capacity to fire, with clean, efficient combustion, the.....boiler(s) at .....of the boiler(s) rating.

The.....burner and air register(s) are to be installed in a (manufacturer's name) No.....rated at..... sq. ft. (steam) (hot water), which is to be connected to..... sq. ft. of equivalent cast-iron radiation measured at the boiler outlet.

(Alternate for high pressure job using steam for industrial purposes). The.....burner(s) and air register(s) are to be installed in a (manufacturer's name) No.....having.....sq. ft. of heating surface and rated at.....boiler hp. Boiler will be operated at .....lbs. steam pressure.

Appendix B

Fuel Oil Storage—*Domestic (Standard 275 gallon inside tank)*—The contractor shall furnish and install one 275 gallon inside fuel oil storage tank. Tank shall be manufactured, tested and installed in accordance with local regulations or regulations of the National Board of Fire Underwriters. Tank openings shall consist of four (4) 2-in. openings in top of tank and one (1) 1-in. outlet in bottom of tank to permit gravity feed to the burner. Tank shall be given one shop coat of asphaltum or other rust proof paint.

Tank shall be rigidly installed on incombustible supports in such a manner as to insure protection against mechanical injury.

Domestic (Standard 1000 gal. outside tank)—The contractor shall furnish and install one.....gallon oil storage tank. Tank shall be manufactured, tested and installed in accordance with local regulations or regulations of the National Board of Fire Underwriters. Tank openings to consist of fill, vent, suction, return and tank gauge threaded I.P.S. openings. Tank shall be given one shop coat of asphaltum paint.

Tank shall be buried.....(where) so top of tank is at least 2 ft. below the finished grade.

Commercial-Industrial—At a point outside the building wall the contractor shall furnish and install.....-gal. oil storage tank(s). The tank(s) shall be constructed strictly in accordance with the rules and regulations of the National Board of Fire Underwriters. (Each) (The) tank(s) shall be fitted with a standard manhole,.....fill pipe connection,.....suction pipe connection,..... connection for vent,.....connection for sound lines,..... fuel oil return connection, and any and all other connections required by the oil burner system. Tank(s) shall be given a heavy coat of ashpaltum paint and, before backfilling, all underground piping shall be painted with a heavy coat of asphaltum paint.

Tank Excavation (Domestic)—All excavating, backfill, concrete work, cutting and patching, trenching, etc. shall be done by (oil burner contractor) (general contractor) according to the plans and in accordance with the requirements of the oil burner contractor.

Appendix C

Fuel Oil Storage Indicating Device—.....Model..... ....shall be furnished and installed in the boiler room to indicate at all times depth of oil in the oil storage tank(s).

Strainers *(Commonly specified only for industrial and commercial installations)*—Duplicate strainer(s) will be installed in suction line to (each) pump. Strainer(s) will be of a type adapted to installation so that they may be cleaned without changing pumps, lines or interrupting service of burner(s).

Gauges, Thermometers *(Commonly specified only for industrial and commercial installations)*—Oil pressure gauge(s) shall be installed to indicate oil pressure at the pump(s). One oil pressure gauge shall be located at each boiler. Pressure gauges shall be.....or equal, graduated from..... to 100 lb. having a 3 in. dial.

A thermometer shall be located in the oil suction line at the pump(s). A thermometer shall be located at (each) boiler(s). Thermometer shall be graduated from 30° F. low pressure heating jobs to 240° F.

Steam traps of the same type and manufacture as is used throughout the building in the heating system shall be installed with all oil heaters.

Steel Front Plates *(Commonly specified only for industrial and commercial installations)*—Necessary steel boiler fronts shall be furnished and installed ready for the mounting of the burner(s) with the necessary openings, fastening holes, toppings, etc., by (contractor) (boiler manufacturer).

Instructions *(To be specified where desired or required)*—The contractor shall furnish the owner with an experienced operator who will be in charge of the oil burning equipment, for the purpose of instructing regular boiler room attendants in the care and operation of the oil burning system, for a period of one week.

Suction Heaters *(Required only where oil is preheated)*—The contractor shall install in the suction line in close proximity to the tank (s) (as shown) a manifold type of heater for the purpose of reducing the viscosity of the oil to permit free flow to the pump(s). No heaters of any kind will be permitted in the tank (s). Heater shall be of sufficient capacity to heat the amount of oil pumped to a temperature not to exceed 110° F. when supplied with steam at .....lb. pressure.

Discharge Heaters *(Required only where oil is preheated)*—The contractor shall install in the discharge line (single) (duplicate) discharge heaters having a capacity to heat the required amount of fuel oil to the temperature best suited for operation of the burner (s) when firing the boiler (s) under maximum load. Heaters shall be provided with a 3-valve bypass. Each heater is to be provided with relief valve protection.

Electric Heaters *(Required only where oil is preheated)*—The contractor shall install at each boiler a 2500-watt electric immersion heater with 3-heat switch control. Electric heaters are to be used only for the purpose of starting a cold boiler when no steam is available for the steam preheaters.

Temperature Control *(Required only where oil is preheated)*—A ..... temperature regulator shall be installed in the oil line at the discharge side of the discharge heaters to maintain a constant temperature on the oil, irrespective of the quantity of oil passing through the heaters. The regulator valve shall be provided with a 3-valve bypass.

High Pressure Installation—Steam traps shall be installed at suction and discharge heaters. Traps shall be of the open float type, as manufactured by ..... and shall be provided with a 3-valve bypass.

RAY BURNER COMPANY

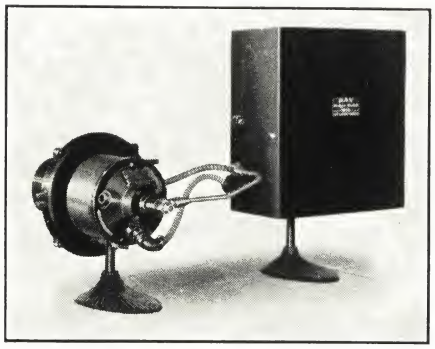
401 Bernal Avenue
SAN FRANCISCO, CALIF.

AUTHORIZED SALES AND SERVICE DEALERS IN ALL PRINCIPAL CITIES

Products

RAY OIL BURNERS.
RAY COMBINATION GAS-OIL BURNERS.

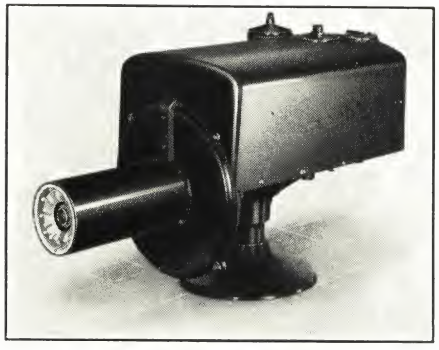
Manufactured in fully automatic, semiautomatic and manual types and in the sizes necessary to meet all domestic, commercial, industrial and marine requirements.



Ray Midget Automatic

Ray Midget Automatic

A fully automatic, straight electric oil burner with the Ray Ring of Fire line voltage ignition. Designed to meet the heating requirements of small homes, consisting of six to ten rooms. At time of going to press, this burner has passed all mechanical tests at the Underwriters' Laboratories, Inc., and listing for No. 2 Oil is pending. A very efficient unit at an astonishingly low price.



Ray Model C Automatic

Ray Model C Automatic

Fully automatic. Straight electric. Belt drive. This burner has the Ray Ring of Fire and many other advanced and desirable features. Among them, a dual pump and reservoir assembly which consolidates all mechanical controls into a single unit; a system of circulating oil through ports and channels in the castings which eliminates all piping on the burner, with the exception of one 6-in. length of copper tubing and a method of interlocking the air and oil supply which automatically varies the mixture from rich for easy starting to lean for economical running. Listed by the Underwriters' Laboratories, Inc., for No. 3 Oil.

Capacity, from 750 to 2,000 ft. steam radiation. Model C is the last word in quiet, reliable automatic oil burners at a price no greater than is asked for burners incapable of approaching its performance.

Ray Fuel Oil Automatics

We believe there are no more economical or satisfactory burners made for large home, apartment, hotel and commercial heating than Ray Fuel Oil Automatics. Gravity or dual pump feed; capacities from 800 to 19,000 ft. steam radiation. Listed by the Underwriters' Laboratories, Inc., for No. 5 Oil for models with gas-electric ignition, and No. 3 Oil for models with electric ignition.

Ray Manuals and Semiautomatics

A complete line from 1½ to 1000 hp. per unit. Capable of burning heavy fuel oil and giving satisfactory service in high or low pressure boilers, furnaces, forges, ovens, kilns, etc. Manual, or semiautomatic operation through a boiler syphon, governor or motor regulator. Direct electric motor, belt or steam turbine drive.

Current Characteristics

Ray Burners are available for operation by current of any usual voltage, cycle or phase.

Angular Vane Nozzle

All Ray Burners are equipped with the patented Ray Angular Vane Nozzle. This makes it possible to fit the flame to long or short fireboxes; it insures finer and more complete atomization; makes possible the use of less oil and heavier oil; eliminates stratification and produces a soft, turbulent flame in the firebox.

Economy

The outstanding feature common to all Ray Burners is their frugality in oil consumption. Their ability to burn cheap, heavy fuel oil efficiently, results in savings sometimes as much as 30% of the season's fuel bill.

Further Information

For further information upon the whole, or any part of the Ray line of burners, or for advice and suggestions on any specific problem involving the application of heat, consult the local Ray Dealer or write to the factory.

SILENT AUTOMATIC CORP.

Manufacturers of the Silent Automatic Oil Burner

12001 East Jefferson Avenue, DETROIT, MICH.

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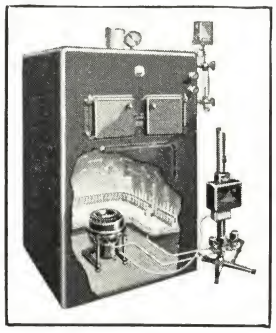
Member American Oil Burner Association

The Company Behind the Product

SILENT AUTOMATIC CORPORATION began to manufacture, sell and install Silent Automatic oil burners a little over six years ago, at a time when many companies were already well established in the field. Since 1928 more Silent Automatic oil burners have been sold and installed than any other make. This positive evidence of public preference is the direct result of sound financial strength and a manufacturing and merchandising policy which provides:

(1) A quality oil burner at a reasonable price.

(2) User satisfaction assured by the definite responsibility assumed by Silent Automatic for continuous trouble-free service after the sale.



Facilities for Oil Heating Service to Architects and Engineers

The Silent Automatic factory in Detroit is probably the largest and most completely equipped plant in the world, devoted exclusively to the manufacture of oil burning equipment. Here, Silent Automatic has established one of the finest and most up-to-date Research Laboratories in the oil burner industry, comprising a Designing and Drafting Department, Patent Office, Experimental Machine Shop, and Testing Laboratory. In addition, a Service Training School is maintained at the factory where Silent Automatic branch and dealer installation and service men must successfully complete a prescribed course of training before they are allowed to install or service Silent Automatic equipment. No Silent Automatic has ever been sold or ever will be sold except where the positive assurance of factory-trained installation and prompt service can go with it. SILENT AUTOMATIC CORPORATION is the only oil burner manufacturer to maintain a factory field service organization. At the factory and in the field trained Silent Automatic engineers are always at your service.

Underwriters' Listings

All Silent Automatic Burners, equipped with either gas or electric ignition, are listed as standard by the Underwriters' Laboratories, Inc.

Approvals and Endorsements

Silent Automatic oil burners have also been approved and endorsed by the following authorities:

New York Board of Standards and Appeals
State of Connecticut
Department of Safety, Commonwealth of Massachusetts
Modern Priscilla Test Laboratory
Popular Science Institute of Standards
Sesquicentennial International Exposition, Philadelphia, 1925
International Heating and Ventilating Exposition, Philadelphia, 1930

Laboratory

Final Inspection

Silent Automatic laboratory tests and field research determine the delivered efficiency for "Silent" installations in every standard type of boiler or furnace. Oil and air are carefully regulated and set for complete combustion. The best available instruments are used to scientifically check all installations and avoid guesswork.

SILENT AUTOMATIC DOMESTIC AND COMMERCIAL OIL BURNERS

Description

Silent Automatic pioneered the first really quiet, automatic oil burner. It is a rotary type, mechanical draft oil burner in which the air required for combustion is induced and fuel distributed by rotation of the burner head. It combines the following features:

(1) Can be applied to steam, vapor, hot water, or warm air heating plants.
(2) Listed to burn not heavier than No. 2 oil—gas or electric ignition.
(3) Is fully automatic in operation.
(4) Oil is prepared for combustion by a combination of mechanical atomization and heat vaporization.
(5) Ignition is by gas or electric pilot.
(6) Oil and air adjustments provide for flame requirements of each individual installation.
(7) Removal of the grates is the only change necessary for installation in heating plants.
(8) Capacity of burners: 350 to 6500 sq. ft. of steam radiation.

Installation

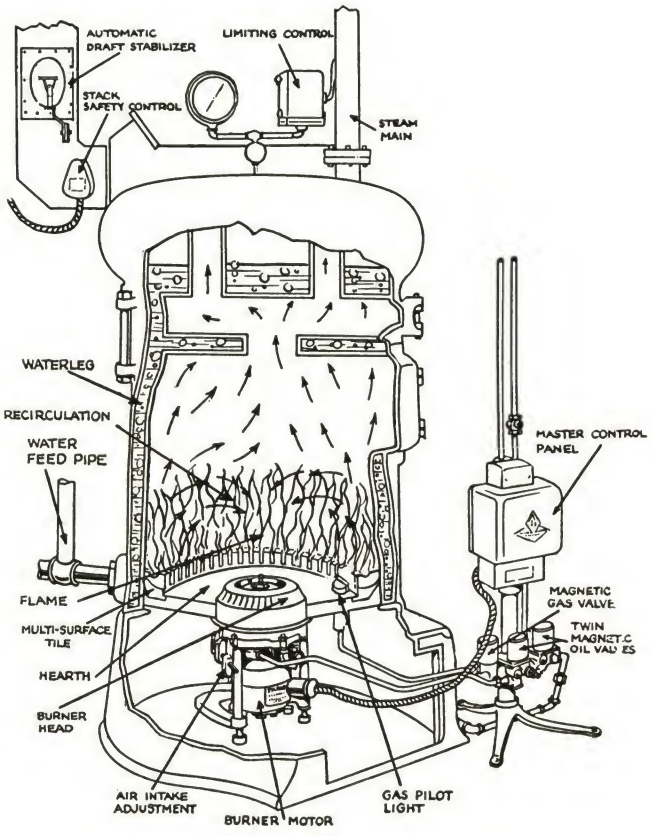
The Silent Automatic oil burner is installed centrally within the ash pit of the heater, and a refractory hearth is built from the burner to the base of the direct heating surfaces of the combustion chamber. Only the coal grates are removed. At the outer edge of the hearth, specially shaped refractory tile are used to promote proper combustion. The hearth is air-sealed in order to properly control and regulate *all* the air admitted into the combustion chamber.

The automatic controls shown outside the heater do not affect the actual construction of the furnace or boiler. The heater is not cut, rebuilt, bricked in or mutilated in any way. Every element in the entire installation is instantly accessible for examination, adjustment, replacement or service.

Principles of Operation

One important reason for Silent Automatic's outstanding performance is due to its unique method of preparing the oil for combustion, and its ability to burn it efficiently. In operation it is extremely simple and effective. Oil is supplied to the *burner* in definite quantity suited to the individual heating system. Rotation of the burner head elevates the oil, simultaneously drawing air through an adjustable *air gate,* and impels this mixture of oil and air to the outer-edge of the *hearth* where it is ignited by a *pilot* located at the *refractory tile*. The flame travels around the entire *hearth* from the *pilot* and immediately builds up a temperature in the *tile* and outer portions of the *hearth*. The hot *tile* and *hearth* serve to vaporize the oil spray passing over them, a function performed by the *pilot* at the time of starting. The flame and hot gases sweep upward against the direct heating surfaces of the heater, rapidly transferring heat to the heating system. Even after combustion, the rotating head of the *burner* draws down some of the escaping hot gases and re-circulates them with the incoming mixture of oil and air, thus aiding complete vaporization of the newly admitted mixture by raising its temperature.

A thorough mixing of the vaporized oil and air prior to ignition results in a blue base flame having clean luminous tips. The Silent Automatic method of intimately mixing oil and air permits the use of a minimum amount of air in excess of theoretical requirements, resulting in maximum combustion efficiencies. Air supplied in excess of the amount needed for complete combustion robs the fire of heat that might otherwise be transferred to the heater, and carries it up the stack as a total loss.



CAPACITIES OF SILENT AUTOMATIC OIL BURNERS

	Burner Limits		
	Model "E"	Model "A"	Model "B-L"
Maximum grate area	5 sq. ft.	12 sq. ft.	24 sq. ft.
Connected load on boiler:			
Steam	Round heaters—Maximum 600 sq. ft. Rectangular heaters—Maximum 750 sq. ft.	Minimum 350 sq. ft. Maximum 2500 sq. ft.	Minimum 2500 sq. ft. Maximum 6500 sq. ft.
Water	Round heaters—Maximum 960 sq. ft. Rectangular heaters—Maximum 1200 sq. ft.	Minimum 560 sq. ft. Maximum 4000 sq. ft.	Minimum 4000 sq. ft. Maximum 10400 sq. ft.
Warm air leader area	900 sq. in.		

Boilers

Correct boiler capacity is of paramount importance to the success of any steam or water heating system, for in addition to the necessity of having a boiler large enough to handle its load . . . it is desirable to operate it at full capacity. Intermittently firing an oversized boiler will result in comparatively short running periods and the *over-all efficiency* of a heating system decreases as the ratio of shutdown periods to operating periods increases. An overloaded boiler demands forced firing with resultant abnormally high stack temperatures and decreased efficiency.

In selecting a boiler for any given load the manufacturer's recommended interpretation of his ratings should be observed. It should also be kept in mind that when intermittent oil firing is to be used, the "pick-up" or "cold starting load" must be provided for in addition to the standing load and allowance for pipe loss. There are several factors to be kept in mind when determining which of several boilers is best suited to an oil burner installation. (Assuming, of course, that all have the proper capacity for the job.)

The boiler with a flat efficiency curve is more flexible and should be chosen in preference to one whose efficiency curve has a fairly definite peak.

A long flue travel so designed as to expose the maximum heating surface will result in the greatest heat absorption.

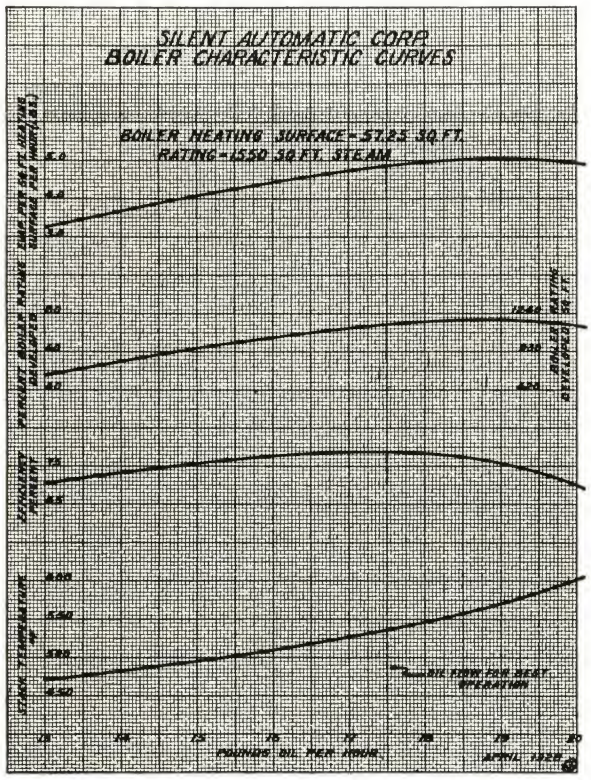


Chart Showing Boiler Efficiency Curves

To get the most out of the direct heating surfaces of a boiler, the combustion chamber design should be such that the oil flame can be applied at the base of the waterleg. By completely wiping the direct heating surfaces from the grate level upward, maximum heat absorption is obtained.

While the round combustion chamber perhaps gives better distribution of direct heating surfaces for the application of an oil flame, it is generally true that boilers of this design are less efficient than those having rectangular combustion chambers. However, a rectangular combustion chamber permits an entirely satisfactory flame application and is recommended when the length is not too great in proportion to the width. For the type of oil flame discussed here, the length should not exceed twice the width.

In sectional boilers, an increase in grate width with fewer sections gives more desirable results than a narrow grate which necessitates a long narrow combustion chamber in order to provide boiler capacity.

When setting up a boiler, particular attention should be given to the sealing of all possible air leaks. Any infiltration of air into the combustion chamber or flue passes will materially decrease over-all efficiency by robbing the boiler of heat that it would otherwise absorb. The boiler should likewise be well protected against heat loss by adequate insulation.

Warm Air Furnaces

As in the case of boilers, the capacity of a furnace is of prime importance and the best guide to correct selection is the recommendation of the furnace manufacturer.

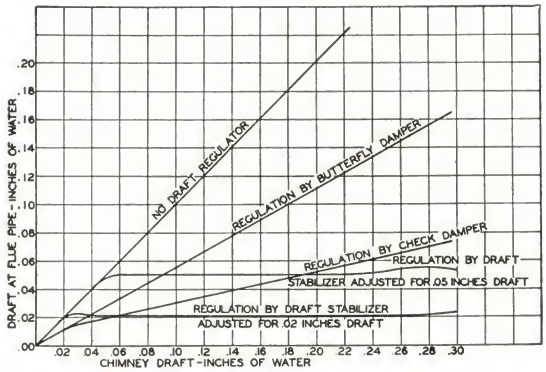
A long flue travel is desirable from the standpoint of efficiency, although it may prove somewhat detrimental to intermittent oil firing unless provision is made for temporarily short circuiting the flue travel at the time the burner starts when draft intensity is at a minimum. The furnace selected should be of gastight construction.

Having selected the furnace, installation in accordance with the Standard Code governing warm air heating systems should be definitely specified.

Smoke Pipes and Chimneys

While it is generally true that less draft is required with oil fuel than solid fuels, a margin of safety is desirable. Chimney sizes may be based on the heater manufacturer's recommendation. The construction and the installation of smoke pipes should conform to Standard Code Specifications except in so far as the installation of check dampers in smoke pipes is concerned.

An automatic draft stabilizer or control device that



The above chart graphically illustrates the variation in draft in the combustion chamber of the heater under different control conditions. Note the even draft maintained by the Silent Automatic Draft Stabilizer

will not only regulate draft but maintain it at the proper intensity in the combustion chamber under varying conditions, should be installed in the smoke pipe. A number of devices of this kind are on the market and it would be well to establish their relative merits.

CONTROL SYSTEMS, SAFETY DEVICES AND IGNITION

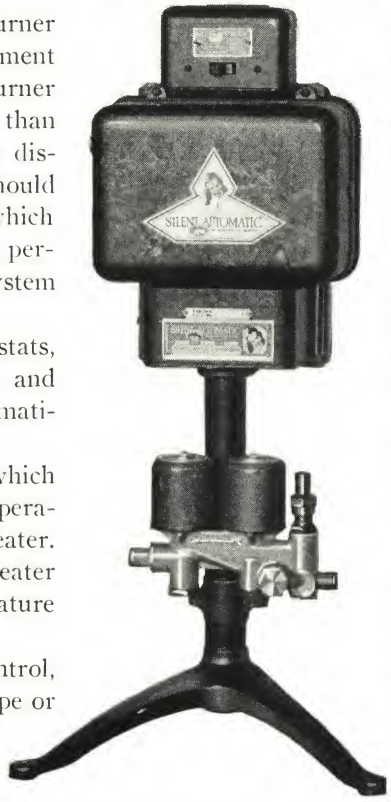
The choice of controls for a burner should be limited to the equipment furnished as standard by the burner manufacturer, for specifying other than standard equipment involves obvious disadvantages. Available equipment should have the Underwriters' approval, which will insure proper design and safe performance. A burner control system should include:

(1) Plain or Clock Type Thermostats, the latter permitting different day and night time temperatures to be automatically maintained.

(2) A Heater Limiting Control, which can be set to prevent excessive temperature or pressure developing in the heater. Such a device will also permit the heater to be operated within its best temperature or pressure range.

(3) A Combustion Safety Control, which when installed on the smoke pipe or heater flue will prevent continued operation of the burner if combustion is abnormal (viz. too much fire—too small a fire—or no fire at all).

Electric or Gas Ignition Controls are usually optional equipment and the type chosen should depend upon the conditions peculiar to any given installation. Generally speaking, gas ignition is mechanically simpler and consequently less subject to service than electric ignition although the latter sometimes has a slight advantage in operating costs.



Silent Automatic Control Assembly Consisting of Master Control Panel, Oil Valves, Line Switch and Gas Valve (or Transformer)

In addition to the controls mentioned above as being necessary to a complete burner control system, there are others which may be installed to make the heating system more completely automatic.

Automatic Water Feeders on steam boilers obviate the necessity of occasional attention to keep the boiler water at the correct level.

Automatic Low Water Cut-outs offer protection against a low water condition in the boiler by shutting down the burner even though the thermostat may be demanding heat. If both automatic water feeding and low water protection are desirable, a combination control having both features can be used.

Such additional controls are easily installed and can be readily adapted to the standard burner control equipment.

FUEL OIL REQUIREMENTS

Silent Automatic oil burners are listed by the Underwriters' Laboratories, Inc., to burn No. 1 or No. 2 oil, as a result of having passed satisfactorily all the tests required to prove their adaptability and suitability with these oils.

In many localities it is possible to obtain No. 2 oil of a uniformly good grade. Where such oil is available at a substantial price advantage over No. 1 oil, its use is recommended. Where No. 2 oil is doubtful as to uniformity or grade, Silent Automatic definitely recommends the use of No. 1 oil as the most economical and dependable fuel. This recommendation is based upon actual experience with many installations operating under widely varying conditions.

Cost per gallon is not in itself proof of economy nor is potential heat value alone a yardstick by which to measure fuel costs. Complete combustion, with a minimum of excess air . . . and efficient utilization of the heat units released are of greater consequence than the so-called advantages claimed for heavier oils. While the heavier oils contain more heat units and usually cost less per gallon as a matter of fact these apparent advantages are more than offset by the higher efficiencies obtainable with the lighter distillate oils. *Heat units must be released before they can be utilized.*

Oil must be intimately mixed with air before it can be burned. It is impractical to mix air with oil in the liquid state. Therefore, it becomes necessary to vaporize or gasify the oil before a combustible mixture can be obtained and this operation must be accomplished in the limited space provided in the average domestic heater.

The lighter distillate oils are best adapted to this application because, being more easily vaporized, a high excess of air is not required to attain proper gasification. A minimum of excess air gives a quiet, low velocity flame, allowing the hot gases a longer time in which to give up their heat and preventing an unnecessary loss up the chimney. Heavier oils require a larger excess of air for both atomization and combustion than lighter oils, and chimney losses are consequently greater and over-all economy less as a result. *Heat must be utilized to be of value.*

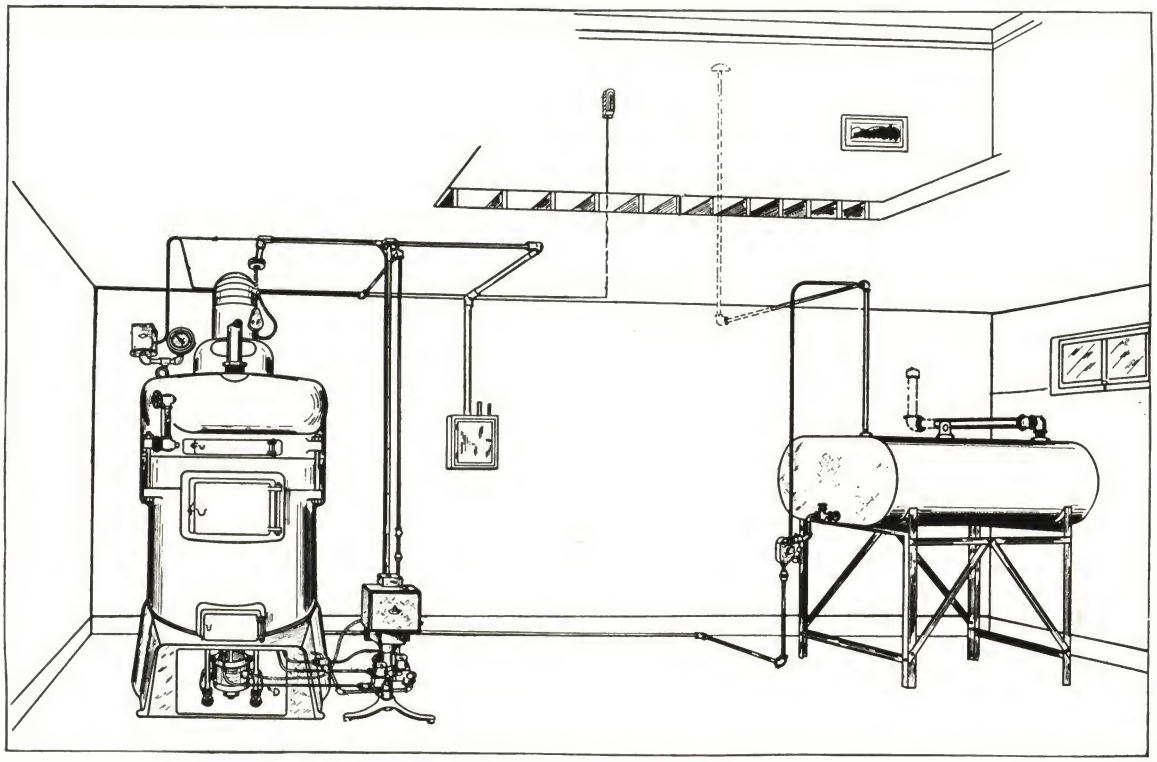
The lighter oils are also recommended because they are more uniform in quality and their characteristics are held to closer specifications by the refiner. The lighter oils are unquestionably cleaner and do not have sediment forming tendencies. Heavier oils are more difficult to handle *automatically* for by nature they tend to clog strainers and small orifices, thereby giving inconsistent performance making changes in adjustment necessary. Domestic burners using the lighter distillate oils require less service.

Fuel Storage and Delivery

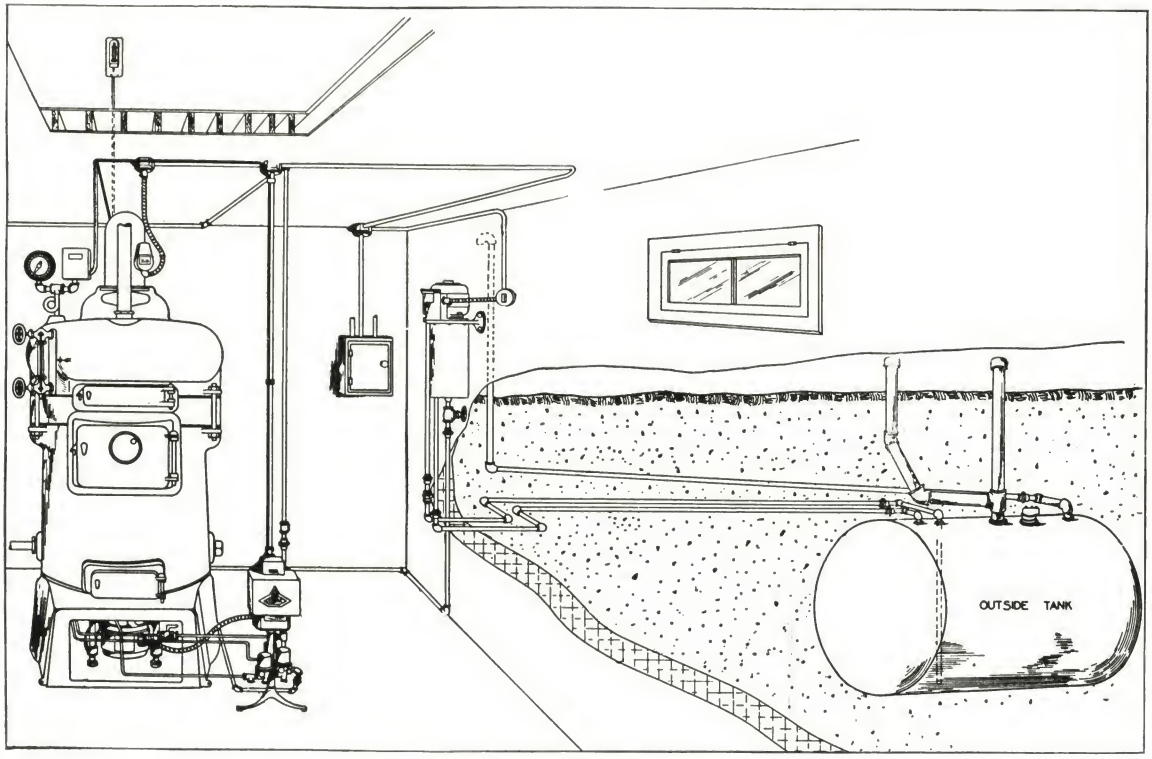
When selecting tankage for an oil burner installation, consideration should be given to governing ordinances. Available oil deliveries and price advantage (if any) for quantity delivery, should influence the size of tank chosen. Disposition of available basement space will be a determining factor in the selection of inside or outside storage as well as the relative initial installation costs of each.

The construction of the tank selected should conform to the Underwriters' requirements and those of governing ordinances. Both inside and outside tanks should have conveniently located fill pipes. An outside tank does not permit of gravity feed, and requires a fuel oil pump. Such a pump should be of the automatic type and approved by the Underwriters' Laboratories, Inc.

For convenience an automatic tank gauge may be furnished. One that can be installed in an accessible location even in the case of an outside tank installation is preferable.



Typical Inside Tank Installation



Typical Outside Tank Installation

SPECIFICATION FORM

This specification contemplates the installation of a complete Silent Automatic Oil Burning System including all necessary installation permits, oil burner, automatic controlling and safety devices, oil storage equipment, gauges, pipe and fittings, electrical connections, etc.

The entire installation should be made to conform with all governing local and State ordinances.

All materials used in the installation should be of best quality and all work executed in a neat workmanlike manner. The installation should be completely tested and inspected and left in condition for proper operation and the architect should be notified on the completion of the work.

General

The owner or contractor shall provide a suitable boiler or furnace (state size, type and name and address of manufacturer) with an adequate system of piping and sufficient radiation to guarantee the owner that the building may be heated to 70° F. in zero weather under normal operating conditions.

The owner or contractor shall provide a chimney of suitable height and cross-sectional area which shall be at least equal to the minimum requirements specified by manufacturers of the heating unit.

Burner Installation

Furnish and install one Silent Automatic, Model (state model number) Burner in (name and size of heater) in accordance with the approved installation instructions and tables issued by the SILENT AUTOMATIC CORP., Detroit, Mich. Furnish and install one Silent Automatic Draft Stabilizer in the smoke pipe.

Controls

Furnish and install one thermostat, located as indicated on plans, which will function to start and stop the burner when the room temperature varies within one degree from a predetermined setting.

Furnish and install approved automatic control to maintain safe working pressures or temperatures at the heater, according to the type of heating system, i.e., steam system, hot water or warm air system.

Furnish and install approved automatic control for regulating the burner motor current and fuel oil in a definite and positive manner.

Furnish and install an approved automatic combustion safety control which will operate to shut off the oil if it does not burn for any reason.

Furnish and install all electrical equipment and wiring required to connect the control apparatus to the motor, and all electric materials and wiring required to correct the burner unit to the lighting circuit located within the cellar or basement.

All electrical work shall be executed in accordance with the requirements of the National Electrical Code, unless otherwise required by local ordinances.

Pipe and Fittings

Furnish and install all necessary gas piping and fittings required to pipe gas from (state size) inlet located in the basement (specify distance to the burner).

Furnish and install all piping and pipe fittings to connect the fuel oil storage tank with the burner, including float strainer for supplying strained oil at a constant head.

Oil Storage

Furnish and install a suitable fuel oil supply tank (specify whether inside or outside, buried or above ground and capacity in gallons). Tank capacity shall conform with local ordinances and wherever possible should provide storage sufficient for two weeks' burner operation.

Outside Tank Installations

Furnish and install an approved automatically operated pump for pumping oil from outside tank directly to the burner or to auxiliary tank.

Guarantee

The Silent Automatic Oil Burner shall be guaranteed for a period of *one* year from date of installation by the SILENT AUTOMATIC CORP. of Detroit, Mich., against any imperfection in material and workmanship and to supply heat up to the normal heating capacity of the boiler or furnace as determined by standard heating methods; provided that the oil used is of the grade and quality specified by the Silent Automatic Research Laboratory.

The Modern Basement Is a Tangible Result, Bringing Increased Satisfaction to the Home Owner and Increased Profits to Architect and Builder

SILENT AUTOMATIC WATER HEATER

General Description

The Silent Automatic Water Heater is an automatically operated oil burning water heater which combines in one unit the quick action of the flash type water heater and the economy of the hot water service tank.

The Silent Automatic Water Heater may be used in conjunction with an indirect heater, tank or in connection with both heater and tank.

The temperature of the water is controlled by a hot water temperature regulator which automatically starts and stops the burner through a master control panel.

The water heater is compact and entirely self-contained. Water tank, burner and automatic controls are all assembled into one unit and shipped complete from the factory, making the installation extremely simple.

Fuel Requirements

Light domestic fuel oil No. 1 or 36°-40° Baume furnace oil is recommended for use with the water heater.

Power Requirements

The Model "E" burner furnished with the Silent Automatic Water Heater is equipped with a 1/40 hp. motor for alternating-current circuits of the following frequencies and voltages:

60-cycle—110 volts, 30-cycle—110 volts, 25-cycle—110 volts.

Ignition Requirements

The Silent Automatic Water Heater is equipped with either gas or electric ignition.

Capacity of Heater

The water heater is made in two sizes with capacities as shown in the following table:

GALLONS OF WATER PER HOUR

Size of heater	Temperature rise			
	100°	75°	50°	25°
No. 30	75	100	150	300
No. 50	100	135	200	400

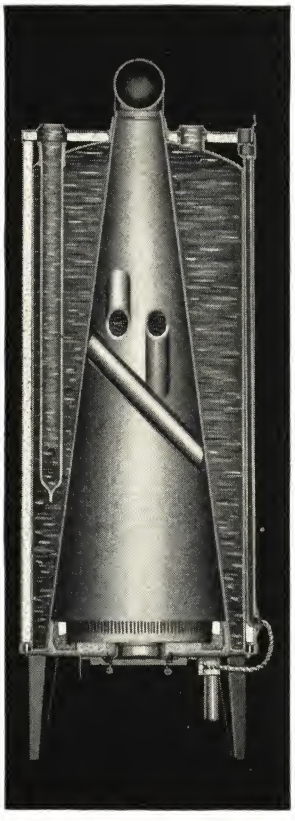
Size of Tank and Heater Required

The size of tank and heater required may be determined by the size of the building or the number of hot water fixtures to be supplied.

Size of Building Method

When the size of the building is known, the tank and heater size may be determined from the following table:

Silent Automatic Water Heater



Cut-away View of Water Heater

SIZE OF STORAGE TANK AND HEATER FOR AVERAGE CONDITIONS

(Based on Size of Building)

Size of building	Size of heater recommended	Recommended auxiliary tank capacity, gal.
Residence up to 8 rooms	No. 30	0
Residence 9 to 12 rooms	No. 50	0
	No. 30	60
Residence 13 to 16 rooms	No. 50	100
	No. 30	140
Single flat	No. 50	0
	No. 30	0
Duplex	No. 50	0
	No. 30	60
4 to 6 apartments	No. 50	120
	No. 30	140
7 to 10 apartments	No. 50	220
	No. 30	250
11 to 14 apartments	No. 50	365
	No. 30	420
15 to 20 apartments	No. 50	525

Example: In a building with 7 to 10 apartments, use the No. 50 water heater with a 220-gal. storage tank, or the No. 30 water heater with a 250-gal. storage tank.

Hot Water Fixture Method

When the number of fixtures is known, the following table of hot water fixture capacities may be used for determining the amount of storage required. The size of the storage tank should be the total storage, less the volume of the water heater (50 or 30 gal., depending on the heater used).

HOT WATER FIXTURE REQUIREMENTS, GALLONS PER FIXTURE

Fixture	Priv. res.	Apt. house	Club	Indus. plant	Hotel	Off. bldg.	Schl.
Private lavatory	3	3	3	3	3	3	3
Public lavatory	.....	5	5	15	8	5	10
Bathtub	15	15	15	30	30	.....	.....
Dishwasher	15	15	30	30	30	.....	15
Kitchen sink	10	10	20	20	20	.....	10
Laundry tubs	25	25	35	.....	35	.....	.....
Pantry sink	10	10	20	.....	20	.....	20
Showers	80	80	150	200	100	.....	200
Slop sink	15	20	20	20	30	15	20
Storage capacity as compared to maximum fixture requirements	30%	35%	40%	50%	45%	40%	40%

Note: Gallons of water per hour per fixture figured at a final temperature of 150° F.

SPECIFICATIONAL DATA

	Model No. 30	Model No. 50
Over-all height	61 in.	73 in.
Over-all width	23 in.	25 in.
Pipe connections:		
Cold water feed	¾ in.	¾ in.
Hot water feed	2 in.	2 in.
Circulation return	2 in.	2 in.
Drain	2 in.	2 in.
Storage capacity	34 gal.	53 gal.

Automatic Control System

The Automatic Control System consists of a stack mounted master control and a hot water temperature regulator.

The master control, known as a No. 44 Lockswitch, serves as master control and combustion safety control and provides complete automatic operation and control of the burner.

The temperature regulator is a low voltage Hydroswitch which serves to maintain the Water Heater at the temperature at which it is set.

TORVIC OIL BURNER CORPORATION

GENERAL OFFICES AND FACTORY
HAGERSTOWN, MD.

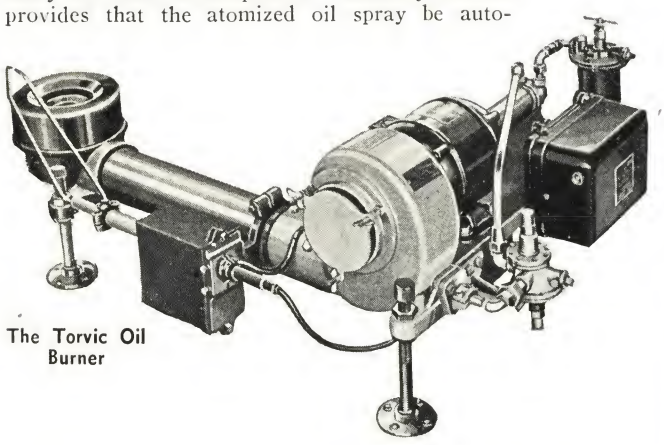
SALES OFFICES
NEW YORK, N. Y., 366 Madison Avenue CHICAGO, ILL., Conway Building

Torvic Oil Burner

For installation and automatic operation in heating plants of any type in residences, and in other buildings within scope of its capacity.

Torvic vertical atomizing type of burner is unlike any other oil burner and represents one of the greatest advances so far achieved in oil burner engineering. It burns the fuel oil in suspension and assures complete combustion.

Safe and Non-explosive—The Torvic is absolutely safe and non-explosive. A safety feature provides that the atomized oil spray be automatically turned on *after* the burner has started and be shut off before the Torvic flame is extinguished.



The Torvic Oil Burner

Underwriter Approval—The Torvic Oil Burner is listed as standard by the Underwriters' Laboratories, Inc.

Other Special Features

(1) It has no moving parts inside of boiler or furnace.
(2) Preheats air before admixture with atomized oil.
(3) Requires no fire pot or refractory of any kind.
(4) Burns with radiant swirling flame, blue-white at base and orange tipped at top. Hottest flame so far achieved in any make of burner.
(5) Distributes heat in fire chamber under sufficient pressure to cause long heat travel and maximum absorption.
(6) The Torvic method of firing permits closing damper to as much as 80% of flue opening, according to draft conditions. Instead of heat escaping up the chimney, it is utilized to the fullest possible extent on water or air surfaces and results in utmost fuel economy.
(7) Positively free of carbon formation.
(8) Creates no fumes or odors.
(9) Burns a low grade No. 3 fuel oil.

Quiet and Odorless—The Torvic Oil Burner is very quiet in operation. A low pressure fan induces the proper amount of air which is correctly carbureted with the atomized oil spray at low velocity, thus assuring a slow quiet burning flame giving intense and perfect combustion of the fuel. There are no obnoxious fumes or odors.

Fuel Economy

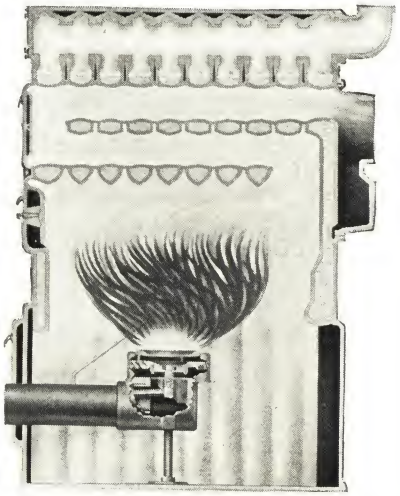
The Torvic burns No. 3 fuel oil, the heaviest of domestic fuel oils, which is about 30% more economical than lighter oils. Exhaustive tests in the laboratories of the Torvic Oil Burner Corporation show a substantial saving in most regions over the cost of burning anthracite coal, and these tests are verified actually by testimonials from many users. Reports of these tests gladly sent or request.

Design and Construction

The smooth-working Torvic Oil Burner is foolproof and trouble-free. It requires little or no attention, having only two moving parts—motor and pump—both of which are outside of the fire chamber. There are no intricate parts, mechanisms or hookups to get out of order. Very little, if any, servicing is needed once the burner is accurately adjusted for automatic operation.

Construction—All parts are of standard make and properly and accurately assembled. Every burner is thoroughly tested as an operating unit at our factory before shipment. All material and parts are of very best quality and highest grade of workmanship and finish.

Deflector Head—Unique in design. Directs the air to form a vertical, conical, spiral and swirling flame which burns the oil in suspension. Heated strata in lower part of the flame gasifies the finely atomized oil as it leaves the deflector, giving a blue-white luminous flame at the base, blending into orange color without the aid of excessive air, and reduces combustion sound to a minimum. Air being directed around nozzle absolutely eliminates carbonizing. Deflector head is stationary, has no moving parts, and is entirely of cast iron. It never becomes heated and will not wear out. Burner is adjustable to all types of boilers and furnaces and to all chimney conditions.



Close Up of Radiant Swirling Flame Showing Extra Long Heat Travel

Pump — Directly connected to a motor of standard make by a flexible coupling eliminating vibration and making burner assembly compact.

Fan — Operates noiselessly and requires no attention.

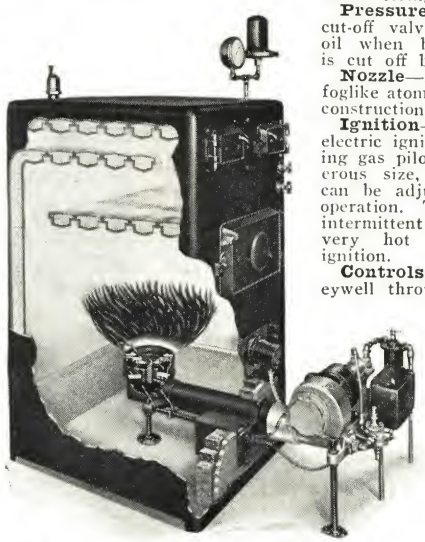
Filter—Of ample size, preventing dirt from entering pump. Easily cleaned once a season by removing plug at bottom of large sump and without disconnecting any joints. Thimble strainer is inserted in nozzle body preventing dirt entering nozzle.

Pressure Valve—Pressure and cut-off valve prevents after drip of oil when burner stops. Oil spray is cut off before motor stops.

Nozzle—Atomizing nozzle gives foglike atomization of oil, is simple in construction and easy to keep clean.

Ignition—Equipped with either electric ignition or small non-expanding gas pilot. Electrodes are of generous size, will not carbonize and can be adjusted while burner is in operation. Transformer is of grounded intermittent duty type producing a very hot spark insuring instant ignition.

Controls — Minneapolis-Honeywell throughout and are standard equipment. Controls consist of thermostat for controlling room temperature, protectorelay for controlling operation of burner, boiler control for protection of boiler and protectostat to stop burner in case of failure.



Torvic Oil Burner as Installed in a Boiler

Installation—The Torvic Oil Burner requires no refractory in fire chamber and therefore is very easy and simple to install.

MAXIMUM CAPACITIES

Model	Nozzle maximum size	Radiation, sq. ft.	
		Steam	Hot water
A	2½ gals.	875	1400
B	5 gals.	2000	3200
C	12 gals.	5000	8000

WILLIAMS OIL-O-MATIC HEATING CORPORATION

Manufacturers of Automatic and Manually Controlled Oil Burners

BLOOMINGTON, ILL.

FACTORY BRANCH OFFICES

NEW YORK, Graybar Building CHICAGO, 185 North Michigan Avenue

Products

WILLIAMS OIL-O-MATIC fully automatic fuel oil burners for residences and buildings.

For Williams Ice-O-Matic Electrical Refrigeration, see Manufacturers' Index.

WILLIAMS OIL-O-MATIC HEATING

Applications of Oil-O-Matic Heat

For every heating need, consider Oil-O-Matic automatic heating. Installed in steam boilers or warm air furnaces, a Williams fuel oil burner assures an even healthful temperature regardless of weather condition. There is no furnace work or worry. No need for you to plan room for bulky fuel storage or ash disposal. The basement becomes as clean and usable as any other part of the building. The economy and satisfaction of Williams automatic oil heating is proved by the gratifying number of new installations and the reports of satisfied users.

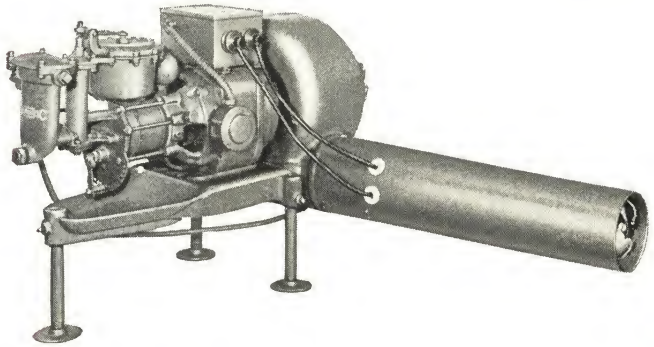
In addition to dependably heating apartments, business and public buildings, churches, schools, hospitals and greenhouses, Oil-O-Matic is being used for an endless number of business purposes. Pasteurizing milk, tempering metal, drying grain and lumber, heating large quantities of water, melting lead for typesetting machines and protecting buildings against ice as at Niagara Falls are only a few applications of Oil-O-Matic burners. Write to the Williams Engineering Department for complete information on any heating problem.

Domestic Hot Water Supply—Oil-O-Matic is ideally adapted to providing an inexhaustible hot water supply.

Service

Installation—Every Williams dealer has factory trained men who are well qualified to properly install oil burners. Williams widespread dealer organization assures service after installation. For detailed information see A.I.A. File No. 30gl, consult local dealer, or write direct to the Engineering Department at the Oil-O-Matic factory, Bloomington, Ill.

Catalogues—"Oil Heating at Its Best" and "Architects Manual of Oil Heating."



Oil-O-Matic Oil Burners

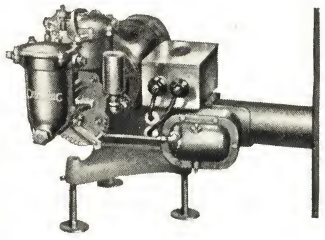
Williams Oil-O-Matic is designed, and listed by Underwriters' Laboratory, Inc., to burn Nos. 1, 2, 3, and 4 fuel oils (Diesel Oil, Pacific Coast). These fuels are almost universally available at relatively low cost and the heavier grades are, by government figures, richer in heat unit content than lighter oils. However, lighter grades of distillate oils can be burned efficiently without any burner adjustment.

The exact ratio of fuel and air for most efficient combustion is maintained mechanically—independent of natural draft or weather.

All oil is accurately metered. This measured quantity of fuel is mixed, inside the firebox, with a predetermined amount of air. Air stream is of low velocity and adjustable. This Oil-O-Matic method eliminates high pressures of oil or air and needle valve atomization.

Continuous gas pilot is not used. Automatic spark or gas ignition operates only about fifteen seconds when burner starts. Room thermostat controls operation of burner. Stack, steam and water controls are additional safeguards. No part inside the firebox—oil is burned in suspension near a refractory material as recommended by combustion authorities.

A New Oil-O-Matic for Small Homes with Hushed Heat



The new Model K Oil-O-Matic, introduced in July, 1931, is identical in principle and in all important features of mechanical design to the larger Oil-O-Matic models. In addition, Model K embodies a new development in flame projection, called because of its remarkable quietness, "hushed heat."

Flame is generated entirely in mid-air, several inches beyond the burner tip, whereby combustion roar is minimized and ignition electrodes never become fouled or carbonized. The resultant combustion in Model K, as in the larger Oil-O-Matic models, is so complete that in a proper installation there is no soot deposit whatever.

Models—There are three Williams Oil-O-Matics: the new small-home Model K, the J and the JJ. Model K will serve up to 600 sq. ft. of direct steam radiation, 960 sq. ft. of hot water radiation or warm air furnace up to 24-in. grate diameter. Model J will serve up to 1500 sq. ft. of direct steam radiation, 2500 sq. ft. of hot water radiation or warm air furnaces up to 36-in. grate diameter. Model JJ will serve up to 6000 sq. ft. of direct steam radiation, or 9600 sq. ft. of hot water radiation. Two or more burners form the most economical method of carrying larger loads.

Electrical Current Requirements

For all Oil-O-Matic models the standard motors are 110 and 220 volts, 60-cycle, a-c. or d-c. Special motors will be promptly furnished for special cycles or voltages.

Oil Storage

An outside tank of 1000 gal. or greater capacity is recommended. For small installations two 275-gal. tanks, installed inside, form the most satisfactory storage equipment. Gravity flow may be used or pump attached to burner motor. An independent pumping unit has many advantages.

THE BRISTOL COMPANY

Manufacturers of Recording, Indicating and Controlling Instruments

WATERBURY, CONN.

BRANCH OFFICES

AKRON, OHIO, 572 So. High Street
BIRMINGHAM, ALA., Comer Building
BOSTON, MASS., Consolidated Building
CHICAGO, ILL., 205 W. Wacker Drive
DENVER, COLO., U. S. National Bank Building
DETROIT, MICH., Book Building
LOS ANGELES, CAL., 747 Warehouse Street
NEW YORK, N. Y., 114 Liberty Street
PHILADELPHIA, PA., Widener Building
PITTSBURGH, PA., Koppers Building
ST. LOUIS, MO., Boatmen's Bank Building
SAN FRANCISCO, CAL., Rialto Building

Products

RECORDING and INDICATING PRESSURE and VACUUM GAUGES; RECORDING THERMOMETERS for temperatures up to 1000° F.; INDICATING and RECORDING PYROMETERS for temperatures up to 3000° F.; RECORDING VOLTMETERS, AMMETERS, WATTMETERS, all these for both permanent mounting and portable use.

TRADE-MARK BRISTOL'S REG. U. S. PAT. OFFICE

Also complete equipment for Automatic Temperature Control to use with gas, oil, steam, water and electrically heated apparatus

Bristol's Field Engineering Service

To aid in selecting the right equipment, Bristol's Field Service Engineers are available to co-operate in every way possible—for consultation, to survey conditions peculiar to individual needs, to specify equipment needed, and outline installation details. These men bring to the job over 50 years of accumulated knowledge of the Bristol's Engineering Staff. Also a wealth of personal experience gained in contact with temperature control installations covering thousands of industrial processes. This Engineering Service is offered without obligation.

For more complete information or request for interview, write nearest branch office or direct to main office at Waterbury, Conn.

Bristol's Recording Pressure and Vacuum Gauges

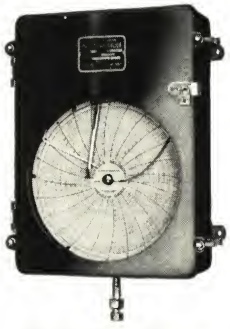
Recording Gauge
Model 11 Inverted

Recording Gauge Model 11, Inverted—This type instrument is available in two sizes, using 12-inch and 8-inch diameter charts. Can be furnished to record over any selected range from full vacuum to 12,000 pounds pressure per sq. in.

Case is constructed of an aluminum alloy (rustproof) metal and is dustproof. Can be arranged for front or back connection.

Inverted pen arm is standard though upright pen can be furnished if desired. Standard finish is black enamel.

Initial purchase includes supply of 100 charts, ink, etc.



Recording Gauge
Moistureproof—Model 40

Recording Gauge Moistureproof Model 40—The rectangular case is especially rugged; of moisture- and fume-proof construction. It is built to house the same movement as used in the Model 11.

This instrument is recommended for use where exposed to excessive dust, moisture, fumes or gases which would otherwise affect operation of equipment.

Can be furnished with inverted or upright pen arm. Illustration shows inverted pen arm. Standard case finish is black enamel.

Bristol's Recording Thermometers

For Temperatures up to 1000° F.

Recording Thermometer Model 341—The Round Form Recording Thermometer illustrated, is known as the Gas Filled Type. In operation, the gas filled system when exposed to temperature, builds up an internal pressure which causes the pen arm to record. The case is moisture- and dust-proof in construction, and instrument is standard with inverted pen arm.

Recording Thermometer
Model 341

Suitable length of armored connecting tubing allows for convenient location of the instrument with sensitive-bulb properly located in medium to be measured.

For installations where continuous records of temperature for long periods of time are desired, the Strip Chart Instrument is available. Such instruments can be furnished to supply continuous record for 45, 30 and 15 days.

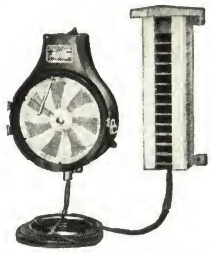
Both the Strip Chart and the Round Chart Instruments can be arranged to record more than one temperature, or temperature and pressure as the case may be.

The Strip Chart Instrument is shown arranged to record both temperature and pressure on the shame chart. Varying clock speeds are obtainable to suit practically all needs.

Strip Chart
Model 225

Bristol's Atmospheric Recording Thermometers

Recording Thermometer for Outdoor Atmospheric Temperatures — Thermometer Model 311, shown with the weather house, is designed for recording outdoor atmospheric temperatures. The weather house with sensitive-bulb is installed out-of-doors and the instrument inside the building for easy reference. This same instrument can be furnished with two pens, one for recording indoor temperatures and the other for outdoor, giving a direct comparison on the one chart. This is especially desirable in controlling building temperatures.



Outdoor Recording Thermometer
Model 311

Recording Thermometer for Atmospheric Temperatures for Portable Service—The Portable Recording Thermometer, Model 169, is an entirely self-contained unit. The perforated case admits atmospheric temperatures to the sensitive-bulb located inside the instrument. A leather handle provides ready means for carrying instrument from place to place, and metal legs for supporting in correct position on any flat surface. Such an instrument is much used in storage rooms, ventilating ducts, hotel lobbies and public buildings of all kinds.

Portable Recording Thermometer
Model 169

Bristol's Indicating and Recording Pyrometers

For Temperatures up to 3000° F.

Indicating Pyrometer Model 420—The Thermo-Electric Pyrometer furnished by Bristol fits many industrial uses for indicating and recording higher temperatures. The instruments are of particularly rugged quality and can be used for almost any installation with confidence of continuous operation.

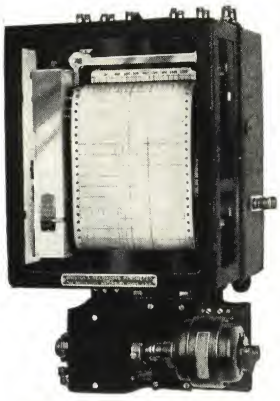
The Model 420 Indicating Pyrometer has a wide open scale which is, in actual measurement, 7 in., making it easy to read even at a distance. This instrument is equipped with automatic internal cold end compensator. Zero adjusting screw is located on outside of instrument where it is readily accessible.

Indicating Pyrometer with Multiple Rotary Switch

Recording Pyrometer Model 425—Strip Chart type, provides continuous records for 45, 30 and 15 days. This type of instrument can be furnished to make 1, 2 or more records on the same chart up to and including 6.

By the use of multiple switch arrangement, indications or records may be had from as many as 20 different sources on the one instrument.

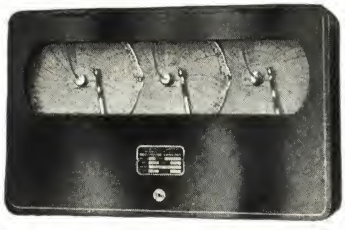
Note: In addition to Indicating and Recording Pyrometers, Bristol's Pyrometer Controllers are available for automatically recording temperatures up to 3000° F.



Recording Pyrometer
Model 425

Bristol's Recording Ammeters, Voltmeters and Wattmeters

Triplex Ammeter, Three-unit 6-in. Chart—Recording Ammeters furnish continuous records of operating current under variable load conditions together with the time and duration of current fluctuations. Furnished for all ranges of direct current as required for commercial practice or with suitable transformer equipment for higher ranges of alternating current. Instruments can be furnished in Round or Strip Chart Models for permanent or portable service.



Triplex Ammeter
Three-unit 6-in. Chart

Recording Voltmeter
Model 535

Recording Voltmeter, Model 535—Bristol's Recording Voltmeters are used to check the constancy of voltage as a safety precaution and because of the effects on the life and efficiency of equipment. Used in connection with power and lighting circuits, furnaces, ovens, electric signs, elevator equipment, etc.

Recording Wattmeter, Portable Type, Model 726—The Recording Wattmeter shown is portable strip chart type, Model 726, particularly useful for test work on polyphase or single phase alternating current.

Convenient for carrying about to obtain records of electrical consumption or load conditions. Can be furnished for alternating or direct current in types for both permanent mounting or portable service.

Recording Wattmeter
Portable type
Model 726

THE FULTON SYLPHON COMPANY

Manufacturers of Sylphon Automatic Temperature Controlling Instruments

KNOXVILLE, TENN.

SALES REPRESENTATIVES

ATLANTA, GA., Earl F. Scott, Candler Bldg.
BALTIMORE, MD., W. R. North, 27 So. Gay St.
BIRMINGHAM, ALA., Haydn Myer, 2224 Comer Bldg.
BOSTON, MASS., L. C. Price & Co., 136 Federal St.
BUFFALO, N. Y., O'Brien Steam Specialty Co., 360 Warwick Ave.
CHARLOTTE, N. C., Chas. M. Setzer & Co., 608-9 Builders Bldg.
CHICAGO, ILL., C. N. Stedman, 610 Wrigley Bldg.
CINCINNATI, OHIO, Wm. Grier, P. O. Box 75
CLEVELAND, OHIO, A. D. Porter, 320 Plymouth Bldg.
COLUMBUS, OHIO, Carl F. Lorimer, 243 No. High St.
DALLAS, TEX., Eggelhoff Engineers, 609 Construction Industries Bldg.
DENVER, COLO., Harry H. Herman, 1226-28 California St.
DES MOINES, IOWA, C. E. Gibson, 210 Masonic Temple
DETROIT, MICH., H. A. McDonald, 2-237 General Motors Bldg.
HARRISBURG, PA., Irvin H. Geiger, 600 No. Second St.
INDIANAPOLIS, IND., Hoover Bros., 1008 Majestic Bldg.
JACKSONVILLE, FLA., G. E. Osgood, 2356 Myra St.
KANSAS CITY, MO., Forslund Pump & Machinery Co., 3031 Main St.
LOS ANGELES, CALIF., R. M. Gunzel, 1015 E. 8th St.
LOUISVILLE, KY., J. Zimmerman, 330 Citizens Bldg.
MEMPHIS, TENN., J. S. Bronson, P. O. Box 6051 Crosstown Station
MINNEAPOLIS, MINN., Cash Company, 603 Washington Ave., So.
NEW HAVEN, CONN., Hoyt-Grant Co., 52 Whitney Ave.
NEW ORLEANS, LA., A. W. Shelby, 1007 New Orleans Bank Bldg.
NEW YORK, N. Y., King & Shepherd, 50 Church Street
OMAHA, NEB., D. E. McCulley Co., 1820 St. Mary's Ave.
PHILADELPHIA, PA., Sheffler-Gross Co., 211 Drexel Bldg.
PHOENIX, ARIZ., John W. Ladlow, P. O. Box 1784
PITTSBURGH, PA., Consulting Engineering Co., 313 Carson St.
PORTLAND, ORE., D. R. Munro, 201 Lumberman's Bldg.
RICHMOND, VA., John Fenzom Co., 904 Electric Bldg.
ROCHESTER, N. Y., O'Brien Steam Specialty Co., 999 E. Main St.
ST. LOUIS, MO., O'Brien Equipment Co., 2726 Locust Blvd.
SALT LAKE CITY, UTAH, J. G. & Rushby C. Midgley Co., Dooly Bldg.
SAN FRANCISCO, CALIF., R. J. Ziegler, 637 Minna Street
SEATTLE, WASH., W. W. Cox, 326 Columbia St.
SPOKANE, WASH., W. B. Starky Co., 205 Wall Street Bank Bldg.
SYRACUSE, N. Y., O'Brien Steam Specialty Co., 636 Gurney Bldg.
TOLEDO, OHIO, The Mason Equipment Co., 1914 Vermont Ave.
WILKES-BARRE, PA., P. F. Gilboy, Brooks Bldg.

EUROPEAN REPRESENTATIVES: Crosby Valve & Engineering Co., Ltd., 41-42 Foley Street, LONDON, W. 1, ENGLAND

CANADIAN REPRESENTATIVES: Darling Bros., Ltd., 140 Prince Street, MONTREAL, QUE.

Products

Patentees and manufacturers of SYLPHON TEMPERATURE and PRESSURE REGULATORS for automatically controlling temperature of liquids, gases and air.

Advantages of Sylphon Devices

All Sylphon devices embody, as motor element or diaphragm, the seamless one-piece bellows of drawn metal shown at right. There is not one bit of solder throughout its length—no chance for leaks or breaks—the most sensitive, flexible and durable expansion member known.

Operation of Regulators

Sylphon Regulators are self-contained and require no compressed air, electricity, water or other auxiliary power to operate them. They are actuated solely by changes of temperature surrounding the thermostatic element.

Sylphon TRADE MARK

Sylphon Bellows

Service and Literature

Information and engineering data on any Sylphon product and its application to specific installations will be mailed on request. National engineering service and consultation is at the disposal of all engineers and architects, without obligation. Communicate with our representative nearest you. (Listed above.)

Any or all of the following bulletins will be sent to interested parties.

Bulletin No. SAC-125 "Temperature Control of Liquids."

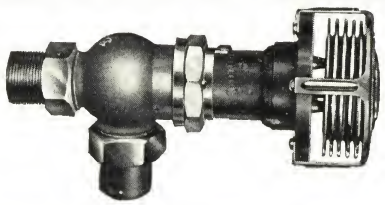
Bulletin No. SAC-150 "Temperature Control of Refrigeration."

Bulletin No. SAC-175 "Temperature Control of Air and Gases."

Bulletin No. SAC-225 "Pressure Control."

SYLPHON AUTOMATIC RADIATOR VALVE

(For complete information, ask for Bulletin No. SAC-250)



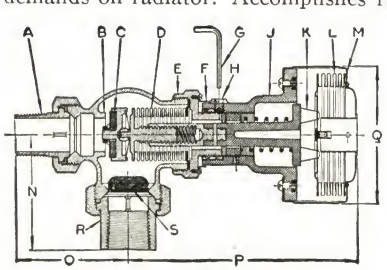
The Sylphon Automatic Radiator Valve is a combination packless radiator valve and temperature control unit to be attached to individual radiators. Suitable for any two-pipe steam heating system utilizing either floor or ceiling radiators, and where steam pressure does not exceed 10 lb. per sq. in. No complicated mechanical movements in its construction; consequently nothing to get out of order or adjustment. A complete controlling device in itself—no electrical or other mechanical accessories are needed for its operation.

This valve eliminates all radiator attention. Its valve is actuated by a thermostat and allows just the right amount of steam to enter the radiator to produce comfortable heat. It affords gradual control in exact accordance with heating demands on radiator. Accomplishes fuel economies, is simple to install, accurate in its functioning, inexpensive to buy and there is no maintenance cost.

General Construction—All parts are made of special composition brass, with the exception of insulating parts, which are made of bakelite. Highly polished nickel finished thermostatic head contrasts very pleasingly with the black bakelite and satin nickel finish of valve body with its highly polished cap nut and unions. The thermostat, powerful and sensitive in operation, consists of a Sylphon bellows with suitable heads to confine a highly volatile liquid, and is responsive to very slight changes in room temperature.

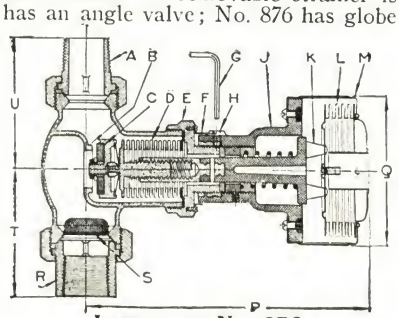
Valve is of the packless type—utilizing the Sylphon bellows to replace customary valve stem packing. Eliminates leaks and repacking of valve stems. A removable strainer is placed in inlet. No. 875 has an angle valve; No. 876 has globe valve.

Temperature setting is easily changed by merely turning thermostatic head "M."



Instrument No. 875

Valve size, in.	½	¾	1
List price, each. (No. 875 or No. 876)	$30.00	$30.00	$30.00
N	3 5/16	3 5/16	3 5/16
O	3 1/8	3 1/4	3 5/16
P	6 9/16	6 9/16	6 9/16
Q	4 3/32	4 3/32	4 3/32
T	3 13/32	3 13/32	3 13/32
U	3 5/16	3 7/16	3 1/2

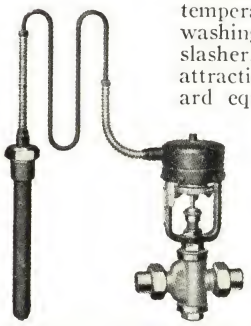


Instrument No. 876

TEMPERATURE REGULATORS FOR LIQUIDS

(For complete information, ask for Bulletin No. SAC-125)

No. 921 Temperature Regulator—An extremely neat and compact temperature regulator for controlling temperature of steam tables, glue kettles, dish-washing machines, open and closed tanks, slashers, coffee urns, etc. Its small size and attractive finish make it ideal for use as standard equipment on many kinds of apparatus. Every detail of construction has been given closest attention.



Standard regulator has iron frame, all other parts brass. Regularly finished in black japan but can be furnished nickelplated all over on special order at additional cost. Sizes ¼ to 1 in., inclusive, suitable for pressures up to 150 lb. Sizes 1¼ and 1½ in. suitable for pressures up to 100 lb.

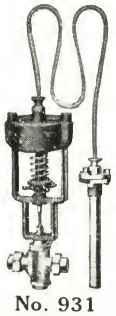
Valve size, in	¼	⅜	½	¾	1	1¼	1½
Price	$50	50	60	65	70	75	80

No. 921-Z Temperature Regulator—For controlling temperature of cooler where brine is used as coolant. Operation unaffected by temperature fluctuations at valve end, either above or below bulb temperature. Temperature ranges: —40°-0°; 0°-40°; 25°-75°; 50°-100° F.

Valve size, in	½	¾	1	1¼	1½
Price	$82	87	92	97	102

No. 930 and No. 931 Temperature Regulators—Used to automatically control temperature of liquids in open and closed tanks, vats, condensers, stills, retorts, etc. No. 930 has lever and weight adjustment, No. 931 has spring adjustment. The extreme sensitiveness, positive action and simplicity have placed these regulators in a class by themselves, and made them applicable in hundreds of ways. No. 930 is made in valve sizes from ½ to 8 in., inclusive; No. 931 in sizes from ½ to 2½ in., inclusive.

No. 930



No. 931

Valve size, in	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
Price 930	$60	65	70	75	80	90	95	100	110	120	175	225	275
Price 931	60	65	70	75	80	90	95						

No. 932 Sylphon Temperature Regulator—This regulator, for controlling temperature of liquids, is composed of three distinct and separable parts—valve, thermostatic bulb and transmission unit. Each may be separately installed, removed or replaced. Power to valve is transmitted by liquid pressure acting between two small Sylphon bellows and is frictionless. Liquid is non-freezing. These features are patented and possessed by no other regulator on the market.

Assembled

Unassembled

This regulator is particularly flexible in installation as only one part has to be handled at a time. One transmission unit fits all regulators having valve sizes ½ to 1¼ in. Another unit for valve sizes 1½ to 4 in. Connecting tubing, 8 ft. long. Longer on order.

Valve size, in	½	¾	1	1¼	1½	2	2½	3	3½	4
Price	$75	80	85	90	95	110	120	130	140	150

No. 932-Z for Control of Drinking Water—Used for control of calcium chloride brine. Valves are balanced piston type, entirely of bronze and fitted with bronze unions in sizes ½ to 1½ in., inclusive. Sizes 2 in. and above have iron bodies with bronze working parts, flanged, flanges drilled manufacturers' standard. Temperature ranges: —30°-10°; 10°-50°; 30°-70°; 30°-90°; 50°-90° F.

Valve size, in	½	¾	1	1¼	1½	2	2½	3	3½	4
Price	$97	102	107	112	117	132	142	152	162	172

No. 935 Sylphon Temperature Regulator—For control of liquids or air. Suitable for controlling temperatures of open vats, tanks, dryers, dry rooms, warming ovens, proofing rooms, etc. May be installed in any position. Extension stem is regularly furnished 12 in. long, but can be made any length on special order.

Valves are double seated balanced type with bronze discs and seats and fitted with unions, except ¼ and ⅜-in. sizes, which are all-bronze single seated, needle type, with screw ends.

Valve size, in	¼	⅜	½	¾	1	1¼	1½	2	2½
Price	$45	45	50	55	60	65	70	80	90

No. 935-Z for Control of Cold Storage Rooms and Boxes for Drinking Water—Used for control of calcium chloride brine. Valves are balanced piston type made of bronze. Temperature ranges: —40°-0°; 0°-40°; 20°-60°; 20°-80°; 40°-80°; 40°-100° F.

Valve size, in	½	¾	1	1¼	1½	2	2½
Price	$72	77	82	87	92	102	112

No. 927, 933 and 933-Z Regulators—Used for temperature control of liquids in open or closed tanks where the supply pipe can be conveniently run past the point where the bulb is installed. The valve of regulator is mounted directly on thermostatic head, making a compact installation.

No. 927

No. 933

The No. 927 Regulator is small and suitable where a small amount of steam is required.

The No. 933 Regulator is larger and is recommended for storage heaters, etc.

The No. 933-Z Regulator is used for controlling brine circulation in drinking water boxes, etc. Temperature ranges: —40°-0°; 0°-40°; 20°-60°; 20°-80°; 40°-80°; 40°-100°; 60°-100° F.

No. 941 Sylphon Temperature Regulator—For controlling temperature of liquids heated by high pressure steam. Has a self-contained, pilot operated, single-seated valve and is suitable for steam pressures up to 250 lb.

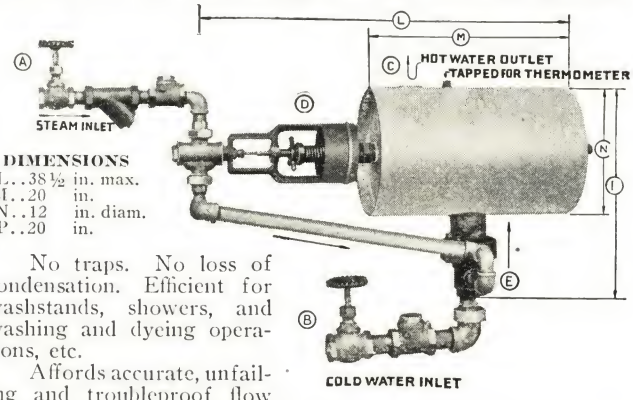
Can not be used on steam pressures less than 15 lb.

Valves ½ to 2 in., inclusive, made of bronze. Sizes 2½ and 3 in. have iron bodies, bronze working parts, flanged connections.

Companion flanges on special order at additional cost.

Valve size, in	½	¾	1	1¼	1½	2	2½	3
Price	$80	80	95	105	120	145	155	170

No. 910 Sylphon Steam Water-Mixer—Injects steam directly into the water, heating it to the required temperature.



DIMENSIONS
L..38½ in. max.
M..20 in.
N..12 in. diam.
P..20 in.

No traps. No loss of condensation. Efficient for washstands, showers, and washing and dyeing operations, etc.

Affords accurate, unfailing and troubleproof flow of hot water at just the right temperature. Temperature ranges from 40° F. to 275° F. Price $125.00 to $180.00 according to size.

TEMPERATURE REGULATORS FOR AIR AND GASES

(For complete information, ask for Bulletin No. SAC-175)

No. 11 Sylphon Liquid Transmission Regitherm—The latest development in automatic control of air temperatures for industrial uses. A simple, self-contained, sturdy instrument without complicated mechanism to continually get out of order.

Valve is mounted in steam line, Regitherm placed on wall or column 5 ft. above floor, power transmission unit is joined by means of T-slot connections.

The power transmission unit consists of two Sylphon bellows joined together by flexible tubing and completely filled with a non-freezing liquid. Tubing regularly furnished 25 ft. in length, but can be made any length required. This particular feature is covered by patents of recent date and possessed by no other temperature control instrument on the market. Regularly furnished to operate from 60° to 80° F. Other ranges available.

Regitherm Assembled

Power Transmission Unit

Valve size, in...	½	¾	1	1¼	1½	2	2½
Price	$70	75	80	85	90	100	110

No. 11-Z for Control of Cold Storage Rooms—When used for control of calcium chloride brine it is furnished with following temperature ranges: 20°-40°; 25°-45°; 30°-50°; 35°-55°; 40°-60°; 45°-65°; 50°-70°; 55°-75°; 60°-80° F.

Valve size, in	½	¾	1	1¼	1½	2	2½
Price	$92	97	102	107	112	122	132

No. 12 and No. 15 Regitherms—In residences heated by hot air, steam or hot water, the No. 12 Regitherm is an ideal house thermostat. It is mounted on the wall where it will be exposed to temperature of the air in the house, and is connected to the dampers of the heater in the basement by means of a flexible cable which is furnished with each instrument.

The Regitherm is particularly adaptable for controlling temperature in warehouses, store rooms, factory work rooms, varnish dryers, turkish bath rooms, and dry rooms of all descriptions. The No. 15 Regitherm is recommended for such service as it develops more power than the No. 12 Regitherm.

Price each, No. 12 Regitherm	$30.00
Price each, No. 15 Regitherm	36.00
Attachments to complete installation for:	
House heating (steam, hot water, vapor)	6.00
House heating (warm air furnace)	5.00
Gas and central heating	5.00
Industrial work	4.00

No. 935—Sylphon Temperature Regulator—The No. 935 Regulator is suitable for controlling temperatures of either air or liquids. See description on preceding page.

No. 942—Sylphon Temperature Regulator—For control of air temperatures in ducts or chambers when valve must be at some distance from thermostatic head. Easily installed, as valve, transmission unit and thermostatic head are separable parts.

Regulator may be installed in any position—either from top, bottom or side of duct. Thermostatic head removable from stem, so that hole cut through duct wall need be only large enough to pass a ¾-in. pipe.

Assembled

Unassembled

Valve size, in...	½	¾	1	1¼	1½	2	2½	3	3½	4
Price	$75	80	85	90	95	110	120	130	140	150

No. 942-Z for Control of Cold Storage Boxes, Rooms, etc.—Used for control of calcium chloride brine. Same construction as No. 942 Regulator described above. Available temperature ranges: —30°-10°; 10°-50°; 30°-70°; 30°-90°; 50°-90°; 50°-110° F.

Valve size, in...	½	¾	1	1¼	1½	2	2½	3	3½	4
Price	$97	102	107	112	117	132	142	152	162	172

No. 980 and No. 981 Temperature Regulators—Used to automatically control temperature of air in dry rooms, etc. No. 980 has lever and weight, No. 981 spring adjustment. The thermostatic bulb is "star shaped" design, which gives the greatest area of exposed surface in proportion to cubical content and mass of any design known. Bulb may be placed at any point, and is connected with the operating valve by a flexible tube of any required length.

No. 981

No. 980

Valve size, in	½	¾	1	1¼	1½	2	2½	3	3½	4	5
Price 980	$70	75	80	85	90	100	110	125	140	150	225
Price 981	$70	75	80	85	90	100	110	...	..	..	...

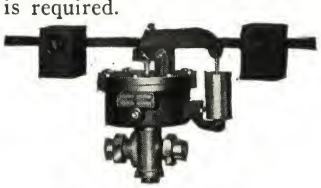
SYLPHON PRESSURE REGULATORS

(For complete information, ask for Bulletin No. SAC-225)

Nos. 950, 951 and 952 Sylphon Pressure Regulators—For controlling pressure of steam, water and air. May be used as pressure reducing valves to reduce from high to low pressure, or used in a line where pressure fluctuates to insure the delivery of uniform pressure.

Types Nos. 950 and 951 are all-metal construction—not even the customary valve stem packing is required.

No. 951 Regulator



No. 950 Regulator

No. 952 Regulator

PRICE NOS. 950, 951 AND 952 REGULATORS

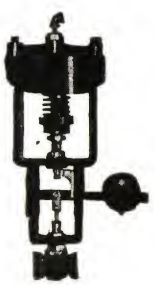
Valve size, in...	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Price	$30	30	35	36	40	45	50	60	75	90	100	120

Note: Nos. 950 and 951 not furnished in sizes ¼ and ⅜ in.

No. 955 Sylphon Interlocking Valve—A safety appliance designed to protect oil fired boilers or furnaces by automatically shutting off the oil supply when the atomizing pressure fails, or is reduced below the required minimum.

Valve is installed in fuel line and pressure of atomizing supply is admitted to Sylphon bellows chamber through a ¼-in. pipe connection at top, so that under normal condition atomizing pressure is on the bellows. Pressure acting upon bellows or diaphragm holds valve open. Should pressure drop to predetermined minimum, the latch holding valve open will be immediately released, allowing weighted lever to close valve, thus shutting off fuel supply to burners. Regardless of return of atomizing pressure, the valve will remain closed until opened by hand. Easily adjusted for different pressures.

Globe pattern valves, single seated, with bronze bodies and discs, screwed ends. Valves ½ to 1½ in., inclusive, suitable for 125-lb. oil pressure. Valves 2 and 2½ in., suitable for 100-lb. oil pressure.



Valve size, in.....	½	¾	1	1¼	1½	2	2½
Price.....	$49	50	55	60	65	75	95

McDONNELL & MILLER

Wrigley Building, CHICAGO, ILL.

EASTERN OFFICE: Grand Central Terminal, NEW YORK, N. Y.

Products

McDonnell No. 30 Series Safety Feeders.
McDonnell No. 31 Emergency Switch.
McDonnell No. 28 Self-cleaning Duplex Feeders.
McDonnell No. 29 Self-cleaning Single-Valve Feeders.
Also McDonnell No. 32 Individual Low-water Cut-off.

SERVICE RECOMMENDATIONS

Boiler size, sq. ft.	Maximum boiler pressure, lbs.	Service conditions	Correct feeder
Hand or Gas Firing			
3000 or less	Vacuum to 15	Normal heating or process work	No. 30-S Safety Feeder
	Vacuum to 25	Normal heating or process work	No. 30-L Safety Feeder
Over 3000	Vacuum to 25	Normal heating or process work	No. 30-L Safety Feeder
	15 or less but no vacuum	Where condensation is apt to be held up in system	No. 28 Duplex
Any	25 to 50	Normal heating or process work	No. 29 Rotary Single Valve
Oil or Stoker Firing			
3000 or less	Vacuum to 15	Normal heating or process work	No. 30-S-31 Combination
	Vacuum to 25	Normal heating or process work	No. 30-L-31 Combination
Over 3000	Vacuum to 25	Normal heating or process work	No. 30-L-31 Combination
	15 or less but no vacuum	Where condensation is apt to be held up in system	No. 28 Duplex and No. 32 Individual Cut-off either in parallel or at entirely separate locations
Any	25 to 50	Normal heating or process work	No.29 Rotary Single Valve

Note: Minimum available water pressure must be at least 10 lbs. greater than maximum boiler pressure.

Dependable Feed Water Regulation

McDonnell & Miller Boiler Feeders offer a simple and positive means of maintaining the boiler water line in low pressure boilers. They protect the boiler from the costly repairs and shutdowns that result when someone forgets the boiler water line.

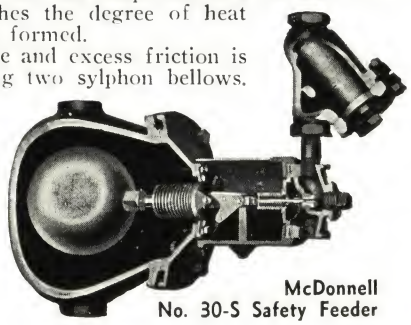
Absolute dependability is a proved quality of McDonnell Boiler Feeders.

In the No. 28 Self-cleaning Duplex Feeder it is secured through the use of rotary self-cleaning valves. In the No. 30 Series Safety Feeder it is a result of ingenious simplicity and advanced design that isolates the feed valve from the hot water of the float chamber. Additional protection is offered for oil-fired and stoker-fired jobs in the No. 31 Emergency Switch.

McDonnell No. 30 Series Safety Feeders

These feeders are used as "safety" feeders, that is, they are located below the normal boiler water line in such a position that they will feed water only when the water line drops to the danger point. Their design is the outgrowth of many years of "doing one thing well." The source of sticking and binding is removed by isolating the feed valve from the heat of the float chamber so that the temperature of the water surrounding it never reaches the degree of heat where lime and scale is formed.

The source of leakage and excess friction is also eliminated by using two sylphon bellows. One is used to take the place of a stuffing box between the float chamber and toggle compartment. The other is used between the toggle compartment and feed valve. The result is a packless and almost frictionless feeder.

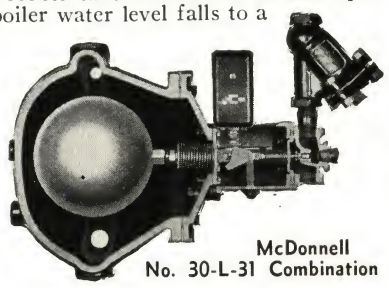


McDonnell No. 30-S Safety Feeder

The No. 30 Series is made in two sizes: 30-S (small) for boilers under 3000 ft. capacity; 30-L (large) for boilers above this size (see service recommendations).

McDonnell No. 31 Emergency Switch

Particularly on oil fired or stoker fired jobs where the particular boiler is subject to priming or foaming, the McDonnell No. 31 Emergency Switch when added to the No. 30-S or 30-L offers the double protection of feeder and low water cut-off at the lowest possible cost. The feeder takes care of all normal operations—opens when the boiler water level falls to a point 1½ ins. above the bottom of the gauge glass. If, however, a priming or foaming condition draws out water faster than the feeder can supply it, the switch stops the burner until the feeder catches up and then turns the control of the boiler back to the feeder.



McDonnell No. 30-L-31 Combination

Typical Specifications No. 30 Series

If hand fired or gas fired

Furnish and install on each (low-pressure heating boiler) one McDonnell No. 30 (-S or -L) Safety Feeder.

If oil fired or stoker fired

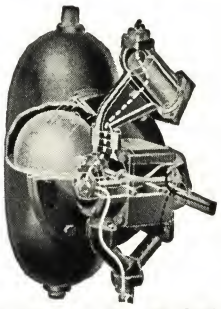
Furnish and install on each (low pressure heating boiler) one McDonnell No. 30 (-S or -L) Safety Feeder with No. 31 Emergency Switch.

Installation to be in accordance with diagrams and detailed instruction sheet furnished by the manufacturer.

McDonnell No. 28 Self-cleaning Duplex Feeder

This feeder is used on boilers requiring protection against excess return of condensation as well as low water. It prevents flooding by draining off the surplus, and also feeds the make-up water when the boiler water line drops.

The outstanding features of the No. 28 Self-cleaning Duplex Feeder are large capacity, superlative quality of construction, and self-cleaning rotary valves. These valves are stainless steel of file hardness, machined to highest precision. The rotary construction enables the steamfitter to adjust the water line an inch up or down after the feeder is in position. The differential between supply and overflow valves can also be adjusted to 1, 2, 3, 4, or 5 ins.



McDonnell No. 28 Self-cleaning Duplex Feeder

Typical Specifications No. 28 Self-cleaning Duplex Feeder

Furnish and install on each boiler one McDonnell No. 28 Rotary Valve Duplex Boiler Feeder, with adjustable feed level feature and adjustable range between feed and overflow. Installation to be completed strictly in accordance with manufacturer's detail print.

McDonnell No. 29 Single Valve Self-cleaning Feeder

This type of feeder is adaptable where the boiler is operating under steam pressure of from 25 to 50 lbs. and where water pressure is always in excess of maximum steam pressure.

It has the same general features and capacity as the No. 28 Feeder. (See service recommendations.)

Service and Information

Our Engineering Department offers prompt advisory service. Installation details will be sent by air mail covering any size or type of boiler. Descriptive literature and engineering data upon request.

ESTABLISHED 1874

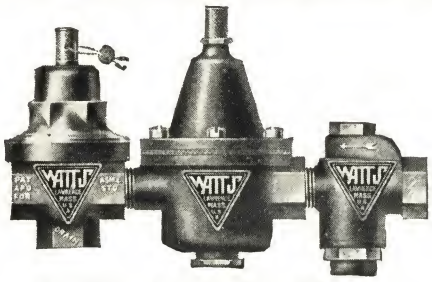
WATTS REGULATOR CO.

Manufacturers of Steam, Water and Air Specialties

241 Lowell Street, LAWRENCE, MASS.

EXCLUSIVE DISTRIBUTORS UNITED STATES: John C. Kelly, Inc., 210 East 45th Street, NEW YORK, N. Y.

Watts Hot Water House Heating Unit, Type 38



Relief Valve Reducing Valve Strainer

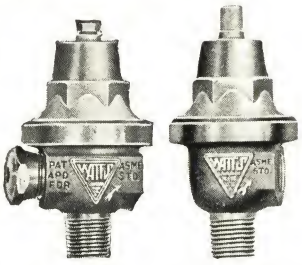
Automatically keeps system filled with water. Speeds up circulation, giving more heat at lower cost. Made entirely of bronze, so will not rust or corrode. Large waterways prevent clogging. Readily installed in new or old systems. Consists of ½-in. strainer, ½-in. reducing valve set and sealed 10-13 lbs. and ½-in. relief valve set and sealed 25-30 lbs., A.S.M.E. Std.

Length 8½ ins.; height 5½ ins.; weight 5 lbs.

Watts Diaphragm Relief Valves

A protection against excessive pressures and temperatures for boilers, tanks and pumps. Made with bronze body and forged or cast bronze dome. Diaphragm is laminated monel metal and phosphor bronze, 3 or 5-ply, attached to Jenkins disc. Large diaphragm area insures positive and accurate operation. A.S.M.E. Standard.

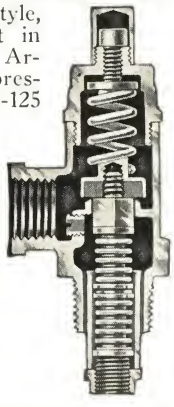
Type 30, ½ and ¾ in.; Type 300, 1 to 2 ins., inclusive. These types for pressure relief only.



Type 29 Type 30

Type 29, ½ in. only, for pressure, temperature and vacuum; Type 31, ½ in. only, for pressure and temperature, without vacuum valve. Furnished in three styles. Set and sealed and adjustable—range 30-125 lbs. in all types and sizes. Calibrated, range 75-125 lbs. in the ½-in. sizes only. Adjustments can be reset without the use of a gauge.

Adjustment feature (left) shown by Type 29 above and top view of calibrated style, ½-in. size only. Can be set in the field without a gauge. Arrow points to relieving pressure. Range of adjustment 75-125 lbs.



Watts Autotherm Relief Valve, Type 40

For range boilers, hot water storage tanks, etc. Opens and also *closes* automatically to relieve excessive temperature and pressure.

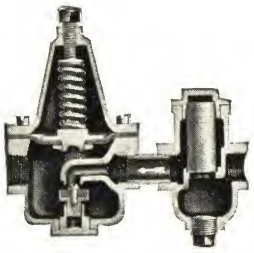
Stock valves are set to relieve at 200° F. and 125 lbs. pressure; range of pressure adjustment 50-125 lbs. ¾-in. male inlet, ½-in. female drain only.

Watts Water Pressure Regulator, Type 23

By reducing water pressure, it eliminates waterhammer damage to plumbing, and waste of water. Shuts tight against a dead end.

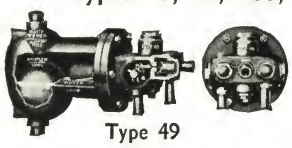
Valves are made of bronze composition, diaphragms of new live rubber. Stock valves set for 45 lbs. and are adjustable. Sizes ⅛ to 2 ins.

Watts Water Pressure Regulator with Strainer, Type 23-S

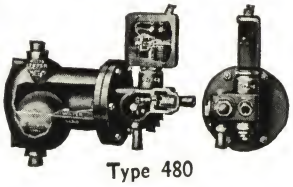


Same as Type 23, but with bronze strainer. Strainer screen is a perforated brass cylinder, readily removable for cleaning. Sizes ⅛ to 2 ins. Strainer, Type 34, sold separately. Made with large sediment space and clean-out plug. Water flows from inside. Sizes ½ to 2 ins.

Watts Boiler Water Feeder, Types 48, 49, 480, 490



Type 49



Type 480

Feeders for gas and oil fired boilers. Prevent dangerous low water. Watts dual feeder also prevents flooding.

Heavy cast iron body, seamless copper float. All other parts are bronze.

Supply and overflow connections, ½-in. iron pipe size female tappings. Steam and water equalizer connections 1-in. female.

ENGINEERING DATA

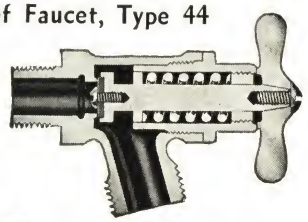
Differential	Radiation, sq. ft.	Type	Operation	Max. lbs.
15	3000	48	Water feeder only	75
30	5000	49	Dual feeder and overflow	15
50	6500	480	Feeder with low water cut-off and pressure switch	75
		490	Dual feeder with low water cut-off and pressure switch	15
		50	Low water cut-off and pressure switch	75
		51	Pressure switch only	Up to 300

Watts combined low water cut-off and pressure switch, Type 50, and Watts pressure switch, Type 51.

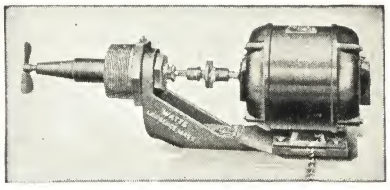
Watts Automatic Relief Faucet, Type 44

A pressure relief valve designed as a faucet, tray-bib or drain cock. Opens automatically to relieve excessive pressure.

Made in brass and bronze. ½-in. size only. Set for 125 lbs., or furnished to relieve at 100-85-60 lbs. Rough polished or nickelplated



Watts Water Circulator



For hot water heating systems and hot or cold water circulating system.

Speeds up circulation of water in heating system. Effects fuel savings up to 30% and permits more rapid heating. Noiseless in operation. Low installation and operating cost

Circulator, in.	Returns, in.	Direct radiation, sq. ft.	Gal. per hr. in circulating systems
1½	1½, 2, 2½	500	600
2	3, 3½	1000	1100
3	4, 4½, 5	2000	2500

Watts U-Tube Heat Interchangers

Copper tubes, bronze head, wrought iron shell. Instantaneous direct or indirect heating. Water tubes tested to 500 lbs., shell to 300 lbs. Suitable for heating water, oil or gas, using steam, vapor or hot water as heating medium. Sizes 300 to 6000 gal. per hour.

PIPE HANGERS & SUPPORTS

GRINNELL COMPANY

INC.

GRINNELL COMPANY, INC.

EXECUTIVE OFFICES
PROVIDENCE, R. I.

OFFICES, PLANTS AND BRANCHES

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MONTREAL, QUE. OSHAWA, ONT. TORONTO, ONT. VANCOUVER, B. C. WINNIPEG, MAN.

Pipe Hangers and Supports

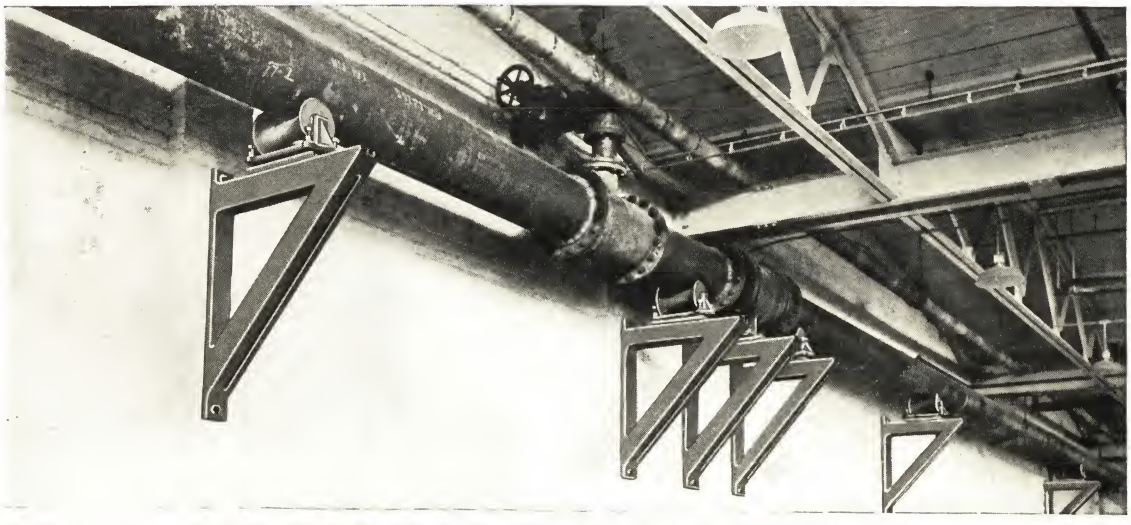
• Effect of Correct Piping on Maintenance

The consistent and lasting performance of piping systems is an important factor in the economical maintenance and efficient operation of a building. This desired result, so far as piping is concerned, is only obtainable where the architect makes certain that heating, service, sprinkler and power piping lines are *originally adjusted* to established levels and pitches and where the circulation system is made *permanently and easily adjustable* at every point.

• Efficiency of Correct Piping Supports and Hangers

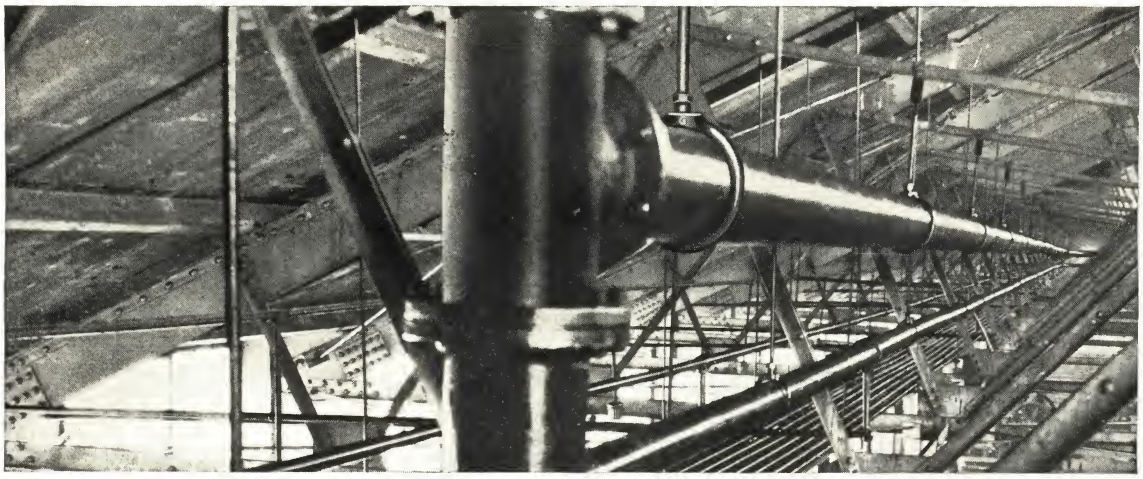
Of great importance, too, is the use of efficient anchorage methods for pipe hangers in view of the eventual settling, warping or shifting movement in the structure which may easily weaken or destroy poorly or insecurely hung lines.

Where trouble from such conditions has occurred, the reason is apt to be found in the lack of adjustability during installation, or more often after piping was erected.



Typical Installation of Welded Steel Brackets Anchored with Bolts Through Brick Wall and Carrying Heavy Pipe Lines on Adjustable Pipe Stands

Expansion and contraction is fully provided for and the feature of adjustability makes it possible to establish and maintain correct alignment at all times



Perfect Alignment in a Thousand Feet of Heating Pipe Insured by the Use of Adjustable Pipe Hangers

ADJUSTABLE PIPE HANGERS vs. STRAP HANGERS

The Old, Inefficient Method Using Strap Iron Hangers Results

1 Unsightly and careless workmanship.

2 No standard method of anchorage, resulting often in expensive and inefficient hanging.

3 Only crude adjustments are possible, affecting the efficiency of installation.

4 Ultimate sagging of pipe lines, difficult to correct.

5 Weight of pipe unevenly distributed on hangers.

6 No provision for expansion and contraction, subjecting hanger to enormous overload and strain.

7 Higher labor costs to install and maintain.

8 Damage and expense due to sagging or other disturbance to the lines.

The Modern, Efficient Method Using Adjustable Pipe Hangers Results

1 Neat and efficient installation.

2 As explained hereinafter, Grinnell Company has developed practical types of hanger anchorages.

3 Minute adjustments can be made at all times, making it possible to line up pipe quickly and exactly.

4 Sagging in pipe line can be corrected instantly.

5 Weight of pipe evenly distributed by simple adjustment.

6 Full provision for expansion and contraction.

7 Rapid installation and easy maintenance means low labor cost.

8 Damage and expensive leaks prevented by adjustability which makes it possible to keep pipe lines in correct position at all times.

ADJUSTABLE FEATURES OF GRINNELL HANGERS

The feature of adjustability in Grinnell hangers makes it possible to install and "true up" pipe lines in less time than that represented by the old method of strap iron hangers with which it was necessary to prop up the lines and trust to good fortune that the crude adjustments possible would establish proper pitches and rigidity. Thus, through the elements of time-saving and adaptability, the use of adjustable pipe hangers represents no greater cost than the old system and carries with it positive assurance of a considerable saving in maintenance and operation cost and effectually secures the trimness of appearance which the architect finds so desirable.

It is a plain fact that the adjustable feature of any pipe line must be found in the supporting hangers and that the correct provision of this adjustment factor will not only facilitate proper installation but will afford a degree of controlled flexibility which without cost may easily eliminate sagging or improper leverage conditions as they develop.

The various types of adjustable pipe hangers illustrated herewith represent the solutions of practical piping problems of every kind. Having once examined the following pages and having been assured of the correctness and adaptability of this line of adjustable pipe hangers, the architect can forget the detail of pipe line installation and insure its efficiency and correctness by using the simple specifications set forth on page 10.

GRINNELL ADJUSTABLE PIPE HANGERS

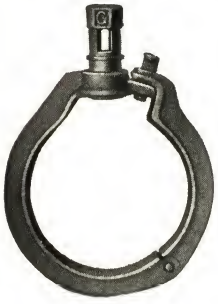
No. 101
Adjustable
Swivel
Ring

No. 101 Adjustable Swivel Ring—Malleable Iron

The Adjustable Swivel Ring is the modern efficient method of providing for the most minute adjustments in hanging pipe lines resulting in the perfect alignment of pipe. The unusual feature of this ring is the swivel shank which allows an adjustment of about 2 in. by simply turning the nut on the shank to the left or right. No temporary support is necessary while making adjustments—a fact which insures careful and rapid installation. The ring and shank, while two separate pieces, are cast as one unit. The swivel shank automatically locks when pipe is in desired position, preventing loosening due to vibration and assuring proper pitch of line at all times.

Made for use with ¾, 1, 1¼, 1½, 2, 2½, 3, 3½, 4, 5, 6 and 8-in. pipes. This Adjustable Swivel Ring is used with practically every type of ceiling flange, expansion case, insert and other pipe anchorages shown on the following pages.

Considering its adjustable features, compact strength, and moderate price we believe that there is no other pipe ring on the market which can be compared to the Adjustable Swivel Ring as an efficient, economical and labor saving device. The use of this ring means lower labor costs and decreased maintenance.



No. 104
Adjustable
Swivel Ring—
Split Type

No. 104 Adjustable Swivel Ring—Split Type—Malleable Iron

The Split Ring Type of Adjustable Swivel Ring can be used with coach screw rod or machine threaded rod in the same way as the solid ring type shown above. It has the same style of swivel shank with the same adjustable and automatic locking features.

The hinging of the ring is somewhat off center, which provides sufficient seating to hold the pipe before closing the ring. A wedge type pin is loosely but inseparably cast into the hinged section for fastening this section after the pipe is in place. Made for holding ¾, 1, 1¼, 1½, 2, 2½, 3, 3½, 4, 5, 6 and 8-in. pipes.

No. 107
Split Pipe
Ring with
Socket

No. 107 Split Pipe Ring with Socket—Malleable Iron

This is a combination split ring and socket. The socket is bolted to the ring, as shown in the illustration, and is furnished tapped for pipe thread or rod thread, as specified.

Made for holding ½, ¾, 1, 1¼, 1½, 2, 2½, 3, 3½, 4, 5, 6 and 8-in. pipes.

No. 138
Extension
Split
Ring

No. 138 Extension Split Ring—Cast Iron

This Extension Split Ring is made for holding ⅜, ½, ¾, 1, 1¼, 1½, 2, 2½, 3, 4, 5 and 6-in. pipes. It can be furnished with a ceiling flange with or without nipple.

No. 260
Adjustable
Wrought
Clevis Hanger

No. 260 Adjustable Wrought Clevis Hanger—Wrought Steel

Clevis Hangers provide for a vertical adjustment of at least 1½ in., which adjustment may be made either before or after pipe is in place. No temporary support of pipe line is necessary while adjustments are being made.

Hanger rods and supporting nuts may be locked into position after adjustment by use of the upper nuts. Made for holding ¾, 1, 1¼, 1½, 2, 2½, 3, 3½, 4, 5, 6 and 8-in. pipes.

No. 105
Adjustable
Clip
Ring

No. 105 Adjustable Clip Ring—Malleable Iron

The Adjustable Clip Ring is used with an Adjustable Clip Base and a Square Head Hanger Rod, and allows about 1½ in. adjustment, which adjustment can be easily made *after* pipe is installed by raising pipe until head of rod is close to ceiling and turning rod.

It is made for holding ¾, 1, 1¼, 1½ and 2-in. pipes only.

ANCHORS AND CLAMPS FOR PIPE HANGERS

No. 100 Adjustable Coach Screw Clip

No. 100 is a combination of Adjustable Swivel Ring No. 101 and Coach Screw Rod No. 142. It is sold complete as illustrated for hanging ¾, 1, 1¼, 1½ and 2-in. pipes.

No. 102 Adjustable Swivel Ring Hanger

No. 102 is a combination of Adjustable Swivel Ring No. 101, Machine Threaded Rod No. 140, Spring Ceiling Plate No. 133 and U. S. Expansion Case No. 117. It is sold complete as illustrated for hanging ¾, 1, 1¼, 1½ and 2-in. pipes.

No. 106 Adjustable Clip Hanger

No. 106 is a combination of Adjustable Clip Ring No. 105, Square Head Hanger Rod No. 144 and Adjustable Clip Base No. 116. It is made for hanging ¾, 1, 1¼, 1½ and 2-in. pipes.

No. 100 Adjustable Coach Screw Clip

No. 102 Adjustable Swivel Ring Hanger

No. 106 Adjustable Clip Hanger

Split Ring Hangers

No. 127—This is a combination of Split Pipe Ring with Socket No. 107 and Ceiling Flange No. 128 (pipe threaded). It is made for hanging ½, ¾, 1, 1¼, 1½, 2, 2½, 3, 3½, 4, 5, 6 and 8-in. pipes.

No. 132—This is a combination of I-Beam Clamp No. 131, Split Pipe Ring No. 108 and Sockets No. 110. Can be used with pipe nipple or threaded rod. Made for hanging ½, ¾, 1, 1¼, 1½, 2, 2½, 3, 3½, 4, 5 and 6-in. pipes.

No. 139—A combination of Extension Split Ring No. 138, a ceiling flange and 4-in. pipe nipple. Made for hanging ⅜, ½, ¾, 1, 1¼, 1½, 2, 2½, 3, 4, 5 and 6-in. pipes.

No. 127 Split Ring with Socket and Ceiling Flange

No. 132 I-Beam Hanger

No. 139 Extension Split Ring with Ceiling Flange and Nipple

No. 252 Adjustable Wrought U-Pipe Hanger

Designed primarily for hanging pipes from level ceilings or bottom of beams. Provides for 2-in. vertical adjustment. Rugged in construction with ample factor of safety. Each hanger has two drilled holes for screws or bolts and is drilled for hanger rod. Made in 5 sizes for hanging all sizes of pipe from ¾ to 12-in., inclusive.

No. 252 Adjustable Wrought U-Pipe Hanger

Pipe, Swivel and Swinging Hanger Flanges

These flanges are made in five sizes for hanging all sizes of pipe from ¾ to 12 in., inclusive. They are made in the following types:

No. 153 (Cast Iron)—Designed primarily for use on level ceilings and provides an adjustment of 1-in. where rod enters flange.

No. 154 (Cast Iron)—A semi-swinging type flange providing for a ceiling angle not greater than five degrees off level in any direction.

No. 154 Swivel Hanger Flange

No. 155 Adjustable Swinging Hanger Flange (Malleable Iron)

This is a combination of Flange No. 156 and Extension Piece No. 157. Allows a swing radius of 180 degrees and a 1-in. adjustment of the rod. Made for hanging all sizes of pipe from ¾ to 12-in.

No. 158 (Cast Iron)—A full swinging type flange through 180 degrees. Used only with special T-headed Swinging Hanger Flange Rods Nos. 146 and 147.

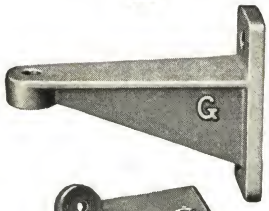
No. 155 Adjustable Swinging Hanger Flange Complete

ANCHORS AND CLAMPS FOR PIPE HANGERS

No. 281
Simplex
Concrete
Insert

No. 281 Simplex Concrete Insert—Malleable Iron

A quality insert made from rust resisting charcoal malleable iron and offered at an attractive price. It provides a different size body for each size tapping and is used on any job where the size of the tapping required can be definitely determined in advance. The four widely separated nail slots, the low height and large flat bottom surface of this insert all tend to minimize the chance of displacement during construction, whether nailed to wood or pasted to steel forms. To help distribute the load the exterior ends are recessed to receive reinforcements up to 1-in. in diameter. The Simplex is made in a full range of sizes—3/8, 1/2, 5/8, 3/4, and 7/8-in. rod size. The 7/8-in. insert should always have reinforcing rods placed under upper flange.

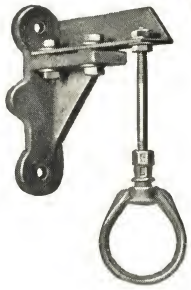


No. 223
Cast Iron
Bracket

No. 223 Cast Iron Bracket—For 2-in. and Smaller Pipe

This light weight cast iron bracket, while primarily designed for use in connection with open sprinklers on the outside of buildings, is entirely suitable for use in supporting small piping in any service. It can readily be installed on walls, columns or beams.

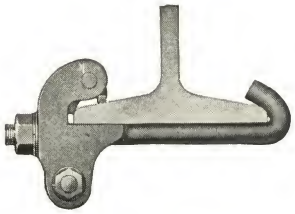
Bracket made in two lengths, 6 and 9 in. to center of hanger rod, and regularly furnished galvanized, but can be furnished black on order.



No. 222
Cantilever
Bracket

No. 222 Cantilever Bracket—Cast Iron—For 2-in. and Smaller Pipe

This consists of Cantilever Bracket No. 221 and angle iron extension for use where lines are located further than 4 7/8-in. from the wall and up to 18-in. The holes in the bracket are slotted, allowing for lateral adjustment to take care of uneven wall surfaces.

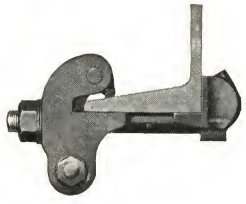


No. 225
Universal
Side
I-Beam
Clamp

No. 225 Universal Side I-Beam Clamp

This Universal Side I-Beam Clamp has been designed in sizes to fit all Standard and Bethlehem I-beams and for hanging all sizes of pipe from 3/4 to 12-in., inclusive. Where requirements call for a rod length varying from a few inches to several feet, the Universal Side I-Beam Clamp is used with an Extension Piece, rod, and Adjustable Swivel Pipe Ring.

In case the pipe line must be located so close to the beam that an extension piece is not practical, the proper procedure is to use an Extension Eye-Bolt. Here the adjustment is all made in the Adjustable Swivel Pipe Ring. See illustration No. 101, page 3.

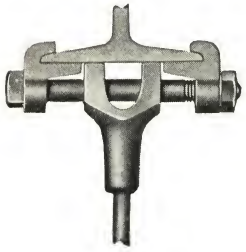


No. 226
Universal
Channel
Clamp

No. 226 Universal Channel Clamp

To meet the frequently recurring need for a strong adjustable clamp for hanging pipe from channels, this Universal Channel Clamp has been developed as a standard unit in the Grinnel Adjustable Hanger Line. It has been designed to fit all Standard structural channels and for hanging all sizes of pipe from 3/4 to 12 in., inclusive.

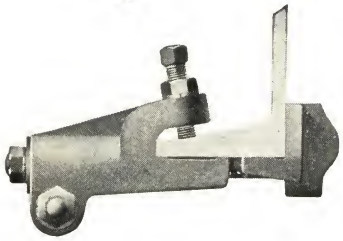
Long experience has shown that without such clamps, pipe installation work is constantly demanding the use of special hangers made up for the individual job, a practice which causes unwarranted delay and useless expense. This clamp and also the Channel Extension Clamp shown can be used with (1) Extension Piece, Hanger Rod and Adjustable Swivel Ring; (2) with the Swivel Pipe Ring, and (3) with Extension Eye-Bolt and Adjustable Swivel Ring.



No. 217
Center
I-Beam
Clamp

No. 217 Center I-Beam Clamp

This clamp is designed for use wherever it is possible to hang the line directly under the I-beam. It is made for hanging all sizes of pipe from 3/4 to 2 in., inclusive.



No. 219
Channel
Extension
Clamp

No. 219 Channel Extension Clamp

This type of clamp is usually employed in sprinkler work so that the sprinkler head, which often must come under the channel iron, can be so located because the extension feature provides sufficient space for this purpose. With this clamp the Extension Piece with hanger rod and Adjustable Swivel Ring is usually employed, but the other types described may be used.

The clamp is designed for use with Standard structural channels for hanging 3/4 to 2-in. pipe only.

GRINNELL ADJUSTABLE WALL COIL HANGERS

No. 160
Adjustable
Wall Coil
Hangers

Adjustable Wall Coil Hangers are furnished with four separate brackets—two for single coils and two for double coils as follows:

Single Coil—No. 160, 2¼ in., and No. 161, 6¼ in. from wall to center line of coil.

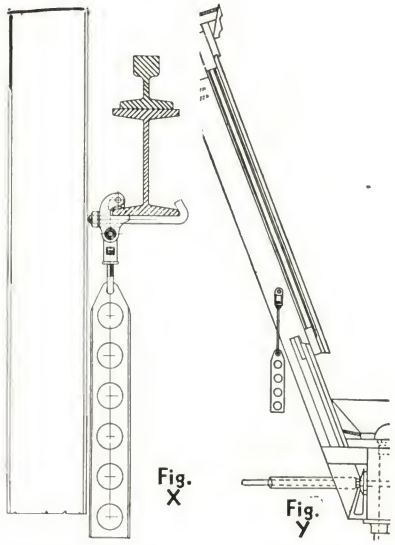
Double Coil—No. 162, 2¼ in., and No. 163, 6¼ in. from wall to center line of first coil.

Hangers No. 160 and 162 are used on flush or straight walls and No. 161 and 163 on walls with pilasters 4 in. deep.

The adjustable feature is the principal advantage. By turning adjusting nut A, hanger plate can be raised or lowered 1 in. or less to secure perfect alignment of piping and make each hanger carry its own proportion of total weight of heating coils. These hangers can be installed with great saving of labor. It is only necessary to fasten the individual bracket in place by two bolts. On brick or concrete construction one of the bolts can be set in wall during construction or both may be set in wall if template is used.

Grinnell Wall Coil Hangers are all metal—a most desirable feature in buildings of fire resistant construction. The Adjustable Hanger Plates are of steel, channel shaped and offer very little resistance to expansion.

The Adjustable Hanger Plate can be fastened to wood or steel framework of saw-tooth skylights, also to steel columns or struts of trusses, when coils are placed vertically in overhead position. ½-in. hook bolts are used in supporting the plate from clamp or bracket.



Coil Hung from Crane Rail Girder

Coil Hung from Purlin

No. 166
Standard
Type

No. 167
Expansion
Type

GRINNELL HOOK PLATES

Standard and Expansion Types (Cast Iron)

While cheaper than our Adjustable Wall Coil Hangers, these hook plates have neither their strength nor adjustability and the difference in price is usually offset by the added installation cost. The expansion type plates are for supporting wall coils in corners to provide expansion while the standard type are for ordinary work. These plates are made for carrying 1, 1¼, 1½ and 2-in. pipe and are listed up to 6 branch only—for larger number of branches order two plates of 6 branch or less.

No. 168
Single Hook

Single Hook (Cast Iron)

For supporting ½ to 3-in. pipe. Used mainly from side of beams where no adjustment is necessary. Applied directly to beams with wood or coach screws. Also useful for hanging small lines from walls by attaching to wooden block fastened to the wall.

No. 164
Standard
Type

No. 165
Expansion
Type

GRINNELL RING PLATES

Standard and Expansion Types (Cast Iron)

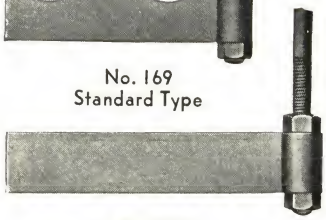
Although we do not recommend these ring plates for general use, there are cases where they can be used to advantage.

Standard type plates are made for supporting 1, 1¼, 1½ and 2-in. pipe and expansion type plates for 1¼ and 1½-in. pipe.

For general use, the Adjustable Wall Coil Hanger shown above is preferable—the adjustable features of that hanger making it a practical and adaptable device for hanging coils.

When heating circulation is to be installed in saw-tooth monitor or from crane rail, Adjustable Hanger Plate should be used as shown above, illustrations X and Y.

No. 169
Standard Type



No. 170
Expansion Type

GRINNELL SADDLE HANGERS

Grinnell Saddle Hangers are made of steel instead of cast iron. The steel bar is shaped at both ends to take the hanger rods. Hex nuts at bottom of rods support the hanger and allow vertical adjustment by turning nuts to right or left.

The standard type of Grinnell Saddle Hanger has recesses punched out for holding the pipe. The expansion type is a plain steel bar for use at corners of coils to take care of sidewise movement due to expansion.

The Saddle Hanger is used in connection with ½-in. rods and hex nuts on 2 to 8 branch hangers, ⅝-in. rods and hex nuts on 9 to 12 branch hangers—and with Expansion Cases, Grinnell Hanger Flanges, Side I-Beam Clamps, etc., for supporting overhead coils.

These Saddle Hangers are exceptionally strong and will not sag. Labor cost of installation is considerably less than with branch rolls and rods.

Saddle Hangers are made for supporting 1, 1¼, 1½ and 2-in. pipe only.

GRINNELL PIPE ROLLS

No. 171
Single Pipe Roll

No. 172
Branch Pipe Roll

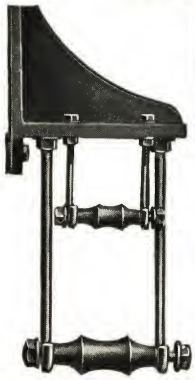
Grinnell Single and Branch Pipe Rolls are especially designed to take care of expansion and contraction. Single Pipe Rolls are made to support all sizes of pipe from 1 to 30 in.—Branch Pipe Rolls for 1, 1¼ and 1½-in. pipe only. Rolls are made hollow, which means small surface in contact with rod. The Adjustable Sockets permit vertical adjustment at the roll. The nut at the bottom of the hanger rod fits into a recess in the socket, thus preventing loosening or turning from vibration.

On Branch Pipe Rolls for 7 to 12 branches inclusive, an adjustable hook is provided for a third or center hanger rod.

Expansion Branch Pipe Rolls, No. 172-E, having longer roll rods than No. 172, are for use at corners of coils to permit side movement due to expansion.

Note: See below for Single Pipe Rolls with Special Sockets for use with Pipe overing Protection Saddles.

For 2 in. overhead coils use Saddle Hangers. See preceding page.



No. 175
Small Pipe
at Top

No. 176
Large Pipe
at Top

TWO-PIPE ADJUSTABLE BRACKETS

This hanger is a combination of two standard pipe rolls and a bracket. It is designed principally for supporting pipe mains in tunnels or against walls and columns, where for convenience or economy it is necessary to carry one pipe directly over the other. Designed to support pipe up to 6 in. The economy of this Two-Pipe Adjustable Bracket lies in allowing the installation of one bracket to take care of two lines. Also this hanger, by means of the pipe roll, will take care of any amount of expansion without buckling or throwing pipe out of alignment.

Note that bracket is constructed so that small pipe can be installed at top and large pipe below, or vice versa.

This is accomplished by slots in the bracket.

The Adjustable Two-Pipe Bracket like most Grinnell hangers, is adjustable, easily installed, compact in construction and economical to use because of its double service.

When ordering always give size of top and bottom pipes.

No. 174
Adjustable Swivel
Pipe Roll

ADJUSTABLE SWIVEL PIPE ROLLS

The Adjustable Swivel Pipe Roll supplies the need for an adjustable type of pipe roll hanger with single hanger rod. It is designed to support all sizes of pipe from 2½ to 12 in., inclusive. It is unique inasmuch as vertical adjustment can be made by use of the swivel shank at the top of the hanger.

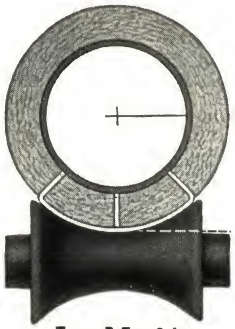
As in the Swivel Pipe Ring No. 101, shown on page 3, the swivel shank automatically locks, preventing loosening due to vibration in the pipe line.

When No. 174 Adjustable Swivel Pipe Rolls are to be used on lines on which pipe covering is to be installed, order hangers for two full sizes larger than pipe. This allows for the installation of 1 in. standard thick covering.

SINGLE PIPE ROLLS WITH SPECIAL SOCKETS FOR USE WITH PIPE COVERING SADDLES

Type A For 6-in.
Pipe and Smaller

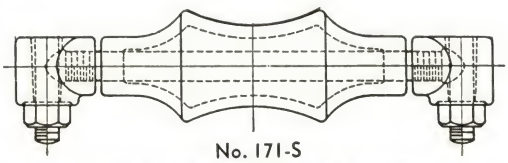
Pipe Covering Protection Saddles
No. 186
For standard thick covering
No. 187
For double standard thick covering
No. 188
For double 1½-in. thick covering



Type B For 8-in.
Pipe and Larger

The illustrations show the improved pattern of Grinnell Pipe Covering Protection Saddles designed primarily for high temperature service or where heat losses are to be kept at a minimum. The construction of this saddle makes possible a weathertight and finished job of covering at the points of pipe support. All saddles are 12 in. long and are made of curved steel plates with side edges turned up, and for 8-in. to 24-in. o. d. pipe have a center plate welded in. Saddles are furnished unfilled and should be filled before being put in place either with plastic cement or with sectional covering cut to suit. They are furnished for standard, double standard and double 1½-in. thick covering.

The Single Pipe Roll with Special Sockets is an adaption of our No. 171 Roll. The special sockets are provided to permit the use of standard size hanger rods while allowing the use of larger size rolls required with Grinnell Pipe Covering Protection Saddles for various thicknesses of covering.



No. 171-S
Single Pipe Roll with Special Socket

ADJUSTABLE PIPE ROLL WITH BASE PLATE

No. 185

For supporting heavy piping where expansion and contraction conditions must be met the cast iron Adjustable Pipe Rolls with Base Plates shown herewith, are often used. They are located on floors, piers or tunnel floors, also with special base plates on brackets as shown in illustration on page 1. Both vertical and horizontal adjustment is obtained—the vertical by four adjusting screws as shown and the horizontal by sliding on ends of bolts in base plate.

This pipe support is regularly made to carry 3, 3½, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20 and 24-in. sizes of pipe.

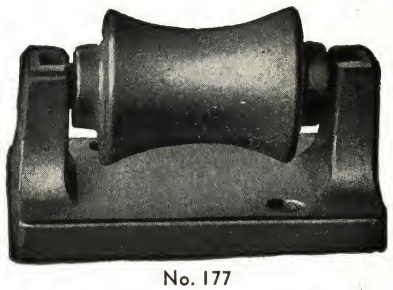
Larger sizes on application.

No. 185

PIPE ROLL CHAIR

No. 177

Grinnell cast iron Pipe Roll Chairs are for use in supporting piping when adjustment is not necessary, but where provision must be made for expansion and contraction. They are similar to Pipe Chairs but can be put to more varied use—for high pressure steam blow-off lines and other pipe lines where a pipe support is required. Regularly made for supporting all sizes of pipe from 2 to 18-in. diameter. Larger sizes on application.



No. 177

PIPE ROLL AND PLATE

No. 180

This cast iron Pipe Roll and Plate is designed for uses similar to Pipe Roll Chair No. 177, described above. It is regularly made for supporting all sizes of pipe from 4 to 24-in. Larger sizes on application.

No. 180

PIPE CHAIR

No. 183

This cast iron Pipe Chair is suitable where no adjustment is required. It is regularly made in all pipe sizes from 2 to 20-in. Larger sizes on application.

No. 183

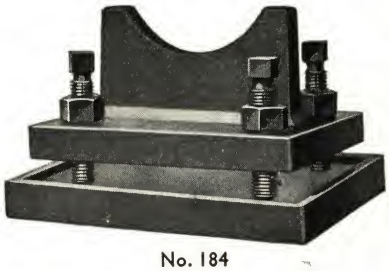
ADJUSTABLE PIPE CHAIR WITH BASE PLATE

No. 184

This Pipe Chair with Base Plate was designed with complete understanding of the need of a suitable pipe support for Blow-Off lines which would be adjustable as well as practical.

The main advantage of this Pipe Chair is, of course, the fact that by adjustment the chair can be brought securely up against pipe or back of fittings after pipe is erected. When thus adjusted it holds pipe line firmly against thrust due to opening of Blow-Off connection.

Regularly made for supporting 3, 4 and 5-in. pipe. Larger sizes on application.



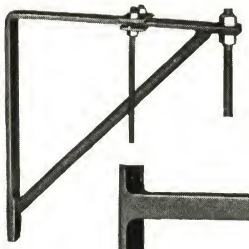
No. 184

GRINNELL WELDED STEEL BRACKETS

Light Weight, No. 194

Designed to support pipe lines up to and including 6-in. size. These brackets may be installed either in position illustrated or reversed as a suspension bracket.

Ends of brackets are drilled to take hanger rods up to and including ¾ in. in diameter, and pipe is ordinarily suspended from this point, but the use of Steel Bracket Clip No. 193 permits hanging pipes 3½ in. or smaller from any other point on the horizontal member.



No. 194
Light Weight
Welded
Steel Bracket

Medium Weight, No. 195

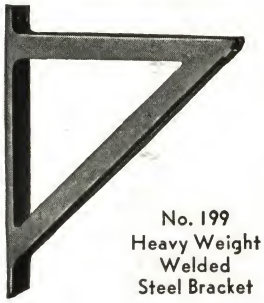
Designed to support a maximum load of 1500 lbs.

These brackets are of the same type and construction as our Heavy Welded Steel Brackets, No. 199, shown below. They may be used with the adjustable pipe stands, anchor chairs, pipe seats, etc., in the same manner as the heavy bracket.

Heavy Weight, No. 199

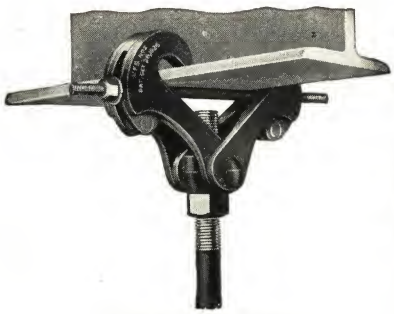
Heavy Brackets are light in weight as compared with the usual cast iron brackets. Top of bracket and supporting brace are constructed of two angle irons with 1-in. space between. All sizes of the bracket are designed to support a load of 3000 lbs. Adjustable Pipe Stands, No. 196, shown in illustration on page 1, also Anchor Chairs, No. 197, and Pipe Seats, No. 198, are designed to be used in connection with these brackets.

We are in a position to furnish on order practically any size or type of welded steel brackets. Prices will be furnished on application. Applications must be accompanied by sketch or print showing all essential dimensions and necessary details.



No. 199
Heavy Weight
Welded
Steel Bracket

GRINNELL U. F. S. I-BEAM CLAMPS

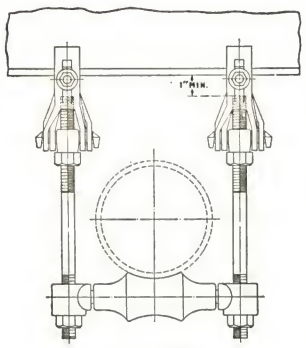


U. F. S. I-Beam Clamp

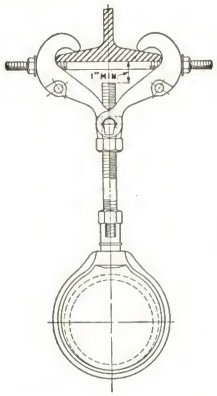
The Grinnell U. F. S. (Universal Forged Steel) I-Beam Clamps are made of forged steel throughout. They have a factor of safety of twelve, as called for by the specifications of the Power Piping Society, based on supporting 12 ft. of extra-heavy pipe of maximum sizes filled with water.

These beam clamps are made in but three sizes for supporting pipes up to and including 24 in. in size. Sizes Nos. 1 and 2 will fit Carnegie Structural I-beams 24 in. x 100 lb. and smaller, and Bethlehem I-beams 15 in. x 54.5 lb. and smaller. Size No. 3 will fit all Carnegie Structural I-beams, Bethlehem I-beams 30 in. x 121 lb. and smaller, and the 30-in. x 135 beam (CB 301) of the Carnegie Beam Section series.

These beam clamps may be used in combination with the Adjustable Wrought Pipe Clamps, No. 251, also with Single Pipe Rolls, No. 171; Adjustable Swivel Pipe Rolls, No. 174; Adjustable Swivel Rings, Nos. 101 and 104; Spring Pipe Hangers, etc.

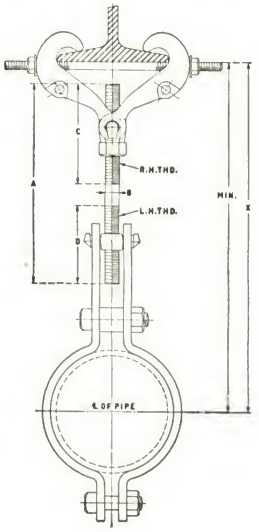


No. 171
Single Pipe Roll



Left:
No. 101
Adjustable Swivel
Ring

Right:
No. 251
Adjustable Pipe
Clamp



Illustrations Showing Applications of U. F. S. I-Beam Clamps with Rods and Three Types of Grinnell Hangers

GRINNELL SPRING PIPE HANGERS —SPRING PIPE ROLL HANGERS

The use of springs in pipe hanger assemblies is recognized by many engineers as an efficient means for absorbing vibration which is often conveyed to piping lines from various causes.

Grinnell Spring Pipe Hangers and Grinnell Spring Pipe Roll Hangers as illustrated represent a convenient means of applying this principle to most types of pipe hangers.

These are furnished standard for all sizes of hanger rods from ⅜ in. to 1½ in. in diameter and are regularly made for all pipe sizes from 1-in. to 24-in. inclusive.

Grinnel Spring Pipe Hanger, No. 255, includes the steel flanges, spring and outside bolts with nuts. Grinnell Spring Pipe Roll Hanger, No. 256, includes the roll, roll rod, adjustable sockets, springs and cups.

The Spring Pipe Hangers with threaded hanger rods may be used in any hanger combinations which have Grinnell U. F. S. I-Beam Clamps, Grinnell Welded Steel Brackets, Adjustable Wrought U-Pipe Hangers, or some other type of overhead support at the upper end, and Grinnell Adjustable Wrought Pipe Clamps, Adjustable Swivel Rings or Adjustable Swivel Pipe Rolls at the lower end.

The Spring Pipe Roll Hangers may be suspended with threaded hanger rods from any of the clamps, brackets, etc., listed above. When the pipe line is to be insulated, Grinnell Pipe Covering Protection Saddles, Nos. 186, 187, 188, should be used. These are shown on page 7.

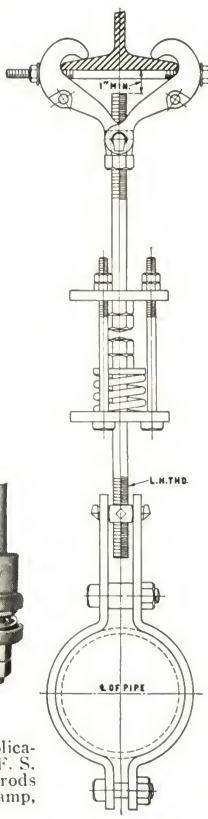
Both types of springs can be made to fit many other applications and can be furnished separately at special prices.

Sketch at right shows application of Spring Pipe Hanger as used with U.F.S. I-Beam Clamp and Adjustable Wrought Pipe Clamp. Left hand nut in pipe clamp will, when specified, be furnished with set screw to prevent hanger rod from turning.

No. 255
Spring Pipe
Hanger

No. 256
Spring Pipe Roll Hanger

Illustration at right showing application of Spring Pipe Hanger with U. F. S. I-Beam Clamp, No. 228, hanger rods and Adjustable Wrought Pipe Clamp, No. 251.



STANDARD SPECIFICATIONS FOR PIPE HANGERS AND SUPPORTS

Piping to be supported by means of hangers or supports which are capable of screw adjustment *after* erection of the pipe.

Hangers

Pipe rings to be made of malleable iron fitted with an adjusting nut of the locking type threaded to take a rod.

Pipe rolls to be provided with threaded nut or with sockets to take threaded rods.

Pipe clamps to be made of heavy steel equipped with a hooked nut threaded to take a rod.

Hangers located overhead to be supported by means of threaded rods fastened to:

(No. 1) Wooden Construction—

(a) By the use of proper hanger flanges or brackets attached directly to ceiling or beams with wood or coach screws.

(b) By the use of coach screw threads provided on one end of rods.

(No. 2) Steel Construction—

(a) By means of U. F. S. (Universal Forged Steel), or Side I-Beam Clamps or Channel Iron Clamps fastened directly to steel beams or channels.

(b) By means of welded steel brackets fastened to steel columns.

(No. 3) Concrete Construction—

By means of malleable iron or steel concrete inserts or of expansion cases placed in the concrete.

Hanger Rod Sizes

No matter what the type of construction the size of rod is to be determined by the size of pipe to be supported as per the following schedule:

¾-in. to 2-in. pipe inclusive	⅜-in. rod
2½-in. to 3½-in. pipe inclusive	½-in. rod
4-in. and 5-in. pipe	⅝-in. rod
6-in. pipe	¾-in. rod
8-in. to 12-in. pipe inclusive	⅞-in. rod
14-in. O.D. and 16-in. O.D. pipe	1-in. rod
18-in. O.D. pipe	1⅛-in. rod
20-in. O.D. pipe	1¼-in. rod
24-in. O.D. pipe	1½-in. rod
30-in. O.D. pipe	1⅞-in. rod

Supports

Piping to be supported from:

(No. 1) Walls or Columns—

By means of welded steel brackets and adjustable pipe (roll) stands.

(No. 2) Floors or Piers—

(a) By means of adjustable pipe rolls or chairs with bases.

(b) By means of saddle stands or stanchions.

(No. 3) Ground (between buildings)—

By means of pipe pole supports and adjustable attachments.

Further Information

Further information, including data sheets, giving dimensions and prices, will be gladly supplied on application.

Other Grinnell Products

The Grinnell Company products also include Sprinkler Systems, Thermoliers (Unit Heaters), Equiflo Valves, Fittings, Fabricated Pipe and Thermoflex Heating Specialties. For these products see Manufacturers' Index.

Grinnell Service

A half century of experience stands in back of all Grinnell products, the benefits of which we offer freely as consultants in any matter pertaining to the use of our products. At each of our sales offices will be found an engineering staff ready to aid in the solution of problems in the various fields of industry covered by the Grinnell Company.

THE RIC-WIL COMPANY

Underground Conduit Systems for Heating and Power Pipes

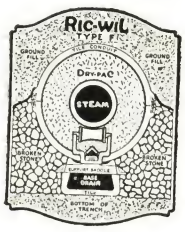
Union Trust Building, CLEVELAND, OHIO

BRANCH OFFICES: NEW YORK, CHICAGO, ATLANTA

AGENTS IN PRINCIPAL CITIES

Products

RIC-WIL INTERLOCKING CONDUIT, INTERLOCKING BASE DRAIN FOUNDATION, PIPE SUPPORTS, RIC-WIL UNDERGROUND PIPE COVERING and DRY-PAC WATERPROOF ASBESTOS CONDUIT FILLER used in the "RIC-WIL METHOD" of Insulating Underground Steam, Hot Water and Fuel Oil Pipes.



Ric-wiL Interlocking Conduit

Ric-wiL Conduit is first quality, standard weight, vitrified glazed tile of the bell and spigot type.

It is shipped on the job in full round sections and split into top and bottom halves as used. When installed, bell and special Loc-liP side joints are sealed with portland cement. Loc-liP joint (see illustrations below) is shaped so that cement locks top and bottom halves permanently together in all directions, giving conduit extraordinary rigidity and strength. Leakage is practically impossible. Top and bottom halves are interchangeable (foolproof) and numbered in pairs so that companion pieces may be kept together.

Sections are all in 2-ft. lengths, sizes from 4 to 24-in. inside diameter. Every sixth section of conduit has an opening in the bottom half through which a pipe support of the roller type projects to carry the steam, hot water or oil pipes, thus making the pipe supports independent of the conduit itself, a desirable feature for this class of work.

Ric-wiL Interlocking Base Drain Foundation

Ric-wiL Base Drain Foundation is first quality vitrified glazed tile so designed that it is both a base for supporting and lining up the conduit and drain for carrying away water which might otherwise accumulate around the conduit. Providing two points of support for the conduit, it adds 35% to the ground load conduit will carry safely, as compared to the same conduit placed on flat ground or broken stone. Top of base drain has slot into which the bell of conduit fits, making sections of conduit and base drain stagger with each other to form a strong interlocking construction. Pipe support saddles rest on the side shoulders, which insure perfect alignment of pipes. Wide flat bottom of base drain makes a solid foundation. Free drainage area of the base drain is large and ample for every practical condition. Made in three sizes to properly support all conduit sizes.

Cast Iron Ric-wiL Conduit

For extra heavy duty under railroads or where conduit is subject to very heavy loads, Ric-wiL is made of cast iron. Has Loc-liP Joint and "interlox" with tile Ric-wiL—made for all 5 types described in next column. A special heavy duty tile base drain or a cast iron base drain is provided for use with Ric-wiL Cast Iron Conduit.

Five Systems to Meet All Conditions

Type F System—For steam heating and power pipes and for superheated steam. A conduit that assures super-efficiency when insulated with Dry-paC (description below), or Ric-wiL No. 11 Filler, packed around pipes in closed construction.

Type SPC System—For steam heating, power pipes and superheated steam. Insulation is any standard make of sectional pipe covering, the kind and thickness depending upon the service to be rendered. Double drainage is provided in this type.

Type DA System—For hot water, oil transmission and condensation returns. Tile and insulation in one, the latter, a diatomaceous earth mixture of high insulating quality, moulded inside the tile and keyed in. This type insulates the pipes from surrounding ground but not from each other, making it specially adapted to carry oil and steam pipes together for oil transmission. Exceptionally easy to install.

Type DF System—For steam heating, power pipes and superheated steam. This is Type DA with the addition of Ric-wiL Asbestos Conduit Filler to be packed around the pipes at a density specified by the manufacturer. The filler is a good non-conductor which will not corrode the pipes nor shrink. Dry-paC furnished when specified.

Unit Type System—For district heating installations. 13½-ft. units of corrugated ingot iron conduit complete with steam pipe, insulation, etc., ready to install in trench. Write for details.

Dry-paC Waterproof Conduit Filler

An absolutely waterproof, insulating filler, permanently impervious to water.

Of unusually high efficiency and great natural strength, it will not slump down away from pipes and is non-corrosive.

Sample of Dry-paC will gladly be sent for testing.

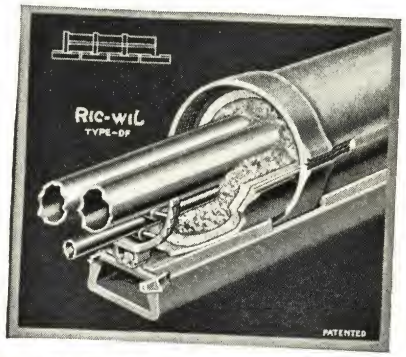
Ric-wiL Pipe Supports

The pipe supports are planned to carry from one to five or more pipes and are ordinarily spaced 12 ft. apart. They are strong, made of cast iron, rustproofed, and interlock with the base drain foundation, imposing no load on the conduit itself. Once in place, no movement of the pipes can disturb them. Ric-wiL pedestal pipe supports also furnished when specified, to set in concrete for carrying extra large pipes.

Engineering Service

Preliminary studies and reports; assistance with plans and layouts; complete service details and installation instructions; installation supervision where desired or complete contracts, by Ric-wiL Construction Department.

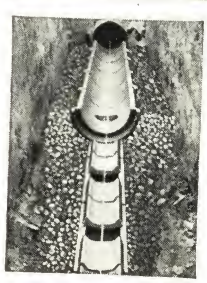
Catalogues, test reports, typical specifications, etc., promptly on request.

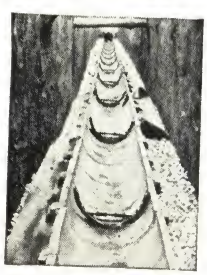


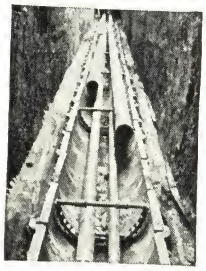
REG. U. S. PAT. OFF.

RIC-WIL

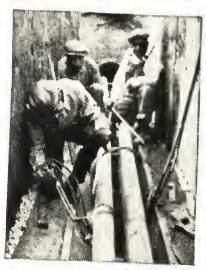
CONDUIT SYSTEMS FOR UNDERGROUND STEAM PIPES







These Progressive Illustrations Show the Simplicity of a Ric-wiL Installation



GRINNELL COMPANY, INC.

Pipe Fittings and Fabricated Piping Materials

EXECUTIVE OFFICES
PROVIDENCE, R. I.

For Offices, Plants and Branches, see Inside Cover of Our Thermolier Catalogue

Products

Pipe Fittings, Fabricated Pipe, Pipe Bends and Welded Piping.

The Grinnell Company Products include also:—Sprinkler Systems, Thermoliers (Unit Heaters), Thermoflex Heating Specialties, Adjustable Pipe Hangers, Equiflo Valves. For these products, see Manufacturers' Index.

GRINNELL PIPE FITTINGS

The Grinnell line of Pipe Fittings is large and embraces all usual forms and many special forms. The fittings shown on these pages are merely a few random selections for brief illustration from the Grinnell Company Catalogue No. 2 on Cast Iron Fittings and Catalogue No. 2-A on Malleable Iron Fittings which show our full line in great variety, fully described. We will send these catalogues upon request.

Nipples

Nipples are close, short, long and extra long. Made in black and galvanized steel and wrought iron, also brass, carefully threaded and finished.

Short or Long Nipple

Close Nipple

Cast Iron Fittings

Grinnell Cast Iron Screwed Fittings, Standard and Extra Heavy, meet every demand for a high grade fitting in design, utility and strength. They are tapped straight and accurately to American Briggs Standard. All fittings are chamfered, permitting an easy entrance of pipe.

We have a large variety of straight and reducing sizes.

Elbow

Tee

Long Turn Elbows and Tees—Commonly used for sprinkler piping. Sizes are 2½ to 6 in. standard and extra heavy. Designed in accordance with rules of the National Fire Protection Association. Reducing forms are available.

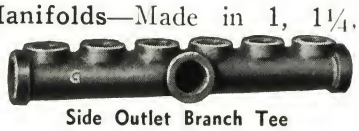
Elbow

Tee

Drip or Drain Tees—These forms are also commonly used for sprinkler piping.

Flanged One End—Drip or Drain Tees—Flanged Two Ends

Branch Tees or Manifolds—Made in 1, 1¼, 1½ and 2-in. pipe size, and with 2 to 12 branches.



Side Outlet Branch Tee

Cast Iron Floor and Ceiling Plates and Sockets

These are made in a variety of forms. The watertight riser sleeve shown provides for caulking around pipe, while gasket makes watertight joint at floor when grouted with roofers' cement.

Ceiling Plate

Floor Socket

Watertight Riser Sleeve

Malleable Iron Fittings

Grinnell Malleable Iron Fittings are tapped straight and accurately to the American Standard Pipe Thread. All fittings are chamfered.

Standard Flat Band Screwed Fittings—Made to the 1927 American standard for Malleable Iron Screwed Fittings and suitable for saturated steam working pressures up to 150 lb. Furnished in standard straight and reducing sizes in patterns as listed in manufacturer's catalogue. Side outlet and drop fittings furnished in plain pattern only.

Elbow

Cross

Standard Plain Pattern Screwed Fittings—Made in sizes up to and including 2-in. in size of elbows, tees, crosses, and couplings; also caps and reducers, or reducing couplings up to 2 in.

Railing Fittings—These are made in plain and ball patterns ½ to 3-in. pipe size. All necessary forms are made including ball ornaments and floor flanges.

R. H.

R. H.

Cast Iron Drainage Fittings

These are recessed and threaded for wrought pipe.

As shown in sectional view, these fittings are made with a shoulder, and being the same diameter as the inside of the pipe, a continuous passage is made when the pipe is screwed up to the shoulder, thus allowing no place for solid matter to collect and clog the pipe.

Made in all usual patterns.

Sectional View

Cast Iron Flanged Fittings and Flanges

Standard Cast Iron Flanged Fittings—These are recommended for steam working pressures up to 125 lb.; sizes 12 in. and smaller only, for non-shock water working pressures up to 175 lb. Made in all usual patterns.

Elbow

Extra Heavy Cast Iron Flanged Fittings—Recommended for saturated steam working pressures up to 250 lb.; and sizes 10 in. and smaller only for non-shock water working pressures up to 400 lb.

Flanges—Including floor, greenhouse, blind and all pipe connection forms.

Floor Flange

Locknut Flange

Special Cast Iron Flanged Fittings

These are made in standard and extra heavy cast iron, also bronze. They include many forms.

Return Bend with Back Outlet

Bronze, Brass and Special Metal Fittings

We are prepared to furnish bronze fittings cast from virgin metal and made from our various cast iron patterns. These include screwed and flanged fittings for standard and extra heavy pressures. We can furnish on order special acid-resisting fittings made from a special alloy.

We can furnish estimates for high grade special brass or bronze castings from our own or customer's patterns.

Grinnell Compound (Graphite Base)

Grinnell Compound is a high grade pipe joint compound, with graphite base, making an excellent lubricant for screwed pipe joints. Only a thin coat is required to make a tight joint on steam, water, oil or gas lines.

GRINNELL FABRICATED PIPING MATERIAL

Triple XXX Products

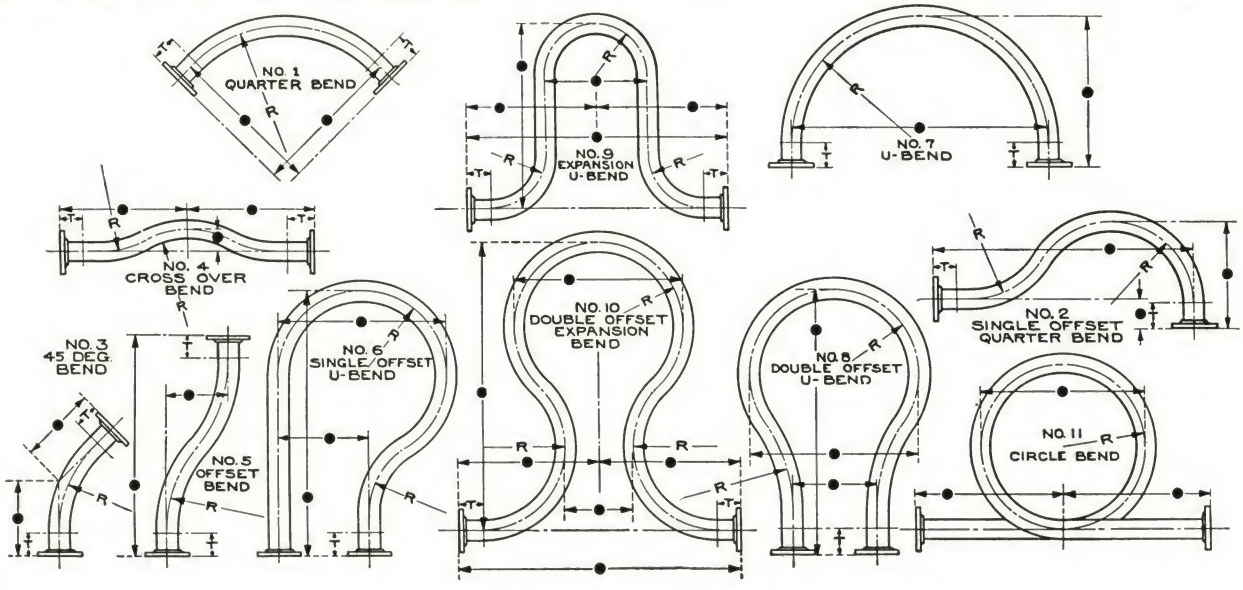
The Grinnell Triple XXX line of fabricated piping materials is as definite and specific in its quality as the standardized manufactured products used in modern super-power installations. Every item in this line has stamped on it three "X's" and underneath 40, 60, 90, 135, representing 400, 600, 900 or 1350 lb. working steam pressure. Any piece of material bearing such stamp can unhesitatingly be used for the pressures indicated.

All joints are machined out of a rough lap which may be formed to twice the thickness of the pipe or seamless tubing. The thickness of the pipe and the *minimum* thickness of the lap are equal. For pressures of 400 lb. and above all laps are finished on edge, face and back.

The basic idea of the Grinnell Triple XXX Pipe Joint is to provide absolute freedom in choosing the type of joint desired for varying conditions, and at the same time to assure maximum strength of the chosen type. The ample thickness of perfect metal in the rough forged lap allows for machining front and back for any conceivable face with a finished lap of at least 100% strength.

The same manufacturing exactitude, coupled with a rigorous policy governing the selection of higher quality materials, produces bends and headers worthy, with the lap joint, to carry the mark of quality—XXX.

Lap joints are regularly made in Square, Tongue and Groove, Male and Female and "Sarlun" types but may be obtained in any other type required. The special features of the "Sarlun" joint consist of the welding lips at the contact face of the flanges which permit sealing of the joint by welding.



QUINCY COMPRESSOR CO.

Air Compressors and Dry Vacuum Pumps

313 Maine Street, QUINCY, ILL.

SALES AND SERVICE LOCATIONS

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ALSO IN OTHER IMPORTANT CENTERS

Products

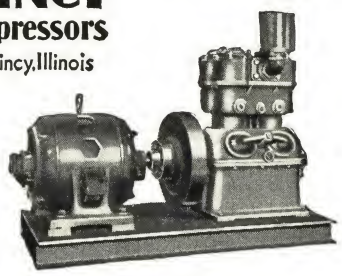
AIR COMPRESSORS: Air, Hopper and Water Cooled; and Piston Type DRY VACUUM PUMPS for many purposes. Air compressors range from 1 to 128 cu. ft. displacement and from 100 to 200 lb. pressure according to size of compressor and requirements. Vacuum pumps are suitable for displacements of 10 to 40 cu. ft. and for maximum vacuum of approximately 28 in. at sea level.

Quincy Air Compressors and Vacuum Pumps

Compressors and vacuum pumps are supplied individually or in complete built-up units in any desired style with or without pressure or vacuum control and either belt driven by V-belts, direct connected, chain or gear driven.

All belt driven units are equipped with single or multiple V-belts, are of special construction affording flexibility and capacity to absorb starting shocks. Because V-belts are intended to run loose and without slippage there is less bearing strain and consequently less wear on both compressor and motor bearings. V-belts will not jump off pulleys and there are no troublesome idlers. A positive power saving of from 20% to 30% by actual test results from the use of V-belts over the conventional flat type with idler or belt tightener. Quincy Compressors are built along the most advanced engineering lines and with the idea of producing a compressor having long life, low upkeep costs and with comparative freedom from trouble.

Model WB-4



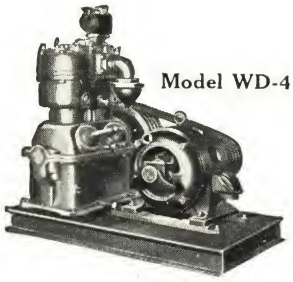
Model WB-4—Water cooled duplex, direct connected, any type of desired control. Full pressure lubrication.

No.	Hp.	Displacement, cu. ft.
WB-4	20	128

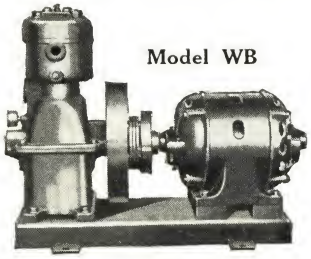
Model WD-4—Water cooled duplex, multiple V-belt drive with any controls desired. Full pressure lubrication.

No.	Hp.	Displacement, cu. ft.
WD-4	15	83
WD-4	20	128

Model WD-4



Model WB



Model WB—Water cooled, direct connected single stage, any desired control. Full pressure lubrication.

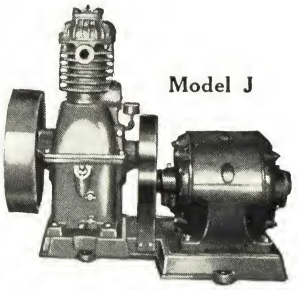
No.	Hp.	Displacement, cu. ft.
WB-1	5	22
WB-2	10	39
WB-3	15	75

Model J—Gear driven air cooled unit for dry sprinkler systems and special fire protection service.

No.	Displacement, cu. ft.
J-1	4
J-2	6
J-2	8
JF-2	11

Other sizes up to 25 cu. ft. in air cooled types.

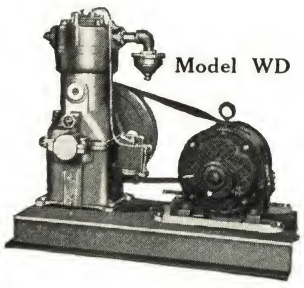
Model J



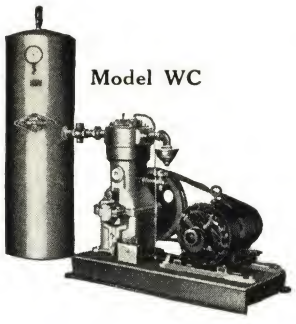
Model WD—Multiple V-belt driven, water cooled units, furnished with any required control. Full pressure lubrication.

No.	Displacement, cu. ft.
WD-1	15-22
WD-2	25-39
WD-3	40-75

Model WD



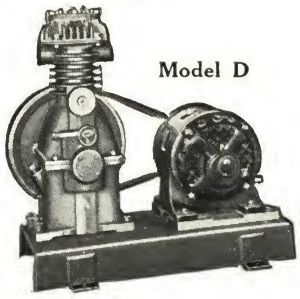
Model WC



Model WC—Complete automatic water cooled units with tanks, automatic water valves, pressure controls, and motor starters. Full pressure lubrication.

No.	Displacement, cu. ft.
WC-1	15- 22
WC-2	25- 39
WC-3	49- 75
WC-4	83-128

Model D



Model D—V-belt driven air cooled units for any special requirement, and any type of control.

No.	Displacement, cu. ft.
D-0	1
D-1	4
D-2	8
DF-4	15
DF-5	25

Model R Dry Vacuum Pumps—Single cylinder, air cooled dry piston type vacuum pumps. Suitable for general industrial service where average vacuum of not to exceed 28 in. at sea level is required.

No.	Size, in.	Displacement, cu. ft.
R-1	4 x2½	10
R-2	4½x3½	19
R-3	6 x4	36

Descriptive Bulletins

The compressors and vacuum pumps illustrated and described here are but representative of the Quincy line. We also manufacture a complete line of automatic units for automobile service stations, portable units for operating pneumatic tools and for general contractors' work, portable units for paint spraying and plant maintenance. Descriptive bulletins of any or all types will be gladly sent on request, together with estimates or recommendations from our engineering department which is available for special service without obligation. Please state the requirements if engineering service is desired.

CAPITAL LIFT & MANUFACTURING CO.

Manufacturers of Electric and Hand Operated Ash Handling Equipment

Town and Lucas Streets
COLUMBUS, OHIO

For Local Representatives, see our page on Electric Elevators
For our pages on Electrically and Hand Operated Elevators and Dumbwaiters, see Manufacturers' Index

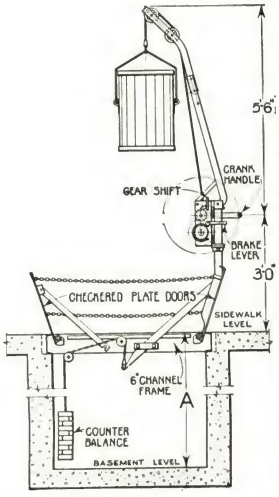
Model 18 Disappearing Folding Mast Can Lift (Hand Crank Operated)

Built as part of a flush type sidewalk door with hoist, frame and door shipped assembled, ready to cement in place. All erection expense is thus virtually eliminated.

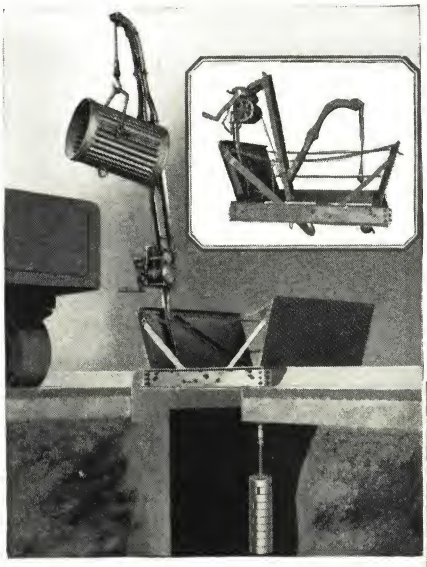
The operator opens balanced doors, unfolds the mast into place and readily raises our No. 2 heavy galvanized corrugated swing pail ash cans 18 in. in diam. by 26 in. high, filled.

Winch has ball bearings with cut gears, has ratchet for holding load and gear shaft with brake for lowering empties. Rugged and easily operated.

Made in one size only. No engineering data required unless basement depth exceeds 15 ft. when extra cable will be furnished. Standard size sidewalk doors 3 ft. x 4 ft.



Side View



Model 18 Disappearing Folding Mast Can Lift

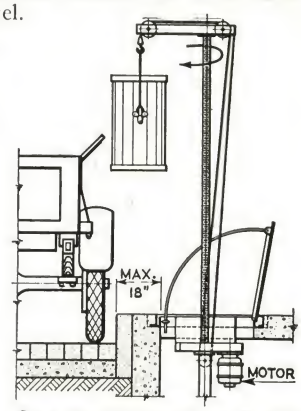
Model 19 Disappearing Screw Mast Can Lift (Electrically Operated)

This model is an inexpensive power driven outfit for the limited amount of ashes from schools, stores, apartments, hospitals, etc., for delivery from basement up through sidewalk door to truck. Its ⅓ hp. motor operates from a light or power circuit. Lifts a filled can of about 165 lb. at approximately 35 ft. per minute. Fits basements 7 to 17 ft. deep. From grade level to bucket hook, 7 ft.

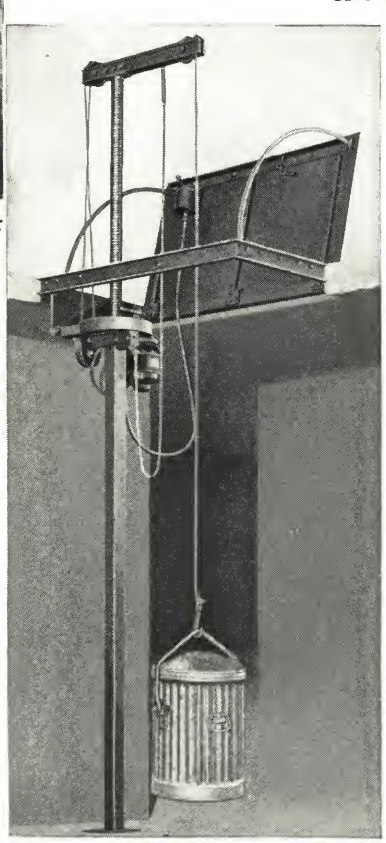
Its screw mast travels through the hub of a motor driven gear, as the bucket raises and lowers. Thus, by arrangement of ropes, the bucket is raised from the basement to truck while the screw travels above grade level.

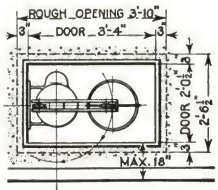
Operation—Open sidewalk door; use "Up" and "Down" switch placed there for full control of lift. Automatic switches fix limits of travel.

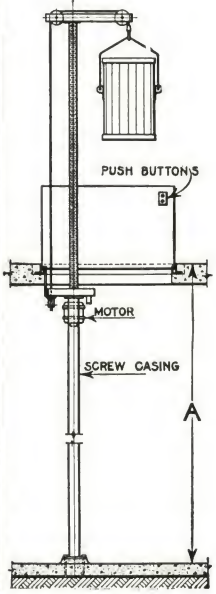
Ordering — In making inquiry, give basement depth "A" and electric current available.



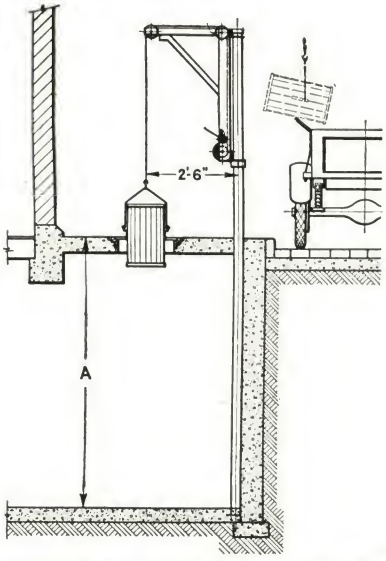
Cans Readily Swing to Trucks







Model 19 Disappearing Screw Mast Cap Lift



Model 11 Mast Type Revolving Can Lift

Model 11 Mast Type Revolving Can Lift

Self supporting, self-contained crane type ash lift, operated from the basement (may also be arranged to operate from sidewalk).

Winch same as on Model 20.

Takes our No. 2 can as above.

May be used with sidewalk rings or in areaways.

For Quotation give basement depth "A."

ESTABLISHED 1889 INCORPORATED 1917

BECKWITH ELEVATOR CO., INC.

TELEPHONE
Liberty 8333

113 Albany Street, BOSTON, MASS.

CHICAGO, ILL., L. G. Tingwall Co., 549 West Randolph Street
DALLAS, TEX., Hunter-Hayes Co.
PHILADELPHIA, PA., Security Elevator Co., 901 Callowhill Street
SAN FRANCISCO, CALIF., Price Building Specialties Co., 683 Howard Street
SEATTLE, WASH., E. C. Hanselpacker & Co., 721 Virginia Street

For our pages on Dumbwaiters and Elevators, see Manufacturers' Index

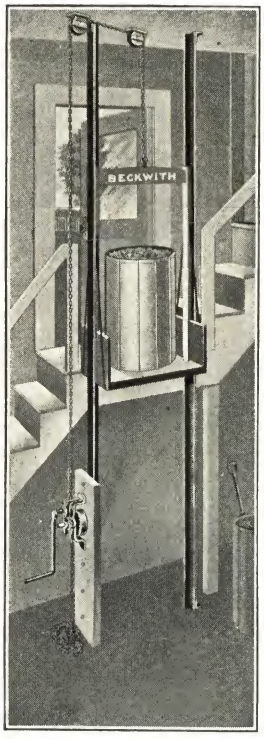
Beckwith Platform Type Ash Hoists—Hand-power, Hydraulic and Electric

Outfit furnished complete ready to erect or installed by us

Hand Power Ash Lift or Fuel Lift A4

Hand power ash lift or fuel lift, used to raise barrels from cellar or boiler room to a door opening or platform of higher level. A simple and reliable outfit easy to install and operate. Operates by crank-turned, two-speed hoist machine, fastened in any convenient place where a direct lead for chain may be obtained. Machine is equipped with automatic brake to insure absolute safety. Car well constructed and braced. Steel guide rails.

This outfit may be used for many purposes with different types and sizes of cars to suit various conditions. Space required for car and guides will be 7 in. wider than car, and 3 in. larger front to back. Machine crank, which is removable, projects out 21 in. beyond guide rail. Make pit 6 in. deep for car to land flush.



Hand Power Ash Lift or Fuel Lift A4

STANDARD A4 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.
1	4	300
2	9	500
3	16	1000

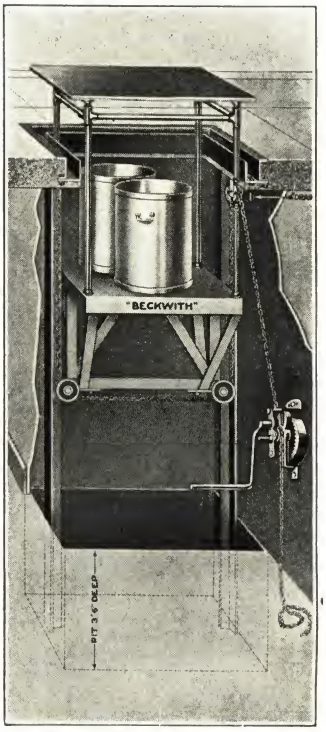
Hand Power Sidewalk Elevator A3

Hand power ash lift, operated by turning crank of machine which raises car by chain (2:1) hitch under car and through pulleys. Machine, which can be located at either side, has two speeds and automatic brake, thereby eliminating accidents. Car strongly constructed of hardwood and well braced. Long guide shoes insure smooth riding. Outfit requires a pit at least 3 ft. 6 in. deep, preferably 4 ft. deep. Clear shaft and opening should be 8 in. wider than car and 3 in. larger front to back. Outfit may be had with bow iron on car to open hinged covers or with pipe standards to lift cover as shown. Watertight steel cover and frame may be had as extra equipment.

STANDARD A3 OUTFITS

Outfit No.	Platform area, sq. ft.	*Capacity, lb.
1	9	500
2	16	1000
3	25	1500

*Exclusive of weight of sidewalk cover.



Hand Power Sidewalk Elevator A3

Hand Power Sidewalk Elevator, Types A6 and A5

Indirect Lift Type A6—Hand power, indirect lift, drum type sidewalk elevator.

Used where space for machine at side of platform is not available.

Operates by double geared machine located at front or back of platform at either side.

Sprockets and chain drive the drum shaft.

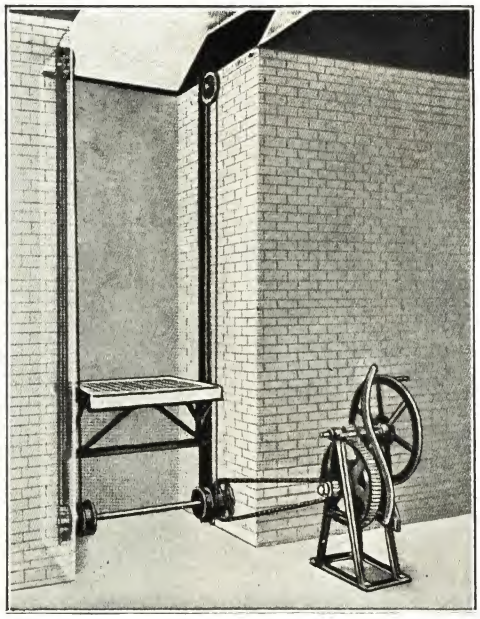
Band brake and lever control assure safety. Brakes may be locked when desired.

Platform of wood and steel construction is suspended by two steel ropes which wind on cast iron drums.

STANDARD A6 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.
1	9	750
2	16	750

Note: For heavier loads or larger cars see following page.



Hand Power Sidewalk Elevator, Indirect Lift Type A6

Long heavy guide shoes insure smooth, easy riding.

Ramp 15 in. above floor is necessary if pit is not used.

Can be equipped with bow iron or pipe standards on car for raising sidewalk cover.

Distance between walls 14 in. more than width of car, and 3 in. larger front to back.

Direct Lift Type A5—This outfit is similar to the A6 hand power, sidewalk elevator, indirect type, except that the machine is located at either side of platform, to give direct lift, instead of back or front of platform, as illustrated.

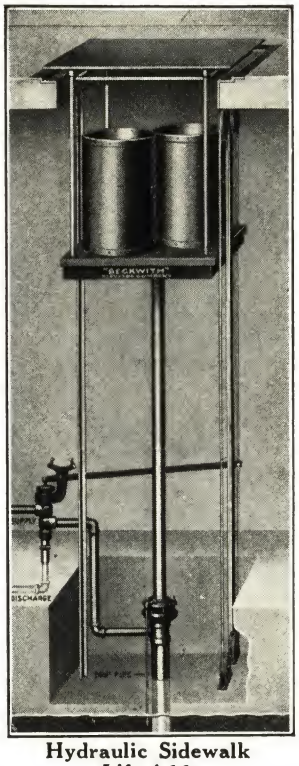
STANDARD A5 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.
1	9	750
2	16	750

Note: For heavier loads or larger cars see following page.

Hydraulic Sidewalk Lift A11

Hydraulic ash lift of direct plunger type made for any capacity or size. Recommended where travel of car does not exceed 20 ft. Operates on any sustained water pressure of 40 lb. per sq. in. and 1-in. supply or over, to suit load and speed. Reliable and satisfactory. Controlled by cable or handle. Stops automatically at top and bottom. Valve can be located at either side of shaft. Supply and discharge connections should be brought to operating valve. Requirements: pit, 3 ft. deep; shaft 10 in. wider and 4 in. larger, front to back, than car. Do not cement bottom of pit until plunger casing hole is dug and casing set. Cover may be either lift-up type (as shown) or hinged, with bow on car to open hinged cover. State type cover desired, as capacity allowance is made for lifting cover.



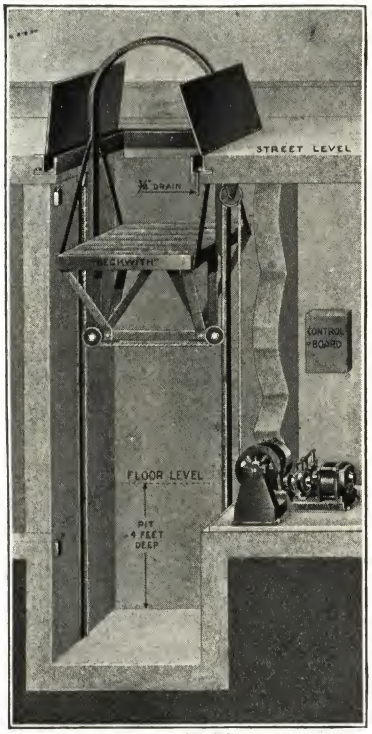
Hydraulic Sidewalk Lift A11

STANDARD A11 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.	Speed, ft. per min.
1	9	500	30 to 50
2	16	1000	30 to 50
3	25	1500	30 to 50

Electric Sidewalk Elevator A10

Standard electric motor type, push button control. Capacity up to 2000 lb. with platform any size. Car operates by rope (2:1) hitch underneath car. Stops automatically at top and bottom. Standard worm gear, electric brake, drum type machine, with high grade motor, is located at either side or back of shaft. Platform equipped with bow iron (illustrated) for opening hinge type sidewalk covers. Pipe standards furnished to raise cover vertically if required by State regulations. Standard machined steel tee-rails. Requirements: pit 4 ft. deep; opening and shafts to be 10 in. wider and 4 in. larger (front to back) than car; wall slot for rope; machinery space 4 ft. long, 2 ft. 6 in. wide, 2 ft. 6 in. high. State type cover desired as capacity allowance is made for raising cover. One control button box, (up-down-stop) is usually placed on car, and another in basement.



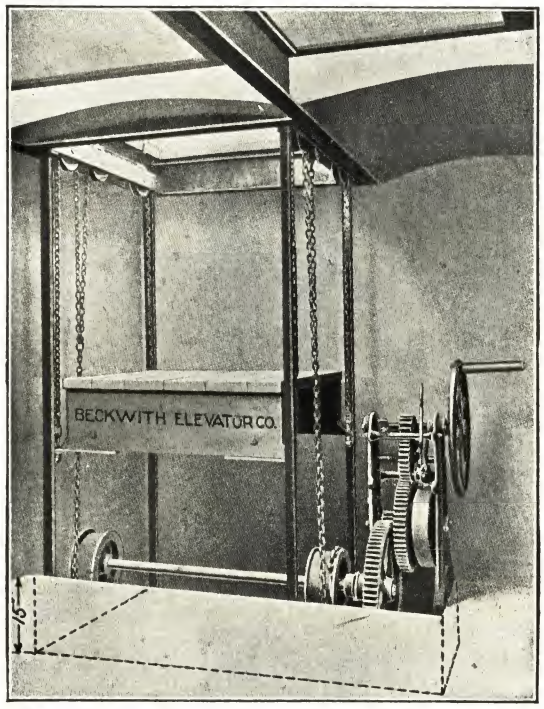
Electric Sidewalk Elevator A10

STANDARD A10 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.	Speed, ft. per min.
1	9	500	30
2	16	1000	30
3	25	1500	30

Hand Power, Heavy Duty, Sidewalk Elevator A7

Hand-power, drum type, platform ash lift for heavy loads and large cars. Geared machine of heavy duty, roller bearing, band brake type, wheel or crank operated, and placed either side of car. Platform, with heavy guide shoes, is supported by lift chain fastened to four corners of car. Allow 24 in. beyond edge of car for machine space. Provide pit 24 in. deep. Car can be arranged to open cover at sidewalk. Clearance for car, cover and frame furnished to suit car sizes.



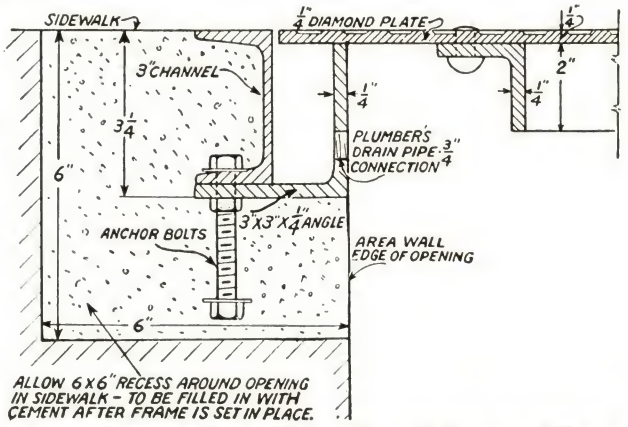
Hand Power, Heavy Duty, Sidewalk Elevator A7

Sidewalk Cover and Frame

One-piece flush type steel sidewalk elevator cover and frame of watertight construction. Cover—made of checkered steel plate, ¼ in. thick, reinforced throughout to support a live load of 300 lb. per sq. ft.—may be the one-piece lift-up type, or the two-piece hinged type. Frame made of steel channel and angle, with corners welded, forming a gutter to catch water. Plumbers' drain pipe connection is provided for carrying off water. Anchor bolts secure frame in concrete. Made any size.

Note: Capacities of car do not include weight of cover to be opened or lifted. Unless specified, allowance for weight of cover if it is to be operated by car must be made when figuring machine capacity.

Note: Hinged covers at sidewalk opened by the ascending car are not acceptable in some cities and states, as they may prove an accident hazard. Vertical lifting one-piece covers are, so far as we know, acceptable anywhere.



Detail of One-piece, Flush Type, Sidewalk Cover and Frame

FRANK ELIAN & CO.

Hoistwell Ash Lift Manufacturers

36-39 23rd Street, LONG ISLAND CITY, N. Y.

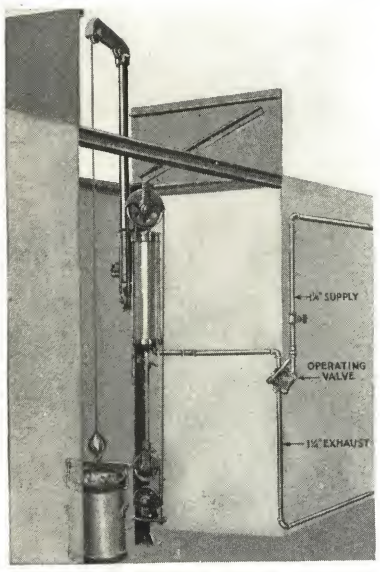
Products—Proved by Years of Service

HOISTWELL ASH HOISTS—telescopic and non-telescopic, hydraulic, hand power and electric—hoisting to grade level, directly to height of truck, to height of window or to suit any special condition.

SIDEWALK DOORS—any size or type, with or without Hoistwell Automatic Opening and Closing Device.

IRON LADDERS—ASH CANS—ASH CAN TRUCKS.

SIDEWALK PLATFORM LIFTS—500 to 2000-lb. capacities.



Hoistwell Model A

HYDRAULIC ASH HOISTS

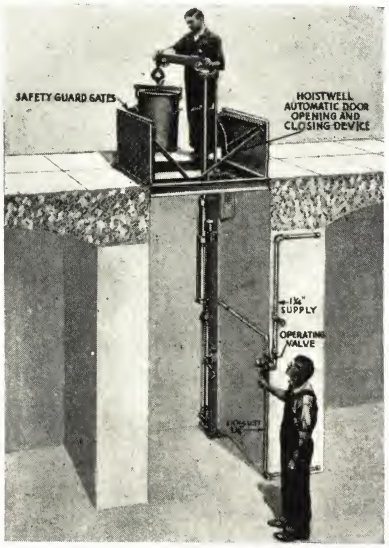
Hoistwell Telescopic Models A and B

Model A—A simple, strongly made automatic ash hoist operated by water pressure of 30 lb. and up, taken from the house main or roof tank. Upkeep and operating cost of water is negligible. To raise 15 cans to a height of 15 ft., the cost is 1 cent (per City of New York rate of 10 cu. ft. per cent). Initial cost 40% less than electric hoists.

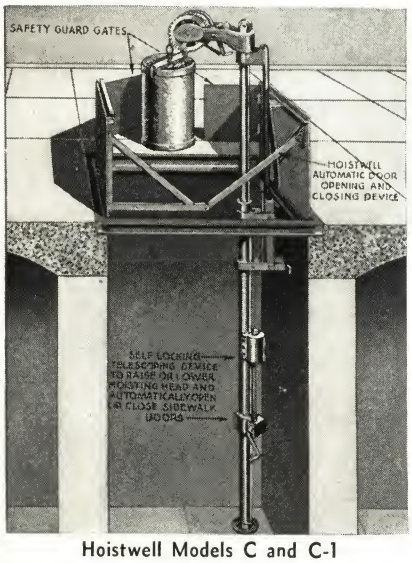
A single operating lever acting on a 3-way valve controls the desired speed, within the upper and lower limits. Hoistwell's water consumption is half of other hoists because only raising consumes water, lowering being gravitational with discharge of water. Hoistwell drains its cylinder (to prevent freezing) and does it automatically.

Model A is most suitable where sidewalk doors are not required to open or close automatically.

Model B—Similar to Model A except that Model B includes a hand-operated, self-locking, worm-geared telescoping device (without chains or cables) to raise or lower the telescopic post, and automatically open or close the sidewalk doors, when equipped with opening and closing device. The post, when raised or lowered, remains safely locked in any position and the telescoping handle motionless, without the use of pins or pawls, upon the removal of operator's hand.



Hoistwell Model B



Hoistwell Models C and C-1

HAND POWER ASH HOISTS

Hoistwell Telescopic Models C, C-1, and C2

Model C—Used with or without automatic sidewalk doors. A totally enclosed hand-operated, self-locking, worm-geared telescoping device (without chains or cables) in the basement raises or lowers the telescopic post, automatically opening or closing the sidewalk doors, and ringing the signal gong. The post remains safely locked in any position and the telescoping handle motionless, without the use of pins or pawls, upon the removal of the operator's hand. The compound gear hoisting unit with the automatic friction clutch device, gravity lowering brake and silencer is operated from the sidewalk. The cranking handle does not revolve when the load hook is being lowered. Lowering is controlled by a powerful brake. All operations are noiseless.

Hoistwell Model C-2

Model C-1—Same as Model C except is equipped with gear shifting device instead of friction clutch.

Model C-2—Same as Model C-1 except built with overhead crane for dumping ashes directly into truck for any hoistway depth.

Model	Specifications—Ash Hoist, Sidewalk Doors, Opening and Closing Device, Ladder, Ash Can Truck and Ash Cans
A	One Hoistwell Telescopic Model A Hydraulic "Grade Level Type" Ash Hoist as manufactured by FRANK ELIAN & Co. (rest of specifications same as Model B, except omit worm-geared telescoping device.)
B	One Hoistwell Telescopic Model B Hydraulic ["Grade Level"] ["Truck Type"] Ash Hoist as manufactured by FRANK ELIAN & Co., of 200 to 300 lbs. cap.; speed of 35 to 75 ft. per min., according to water pressure; equipped with a totally enclosed, self-locking, worm-geared, telescoping device; brass cylinder; cast iron heads; monel metal piston rod; and a 3-way brass body operating valve. Hoist to lower load by gravity using no water. **Note:** (For Models A and B) In plumber's contract provide for furnishing and connecting 1¼-in. galvanized pipe connections from ash hoist operating valve to water supply, and discharge to sewer or sump; also install a brass body gate valve in the supply line above the operating valve.
C	One Hoistwell Telescopic Model C Hand Power "Grade Level Type" Ash Hoist as manufactured by FRANK ELIAN & Co., of [350] [500] lbs. cap.; 30 ft. per min. speed; with compound gear hoisting unit mounted in a cast steel frame; friction clutch device; gravity lowering brake; silencer; and totally enclosed, self-locking, worm-geared telescoping device.
C-1	One Hoistwell Telescopic Model C-1 Hand Power "Grade Level Type" Ash Hoist as manufactured by FRANK ELIAN & Co. (rest of specification same as Model C, except gear shifting device instead of friction clutch device).
C-2	One Hoistwell Telescopic Model C-2 Hand Power Foldable Overhead Crane "Truck Type" Ash Hoist as manufactured by FRANK ELIAN & Co. (rest of specification same as Model C-1).

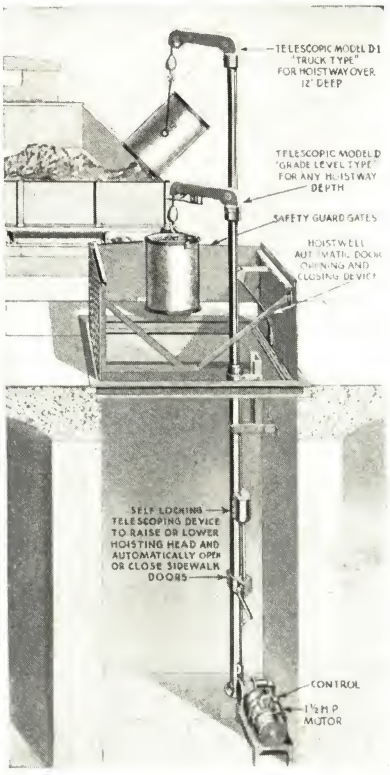
Sidewalk Doors—One pair of Hoistwell flush watertight $\frac{3}{16}$-in. checkered steel plate sidewalk doors 4x4 ft. mounted in a 4-inch iron channel frame (welded corners) with condensation gutter tapped for plumber's drain pipe.

Doors are to be equipped with the Hoistwell Automatic Opening and Closing Device, automatic safety spring guard gates, electric warning gong and sign as required by the Department of Highways.

Iron Ladder—One heavy iron ladder from basement floor to grade level.

Ash Can Truck—One rubber-tired, two-wheel ash can truck.

Ash Cans—17x24 in. [black], [galvanized], [standard], [low fixed bail], [swing bail] ash cans.



Hoistwell Models D and D-1

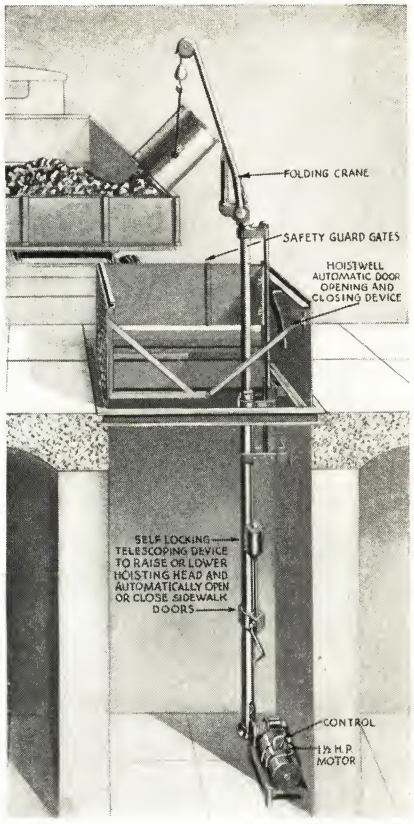
ELECTRIC ASH HOISTS

Hoistwell Telescopic Models D, D-1 and D-2

Model D—Designed for hoisting to grade level. The hoisting unit is conveniently located at the lower level. All hoisting, lowering, stopping, and braking operations are regulated by a single controller from the lower level or both upper and lower levels if desired. The machine consists of a totally enclosed 1½ hp. G. E. ball-bearing motor, equipped with worm drive gear reduction in bath lubrication, magnetic brake, single speed controller and positive upper limit. This unit is made in 300 and 500 lb. capacities, with a speed of 60 ft. per min. A foolproof, hand operated, self-locking, worm-geared telescoping device raises or lowers the hoisting head and automatically opens or closes the sidewalk doors.

Model D-1—Same as Model D but with a higher overhead crane for dumping directly into ash truck when the hoistway is over 12 ft. deep. This eliminates a foldable crane.

Model D-2—Same as Model D except that it is equipped with a foldable overhead crane used for dumping ashes directly into ash truck for hoistways less than 12 ft. deep: this depth not permitting telescoping a straight post.



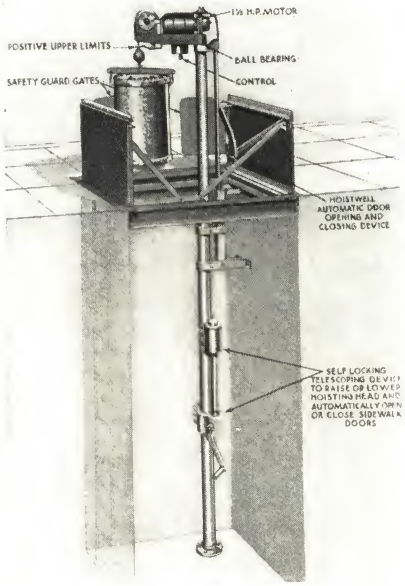
Hoistwell Model D-2

ELECTRIC ASH HOISTS

Hoistwell Telescopic Models E and E-1

Model E—Similar to Model D in every respect except that the motor is mounted on the telescopic post for operation from the grade level and lowers by gravity. This hoist is recommended where the hoistway area is limited in size. It combines improved hoist elements in simplest possible construction to secure the greatest strength and reliability. The gravity lowering device eliminates the use of current and enables speedy lowering. The automatic upper limit prevents cable overwinding. A single controller regulates all operations—raising, stopping, braking, and lowering by gravity. A foolproof, hand operated, self-locking, worm-geared telescoping device raises or lowers the hoisting head and automatically opens or closes the sidewalk doors. This feature eliminates all existing dangers to the operator when lowering the heavy hoist by the commonly used ratchet device which depends on the operator's strength to hold the load. The model is made in 300 and 500 lb. capacities.

Model E-1—Similar to Model E in every respect except that it lowers by positive electric control. Model E-1 is a safe, dependable hoist with positive upper limit and a single controller that raises, lowers, stops, and brakes all operations. The hoisting speed is 60 ft. per min. It is the least expensive and simplest of electric hoists.



Hoistwell Models E and E-1

GENERAL INFORMATION

Inquiries—When making inquiries please furnish correct information as to:
(1) Height between hoisting level and size of opening (rough sketch if possible).
(2) If Hydraulic Hoist—pressure available; if Electric Hoist—current, phase, and voltage available.

Service—Submit your hoisting problems to our engineers. They will help you select the types which will best meet your conditions.

Guarantee—We guarantee all our equipment to give satisfactory results and to be definitely free from mechanical defects.

Patents—All our equipment is fully protected by patents and patents pending.

Catalogue—Catalogue and references will be furnished on request.

Model	Specifications—Ash Hoist, Sidewalk Doors, Opening and Closing Device, Ladder, Ash Can Truck and Ash Cans.
D	One Hoistwell Telescopic Model D Electric "Grade Level Type" Ash Hoist as manufactured by FRANK ELIAN & Co. of [300] [500] lbs. cap., hoisting speed 60 ft. per min. complete with 1½ hp. G-E motor, worm drive gear reduction, electro-magnetic brake, grooved drum, single speed reversible controller, automatic upper and lower limits, and totally enclosed, hand operated, self-locking, worm-geared telescoping device without pin, cable, or chain.
D-1	One Hoistwell Telescopic Model D-1 Electric "Truck Type" Ash Hoist as manufactured by FRANK ELIAN & Co. (rest of specification same as for Model D).
D-2	One Hoistwell Telescopic Model D-2 Electric Foldable Overhead Crane "Truck Type" Ash Hoist as manufactured by FRANK ELIAN & Co. (rest of specification same as for Model D).
E	One Hoistwell Telescopic Model E Electric "Grade Level Type" Ash Hoist as manufactured by FRANK ELIAN & Co. with gravity lowering device, of [300] [500] lbs. cap., hoisting speed 60 ft. per min. complete with 1½ hp. G-E motor, worm drive gear reduction, grooved cable drum, single speed reversible controller with automatic neutral return, automatic upper limit, and totally enclosed, hand operated, self-locking, worm-geared telescoping device without pin, cable or chain.
E-1	One Hoistwell Telescopic Model E-1 Electric "Grade Level Type" Ash Hoist as manufactured by FRANK ELIAN & Co. with electro-magnetic brake for hoisting and lowering electrically (rest of specification same as for Model E).

Sidewalk Doors—One pair of Hoistwell flush watertight $\frac{3}{16}$-in. checkered steel plate sidewalk doors 4x4 ft. mounted in a 4-in. iron channel frame (welded corners) with condensation gutter tapped for plumber's drain pipe.

Doors to be equipped with the Hoistwell Automatic Opening and Closing Device, automatic safety spring guard gates, electric warning gong and sign as required by the Department of Highways.

Iron Ladder—One heavy iron ladder from basement floor to grade level.

Ash Can Truck—One rubber-tired two-wheel ash can truck.

Ash Cans—17x24 in. [black] [galvanized], [standard], [low fixed bail], [swing bail] ash cans.

CHAS. K. ERNST, INC.

Manufacturers of Sidewalk Elevators and Ash Hoists

998-1006 East Ferry Street, BUFFALO, N. Y.

Products

TELESCOPIC ASH LIFTS, with and without Overhead Crane, Hand and Electric; PLATFORM SIDEWALK LIFTS, Hand and Electric; CELLAR WINDOW ASH LIFTS; SAFETY-GUARDED SIDEWALK DOORS; DOOR OPERATING DEVICE; SAFETY GATE; ASH CANS and ASH CAN TRUCKS; NON-TELESCOPIC HOISTS.

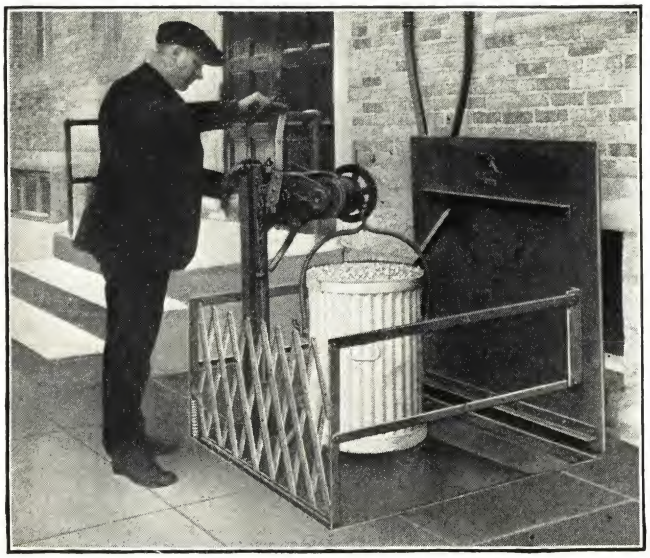
Also Automatic Stokers and Special Grates for forced draft, to preheat air on top of fire-bed.

Type "1" Ernst Sidewalk Operative Hand Power Telescopic Hoist and Safety-guarded Door with Door Operating Device, One-man Operated—Capacity, 500 Lb.; Speed, 30 to 40 Ft. Per Minute

Designed especially for one-man removal of ashes, handling of kegs, crates and boxes, etc. Thousands of installations in schools, apartment houses, churches, banks, public and office buildings, etc.

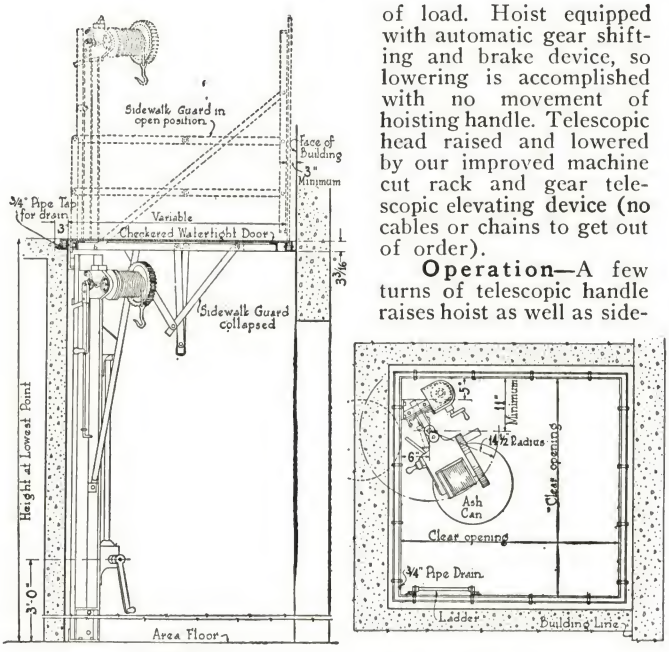
Features—Operates at speed of 35 ft. per minute, requiring pressure of only 7 lb. on hoisting handle for each 100 lb. of load. Hoist equipped with automatic gear shifting and brake device, so lowering is accomplished with no movement of hoisting handle. Telescopic head raised and lowered by our improved machine cut rack and gear telescopic elevating device (no cables or chains to get out of order).

Operation—A few turns of telescopic handle raises hoist as well as sidewalk door into position, as illustrations show. The whole door opening is enclosed by safety guards and spring gate. Operator from sidewalk level can, unaided, hook on cans that are in the cellar and rapidly hoist ash cans to grade level by means of winch on telescopic arm. From 6 to 8 ash cans may be hoisted to sidewalk level before operator has to go to cellar to place another batch of cans in areaway under ash lift. When through hoisting, operator goes down ladder in areaway to cellar, lowers hoist and door closes automatically, flush with sidewalk and is automatically locked, no part being visible under closed sidewalk door.



Door Opening Enclosed on Entire Four Sides. Cans Hoisted to Sidewalk—Passes All City Regulations

Can Swung on Sidewalk, Safety Gate Automatically Closes Front of Door Opening After Can Passes Gate

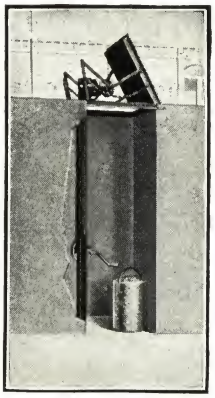


Details of Ernst Type "1" Telescopic Ash Hoist and Safety-guarded Sidewalk Door Operated by Rack and Pinion

See details of door on fifth following page

Construction—Main upright consists of a 6-in. channel into which telescopes an extension arm which carries the hoisting apparatus. Drum on hoisting head revolves on ball bearings and is operated by compound gears and a handle; it is grooved to take ¼-in. flexible steel cable. All gears machine cut and entire hoist made in the most substantial manner.

Non-telescopic hoists can be furnished for any special conditions.



Hoist and Door Automatically Raised in a Single Operation by Operator from the Cellar

Door locked in any position

How to Specify—Furnish and install complete where indicated on plans, in accordance with manufacturer's drawings and instructions, as follows: an Ernst Type "1" Telescopic Hoist with automatic gear shift and brake device, with improved rack and gear elevating telescopic mast complete; an Ernst One-piece Safety-guarded [checkered top] [vault light] Sidewalk Door with flush, watertight door frame; size 4x4-ft. clear opening with guttered frame tapped for ¾-in. drain pipe connection. Frame to be of concealed flush type embedded in concrete, complete with Ernst automatic door opening, closing and locking device, Ernst safety spring gate and electric warning alarm. Also furnish 12 Ernst galvanized swing bail ash cans size 18x26 in. with an ash can truck, and heavy iron ladder. Outfit to receive a coat of black graphite paint at factory. (*Note:* Painter to give another coat after erection.) Hoist to be guaranteed for one year against defects in materials or workmanship. Extra heavy door for traffic can be furnished when required.

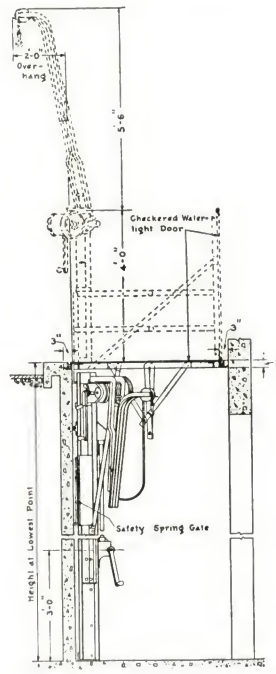
Type "2" Ernst Hand Operated Telescopic Hoist with Overhead Crane, Sidewalk Door and Door Operating Device, One-Man Operated—Capacity, 300 Lb.; Speed 35 Ft. Per Minute

The overhead crane that extends 9 ft. 6 in. above sidewalk level enables one operator at grade level to hoist ash cans from cellar and empty them directly into a wagon 6 ft. above grade, saving rehandling at grade level. Size of door recommended, 4x4 ft., which should be so located that door opening is near curb. Raises loads of 300 lb. at speed of 35 ft. per minute, and is equipped with gear shifting device, brake, ball bearing winch, safety ratchet and crane mounted to swing on ball bearings. Hoisting handle does not revolve when lowering loads to cellar. Recommended to be used with the Ernst safety-guarded door with door operating device.

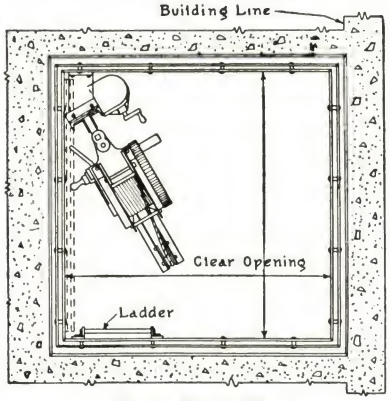
Ernst Hand Operated Vehicle Type "2" Hoist with Can Raised 9 Ft. Above Grade

How to Specify—Furnish and install where indicated on plans an Ernst Type "2" Telescopic Hoist with overhead crane, gear shifting and brake device, having improved rack and gear elevating telescopic mast, complete with an Ernst one-piece safety-guarded door with safety spring gate, door frame (to be embedded in concrete) of concealed type, size 4x4-in. opening, and having condensation gutter tapped for a ¾-in. drain. Also Ernst automatic door opening, closing and locking device, with electric alarm. Supply 12 Ernst galvanized swing bail ash cans size 18x26 in., ash can truck and iron ladder from floor to sidewalk.

Outfit to receive a coat of paint at factory and another coat by painting contractor after erection. Hoist to be guaranteed for one year against defects in workmanship or materials. Extra heavy door can be furnished for truck traffic if desired.



Section Through Areaway Showing Hoisting Arm Lowered Below Door



⅜-in. Scale Plan

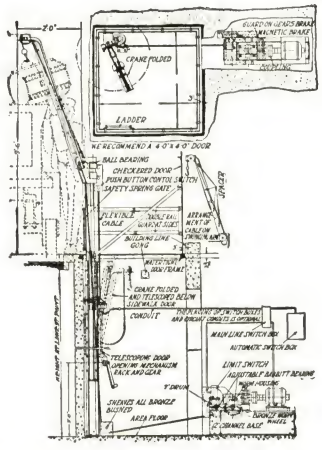
Ernst Type "2" Vehicle Hoist with Overhead Crane Swung and with Can Tilted to Empty Directly into Wagon

Crane swings on ball bearings

Type "3" Electric Telescopic Hoists for One and Two-man Operation

Where a considerable amount of ashes is to be hoisted from cellar to sidewalk or wagon height, and for deep cellars, the electric model should be used. It hoists ash cans at a speed of 70 ft. per minute and has a capacity of 300 lb. This model can be furnished with or without overhead crane. It is operated by a 2 hp. G-E motor, mounted in cellar, with worm gear drive enclosed in case and bathed in oil. It has a positive upper and lower limit switch, with magnetic wall switch, magnetic brake, and, being entirely automatic in operation, is suited for heavy duty work.

Control—Can be furnished with hand starter in cellar for two-man operation but can be operated entirely from sidewalk level by one man by means of remote control push button switch mounted on head of hoist. The motor control stand is in the cellar out of the way. It has one hoisting and one lowering speed. All bearings are bronze bushed end thrust bearings in worm gear drive. We have hundreds of installations in schools, hotels, apartment houses and public institutions.



Ernst Electrically Operated Type "3" Telescopic Ash Hoist, Door Combination and Operating Device

How to Specify—Furnish and install where indicated on plans an Ernst Type "3" Telescopic Hoist (state whether to have or not to have a vehicle crane), complete with 2 hp. motor, with upper and lower limit switch [hand starter] [push button control], magnetic brake, wall switch for entire automatic operation, and worm gear drive. Also furnish an Ernst one-piece safety-guarded door with watertight frame and condensation gutter, size 4x4-ft. opening, safety spring gate, bell alarm, and door operating device. Also a wrought iron ladder from cellar floor to sidewalk, ash can truck and 12 Ernst galvanized swing bail ash cans size 18x26 in.

Outfit to be installed in accordance with manufacturer's drawings and instructions to satisfaction of the architect and guaranteed for one year against any defects in materials or workmanship. Outfit to be given one coat of black graphite paint at the factory and another coat of paint by painting contractor after erection.

Type "4" Ernst Electric Self-raising Platform Lift, Push Button Control, One-Man Operated—Capacity, 1000 Lb.; Speed, 20 Ft. Per Minute

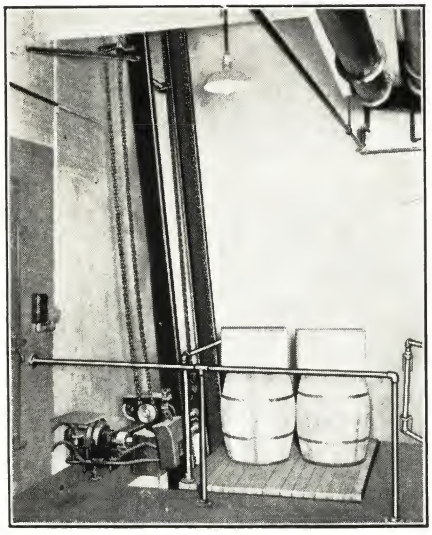
Unique in construction, practically foolproof, with many exclusive features which permit the installation of an electric platform elevator that is entirely automatic in operation and which can be installed in most any areaway, making one of the most satisfactory and economical lifts made. Upright, inclined but 2 ft. 5 in. from vertical lift, with motor and control built in between the uprights, taking up little room in basement and permitting complete elevator to be installed in any areaway.

By deepening pit, platform can be extended 3 ft. 6 in. above sidewalk, to permit unloading of cans directly onto a wagon, no part of lift showing when sidewalk doors are closed. Can be made any height to 26-ft. travel, with or without pit.

Lift operated by a 3 hp. motor at speed of 20 ft. per minute, and can handle from 4 to 6 ash cans per trip. Passes all city ordinances, due to ease of handling and safety to operator. It has an endless chain double drive eliminating replacements and breakage of cables ordinarily used. Lift worm gear driven, with gears bathed in oil. It is equipped with automatic upper and lower limit switches with magnetic brake and reversing wall switch, operated by push button switches ordinarily found only in much more expensive elevators; platform locks at any desired height. All gears are machine cut and keyseated, enclosed by guards, and all bearings are babbitted for extra long life. Ideal for use in schools, hotels, stores, banks, apartment houses and public buildings. Platform operates on roller bearings.

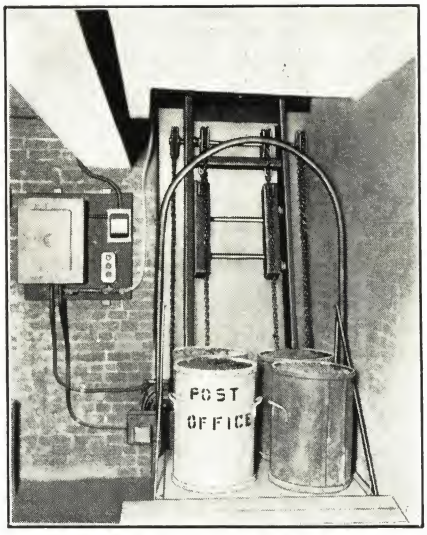
Window Model—This lift can be installed at a window, eliminating an outside areaway. By locating door or window 7 ft. above grade level, ash cans may be emptied directly into a wagon, saving rehandling at grade.

How to Specify—Provide where shown on plans an Ernst Type "4" Elevator with 3 hp. motor, automatic upper and lower limit switch, with magnetic brake and wall switch, worm gear drive with two 3-way push button controls for one-man operation, capacity for 1000 lb., to operate at speed of 20 ft. per minute for alternating or direct current. Include one Ernst double leaf flush type sidewalk door with frame and condensation gutter tapped for ¾-in. drain pipe connection. Include a bow on platform to automatically open sidewalk doors, also furnish bell ringing alarm, 12 standard Ernst galvanized ash cans 18x26 in., with an Ernst ash can truck. Platform and doors to be of size shown on plans. (Self-locking door extra.)



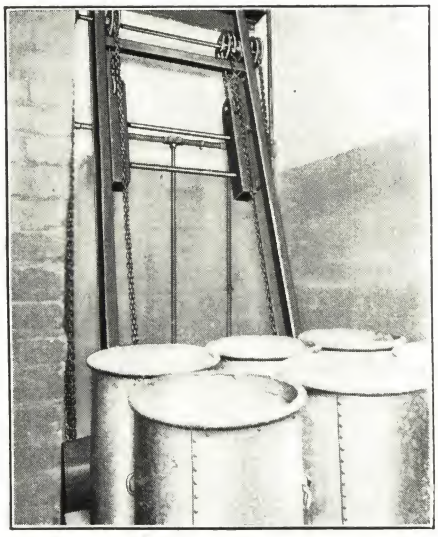
Type "4" Electric Self-raising Elevator Installed in Buffalo Consistory, Buffalo, N. Y.

Serves 3 floors 26-ft. travel. Uprights inclined but 2 ft. 5 in. from vertical lift. Passes all municipal regulations. Has no cables to break or replace. Exceptionally strong and safe. Ideal for large buildings, schools, hotels, apartments, etc.



Lift Installed in Buffalo's Main Post Office, Ellicott Street

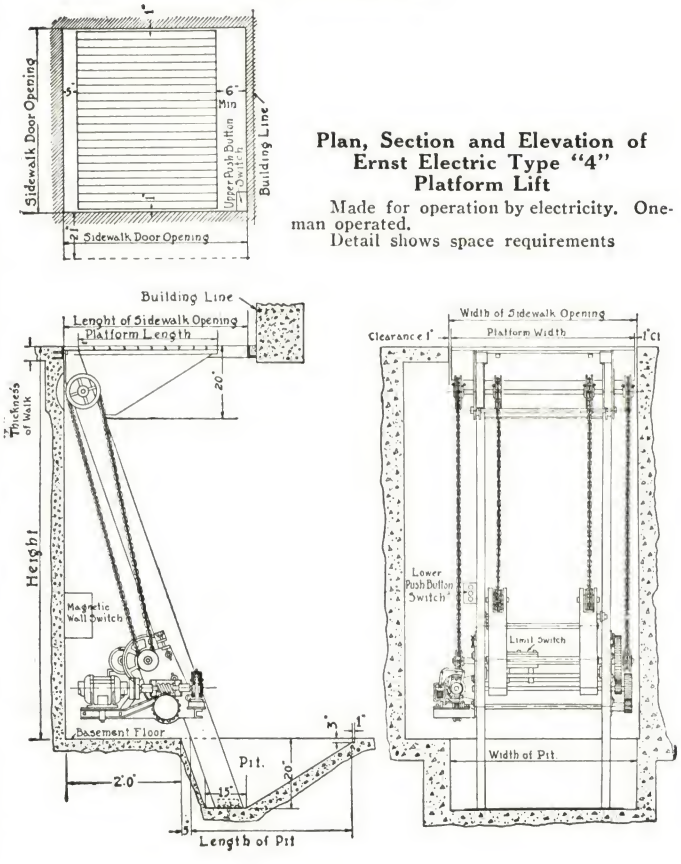
This building occupies a whole square block. Note bow to open sidewalk doors automatically, and push button control. Lift entirely automatic. This installation hoists 170 ash cans in an hour, with 2 men, to grade level, at operating expense of 3¢ for current



Lift Installed in Buffalo Athletic Club, Buffalo, N. Y.

Installed in areaway but 4 ft. 6 in. wide enclosed by walls on three sides. Handles 6 ash cans per trip. Requires less room than a vertical elevator. Nothing overhead, easier to install and one of the least expensive electric elevators made. One that will give many years of satisfactory service.

Many lifts installed that make 50 to 100 trips a day, with no repairs required after 10 or more years' use



Plan, Section and Elevation of Ernst Electric Type "4" Platform Lift

Made for operation by electricity. One-man operated.

Detail shows space requirements

Type "5" Ernst Self-raising Platform Elevator, Hand Power— Capacity, 1000 Lb.; Speed, 12 Ft. Per Minute

A platform lift of unusual merit inclined but 2 ft. 5 in. from vertical lift, having a counterbalanced platform to avoid one-half of cranking ordinarily required. Loaded platform lowers by gravity to cellar and, when empty, platform will rise automatically to sidewalk level. Lift is operated by endless chain drive, there being no cables to rust out or break and need replacement; also has two driving and lifting chains. Lift requires 18-in. space for winch to operate elevator from side; or we can furnish extended winch mechanism to operate lift from inside the cellar where areaway is not wide enough to house operator at side of elevator (see drawings below). Handles barrels, ash cans, boxes, trunks, etc.

Construction — Uprights made of two 7-in. channels attached to plates to door frame and cellar floor. Lift, upon being assembled, requires but four anchor bolts to install it rigidly. Quadruple geared mechanism, attached directly to uprights, has all gears machine cut and keyseated, operating a platform that is suspended between channel flanges. Platform runs on roller bearings, adjusting device taking out slack of chain, so that platform cannot sag nor bind. Being counterbalanced by weight carriage makes it one of the easiest platform lifts to operate. Has powerful, lined brake on a 24-in. hand wheel crank.

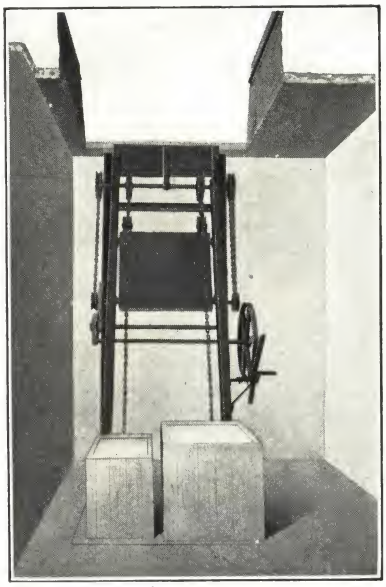
Platform made of hardwood 2 in. thick.

Safety ratchet locks platform at any desired height. There are no working parts in pit to deteriorate or rust out. Pit but 20 in. deep required.

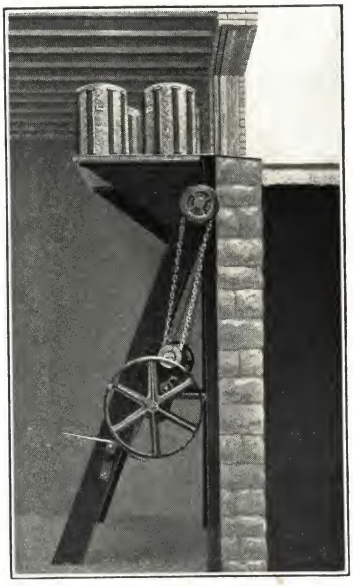
Window Model Type "5"—This lift can be installed in boiler room at window 3 ft. or more in height, so that no outside areaway is needed. It requires but four anchor bolts to install it rigidly in place.

We have hundreds of this type lift installed, that have never had a repair or replacement though installed 10 or more years and they work as well as when first installed.

How to Specify—Provide where shown on plans an Ernst Type "5" Platform Lift of 1000-lb. capacity, with counterbalanced platform [operated by winch at side] [with extended winch for operation in basement]. Platform to be ....x ....ft. Include an Ernst double leaf flush type sidewalk door with frame and condensation gutter tapped for ¾-in. drain pipe connection, tops of doors checkered for above size platform and with bow to open sidewalk doors, bell ringing alarm, and (state number desired) standard Ernst galvanized ash cans 18x26 in., and Ernst ash can truck.



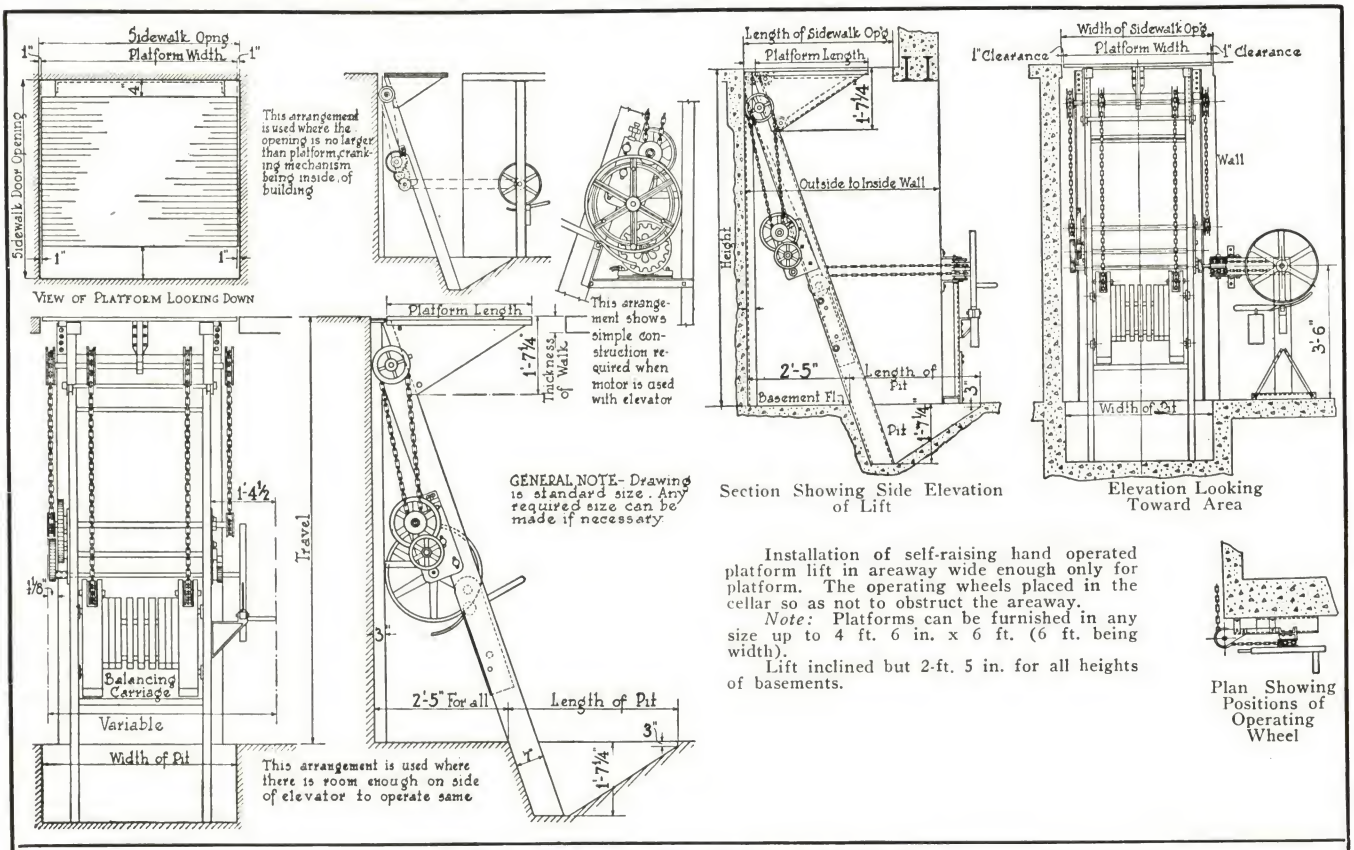
Lift Used in Areaway and Showing Platform Level with the Floor
Will raise automatically to grade level when platform is emptied



Lift Installed at Window Makes an Excellent Four-can Ash Lift
Operated by one man

Typical Installations of Ernst Type "5" Platform Lifts

Eliminates all elevator cable troubles and costly replacement expense. Passes all city regulations.



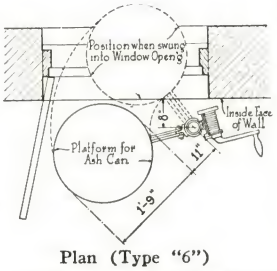
Typical Details of Ernst Type "5" Platform Lift

Type "6" Ernst Perfection Cellar Window Hand Operated Ash Lift
Capacity, 300 Lb.; Speed, 25 Ft. Per Minute

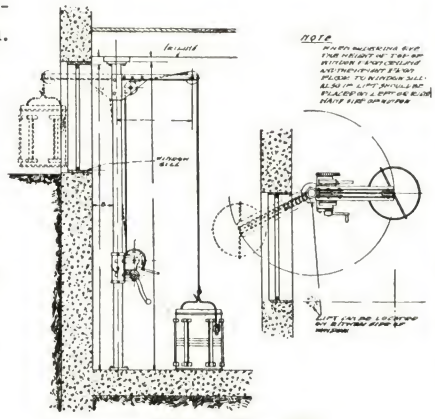
Permits removal of ashes through cellar window where building has no outside areaway for access to cellar. Can be operated through any window 30x30 in. Platform 21 in. in diameter allows standard sizes of ash cans to be hoisted to grade level by winch directly attached to 3-in. pipe upright. Lift is equipped with powerful brake, safety ratchet, cable grooved drum and ⅜-in. cable. Lift is very compact, easy to install, and affords a rapid and economical means of hoisting ash cans.

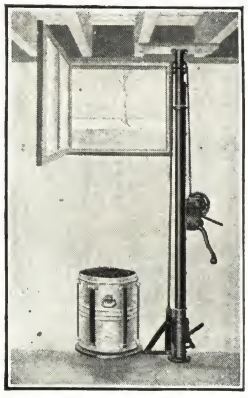
Type "7" Ernst Window Swing Crane Lift—This lift is similar to our Perfection Elevator, but has a crane to handle swing bail ash cans through window to grade, instead of having platform. See drawing.

How to Specify—Provide and install where indicated on plans an Ernst Perfection Elevator [Ernst Window Swing Crane Lift] having capacity of 300 lb. and hoisting speed of 25 ft. per minute. (State height of ceiling, and height of window sill from cellar floor.) Include an Ernst ash can truck, six Ernst standard or swing bail ash cans, and an iron ladder for access from cellar to grade level.



Plan (Type "6")


Section (Type "7")


Ash Can on Platform Ready to Be Hoisted to the Window (Type "6")

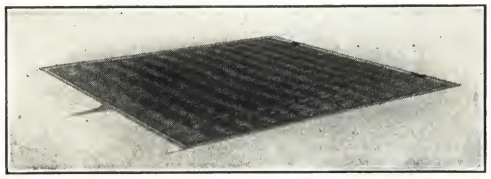
Details of Ernst Perfection Cellar Window Ash Lift

Ernst Safety-guarded Sidewalk Doors and Watertight Frames; Ash Can Trucks

Ernst One-piece Safety-guarded Sidewalk Doors—In so far as we know, the only sidewalk door made in one-piece having a concealed door part of frame visible, and which is automatically guarded to protect the hatchway when open. Neat appearing and long life. Can be provided with our regular frame or with condensation gutter tapped for ¾-in. drain pipe connections. Has no middle seam to bend down, warp or leak water. Perfectly flush with sidewalk, having a new concealed type door hinge, as well as inside locking device. Doors are made with checkered non-slip tops and to withstand loads of 300 lb. per sq. ft. Made in all sizes from 3 to 5 ft. square.

One-piece Safety-guarded Sidewalk Door Showing Complete Guard Rail and Concealed Frame
A bar encloses front side of door

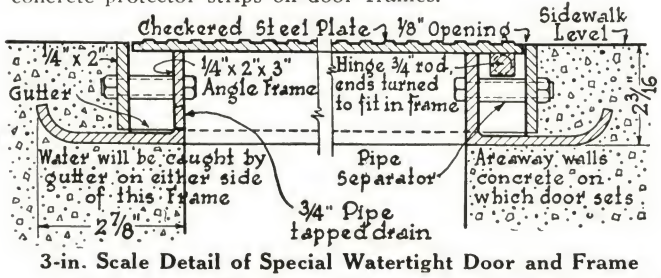
Sizes—Made in all sizes. Stock sizes are as follows: 3 ft. square; 3 ft. x 3 ft. 6 in.; 3 ft. 6 in. x 4 ft.; 3 ft. 6 in. square; 4 ft. square; 4 ft. x 4 ft. 6 in.; 4 ft. x 5 ft. and 4 ft. 6 in. square.


Ernst One-piece Safety-guarded Sidewalk Door Closed
Note concealed frame, flush with walk and neat appearance of door closed. Rail guards invisible

Two-Leaf Doors—We can furnish our doors in double leaf with checkered tops, for any size of door openings having our regular concealed frame embedded in concrete, perfectly flush with sidewalk, with or without special forged watertight door frame with condensation gutter. All door frames electric welded.

Watertight Door Frames for Single and Double Doors—One of the best watertight door frames obtainable, due to special one-piece, forged, angle iron frame. Embedded in concrete, the gutter catches all surface water on door as well as water that leaks in around outside edge of door frame (a special feature of Ernst door frames). Note detail drawing. Hinges bronze bushed; easily replaceable if broken and are entirely concealed. Door frames are $3\frac{3}{16}$ in. high, providing for extra deep and wide gutter. All Ernst doors are perfectly flush with sidewalk, there being no part of frame to slip or stumble over, while checkered top plates are non-slippery.

How to Specify—Furnish and set where indicated on plans, an Ernst [one-piece] [2-leaf checkered steel sidewalk] door with [standard door frame] [special forged one-piece door frame with condensation gutter] tapped for ¾-in. pipe connection of size shown. The one-piece doors to have automatic guard rail enclosures with concealed hinges. All doors to have concrete protector strips on door frames.



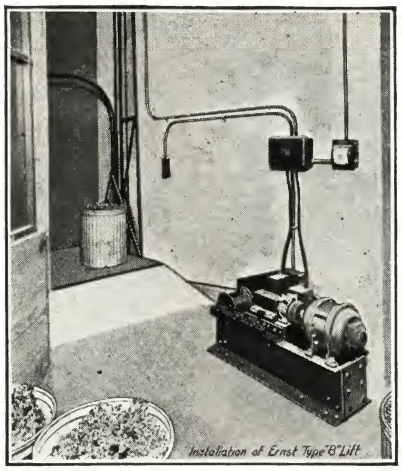
3-in. Scale Detail of Special Watertight Door and Frame

Ernst Ash Can Trucks—Our strong, 2-wheeled hand truck, fitting all makes of standard ash cans, is recommended for use with our lifts. Saves labor; eliminates noise; lengthens life of cans.

Rubber tired trucks also can be furnished if desired.

Ernst Type "8" Electric Platform Lift, with Push Button Control, One-man Operated—Three Capacities, 500, 750, 1000 Lb.; Speed, 20 Ft. Per Minute

Ernst Type "8" lift is giving perfect satisfaction in hundreds of buildings, such as schools, apartment houses, banks, hotels, theaters, etc. One man unaided can use this lift from either floor level. Its operation is entirely automatic. Being equipped with a 2 hp. motor with automatic upper and lower limit switch, magnetic brake and magnetic wall switch, it makes one of the simplest and most economical installations on the market. Motor stand located in basement where most convenient, or in areaway. It handles ash cans, barrels, boxes, trunks and cases to and from basement; noiseless in operation.



(Note the latest type floor winch)

Uprights in Corners—These can be furnished if uprights at sides are not desired.

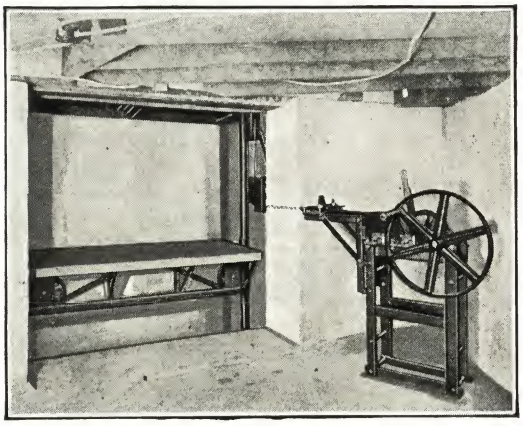
Platform can be made any size up to 25 sq. ft.

How to Specify—Furnish and install an Ernst Electric Type "8" Lift complete with motor, limit switch, worm gear drive, with magnetic brake and wall switch, with two 3-way push button control switches, of capacity of [500] [750] [1000] lb. with worm gear drive, for automatic one-man operation. Include an Ernst double leaf flush type sidewalk door with watertight door frame tapped for ¾-in. pipe connection, bow to open sidewalk doors, bell alarm, and 12 standard Ernst galvanized ash cans 18x26 in., and an Ernst ash can truck. Platform not to exceed 25 sq. ft.

Ernst Type "9" Hand Operated Platform Lift—Capacities, 500, 750, 1000 Lb.; Speed, 15 Ft. Per Minute

Has 1 or 2 cables and drums.

A strong, fast, dependable, easy operating elevator. Can be furnished in any of above capacities to handle merchandise and ashes. Suitable for use in hotels, banks, apartment houses, stores, etc., where an inexpensive operating lift is desired.



Ernst Type "9" Platform Lift

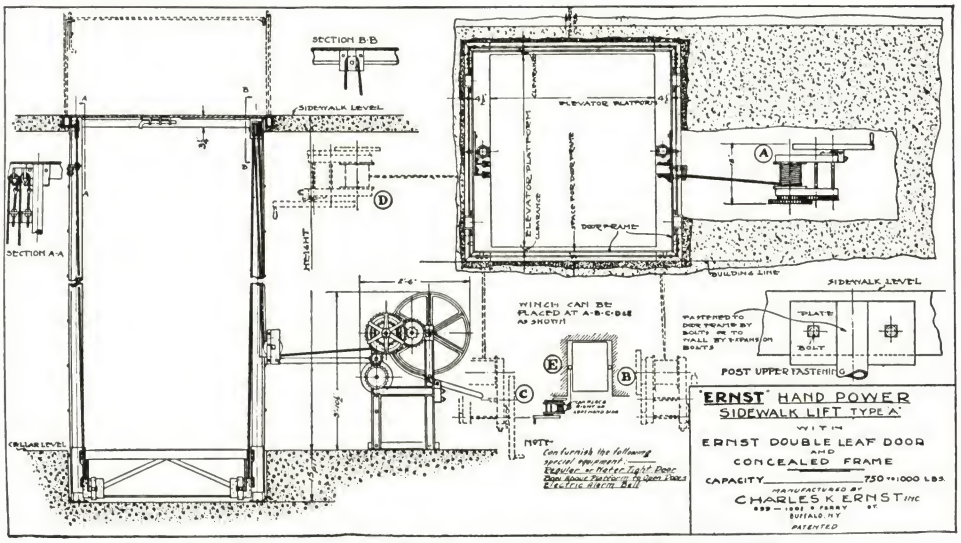
Construction—Consists of two 3-in. uprights with platform and necessary winch, made of the strongest and most durable materials for long life. Platform made of sheet iron, electric welded to platform assembly, so that anything can be easily handled on and off platform. Uprights are bolted to cellar floor and door frame by plates. Roller bearing platform slides are non-binding and platform is very well cross braced and stiffened. All gears machine cut; drum cable grooved; operating wheel 24-in. in diameter; with powerful brake for lowering; is equipped with safety-ratchet to lock platform any desired height. Various types of winches can be furnished in addition to that illustrated. Winch can be at side of elevator, extended in basement or around corner.

Pit—For hand operated lifts, pit should be 15 in. in depth; for electric lifts, 20 in.

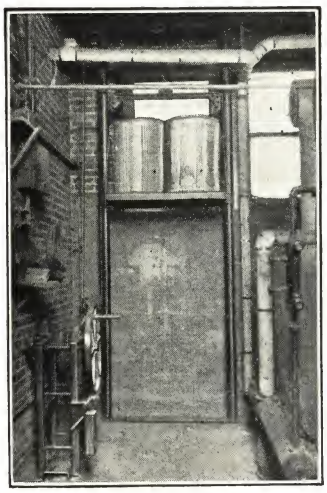
How to Specify—Provide where indicated on plans an Ernst Type "9" Platform Lift, capacity [500] [750] [1000] lb. Platform to be of (state size) [with] [without] pit. Also furnish an Ernst double leaf flush type sidewalk door of proper size for above platform with [standard door frame] [special watertight door frame with condensation gutter], tapped for ¾-in. drain pipe and with bow to open sidewalk doors automatically. (Bell ringing alarm can be provided if specified.) Platform any size to 4x6 ft.

Ernst Type "12" Pitless Platform Lift

This lift is similar to Type "8" but is for use inside of a building. Uprights extend from cellar floor to ceiling, with added feature of pit in basement being unnecessary, as platform lowers directly onto cellar floor. Can be furnished for hand power as well as electric. Makes an excellent 4 to 6-can ash lift.



Installation Details of Types "8" and "9" Platform Lifts



Ernst Type "12" Hand or Electrically Operated Platform Lift

ROBERT GILLESPIE CO.

Manufacturers of Telescoping Ash Hoists and Sidewalk Lifts

GENERAL OFFICES AND FACTORY

WARE, MASS.

REPRESENTATIVES IN PRINCIPAL CITIES

Products

TELESCOPING ASH HOISTS, hand and electric operation, in various types.

CELLAR WINDOW ASH LIFTS.

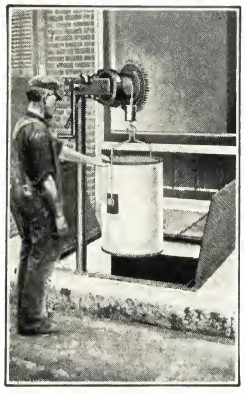
PLATFORM SIDEWALK LIFTS, hand and electric.

SIDEWALK DOORS with Automatic Opening and Closing Attachments and Safety Guard Gates.

Also Monorail Overhead Ash Handling Systems, Overhead Cranes.

Gilco Type T Telescoping Ash Hoist, Fig. 8

Where it is desired to use hand power and where trucks can not drive alongside the sidewalk, this type of equipment should be used. The complete unit consists of telescoping hoist as shown, Gilco automatic opening and closing doors with safety guard gates, operator's steel ladder, warning bell and truck. This is a one-man outfit; the pressure on the handle is 8 lb. for each 100 lb. of load. The capacity of the machine is 500 lb.; lifting speed, 30 ft. per minute.

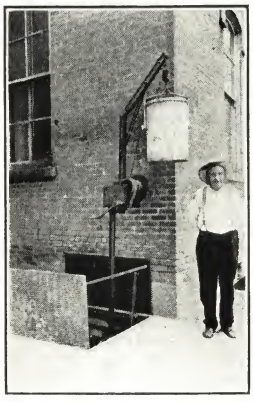


Type T Telescoping Ash Hoist, Fig. 8

A powerful band brake with woven lining controls the lowering of can and, to avoid danger to operator, crane handle does not rotate. The machine operates without noise. The telescoping element is 2½-in. heavy steel pipe; the supporting column is built up of structural channels securely connected by guides, permitting accessibility to all parts of the machine. The hoisting head rotates on ball bearings.

Note: The usual size of areaway is 4x4 ft. in clear, but this hoist may be operated in 3½ x3½ ft.

How to Specify—Furnish and install, where shown on plans, one Gilco Telescoping Type T Ash Hoist with Gilco flush watertight doors, automatic opening and closing device and safety guard gates, twelve 17x24-in. galvanized No. 16 gauge swing bail ash cans, ash can truck and steel ladder.



Type W Direct Truck Loading Ash Hoist, Fig. 14

Gilco Type W Hand Operated Telescoping Ash Hoist for Direct Loading Into Truck, Fig. 14

This model is arranged so that the operator may raise the can from the basement and dump it directly into the truck about 7 ft. above grade. Rehandling is eliminated. The crane head folds under the doors when not in use. The opening for door should be near the curb and 4x4 ft. in clear. The capacity is 300 lb. at 30 ft. per minute.

A powerful band brake with woven lining controls the lowering of the can, and to avoid danger to the operator, the hoisting handle does not rotate. The telescoping unit is 2½-in. heavy steel pipe, supported by steel channel column. This column is fastened to floor and wall with heavy steel brackets and expansion bolts. The machine is noiseless in operation and head rotates on ball bearings.

How to Specify—Furnish and install, where shown on plans, one Gilco Telescoping Type W direct truck loading ash hoist with Gilco flush watertight doors, automatic opening and closing device and safety guard gates; twelve 17x24-in. galvanized No. 16 gauge swing bail ash cans, ash can truck and steel ladder.

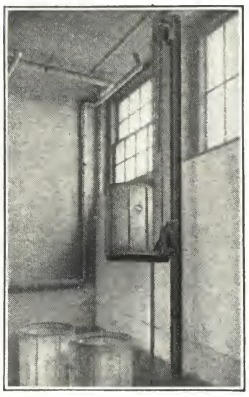
Gilco Type PR Window Ash Hoist, Fig. 9

This machine raises the can and swings it through the window of basement or boiler room. It is simple in construction and easy to operate. Capacity, 300 lb.; lifting speed, 30 ft. per minute.

It can be made for any height basement floor to ceiling. The window opening should not be less than 30 in. high by 30 in. wide for standard cans. The platform comes within 2 in. of floor, rides on rollers on the steel column and travels free from binding.

The hoist has machine cut gears and an automatic brake which holds the load at any point.

This is an economical hoist to use. It is simple in construction, easy to install and the cost of areaway and doors is saved.

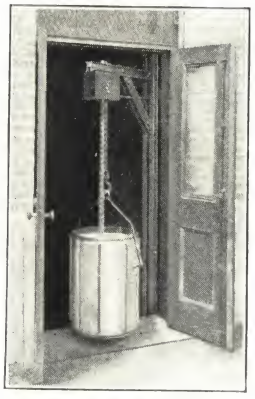


Type PR Window Ash Hoist, Fig. 9

How to Specify—Furnish and install, where shown on plans, one Gilco Window Ash Hoist Type PR having swing platform and roller guides. Height to suit boiler room.

Gilco Type J Ash Crane, Non-telescoping, Fig. 11

It is sometimes convenient to arrange a standard doorway at grade with ladder from boiler room. Where this is possible our Type J non-telescoping ash crane is a simple hoist to use. It raises the can from the boiler room floor and swings it through the opening. Several cans may be landed before a trip to grade is necessary. The operating chain hangs in a convenient position behind the mast. By using our special bail on the crane hook, two cans can be raised at once. The capacity is 500 lb. and the load is raised at 30 ft. per minute.



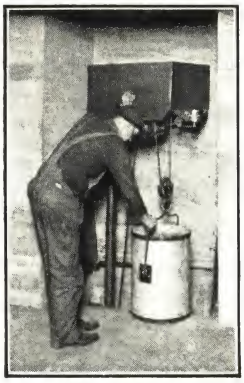
Type J Ash Crane, Fig. 11

The crane rotates on sockets bolted to floor and ceiling or

wall. The hoisting unit has machine cut gears and automatic brake.

How to Specify—Furnish and install, where shown on plans, one Gilco Type J Non-telescoping Ash Hoist to swing can through doorway (with bail for handling two cans at once). Height to suit boiler room and doorway. Also twelve 17x24-in. No. 16 gauge swing bail ash cans, ash can truck and steel ladder.

Gilco Type TE Telescoping Ash Hoist, Electrically Operated, Fig. 20



Type TE Telescoping Ash Hoist, Fig. 20

This model has a capacity of 500 lb., and raises the load at 60 ft. per minute. It should be used where the quantity of ashes is large or the areaway of more than usual depth. It telescopes under the sidewalk when not in use.

The hoisting unit has enclosed worm drive—bronze machine cut gear and steel worm hardened and ground. Motor is fully enclosed type, 1½ hp., designed for hoist service. A magnetic brake operates on the motor shaft, retarding the hook as well as supporting the load. The controller is built into the head and is of the single speed reversing type. The same lever gives up, down and stop motion. An automatic upper limit fixes the hook travel and prevents overwinding of the cable. The hoisting head rotates on ball bearings.

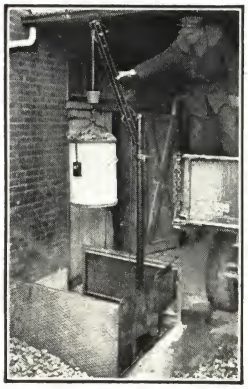
Note: The inside clear dimensions of areaway should be not less than 4x4 ft.

How to Specify—Furnish and install, where shown on plans, one Gilco Electrically Operated Telescoping Ash Hoist, Type TE, with Gilco flush watertight sidewalk doors, automatic opening and closing device and safety guard gates; twelve 17x24-in. galvanized No. 16 gauge swing bail ash cans; ash can truck and steel ladder.

The electrical contractor at the building shall provide and install all wiring and switches up to the service lugs on motor.

Gilco Type WE Telescoping Ash Hoist, Electrically Operated, for Direct Wagon Loading, Fig. 10

In large buildings where it is possible to drive alongside the opening, this equipment delivers the ash can directly into truck 7 ft. above grade. When not in use it telescopes under the sidewalk. It operates electrically and has a capacity of 300 lb. at 60 ft. per minute. The hoisting unit has totally enclosed worm drive running in oil, magnetic brake and automatic upper hook-travel limit. Motor is 1½ hp. fully enclosed with single speed reversing controller.



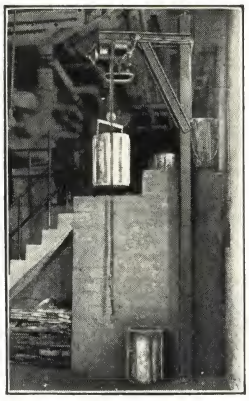
Type WE Telescoping Ash Hoist, Fig. 10

The electric machine with motor is usually placed on the basement floor in a convenient position near the areaway.

How to Specify—Furnish and install, where shown on plans, one Gilco Type WE Telescoping Ash Hoist, wagon height; electric power operation, flush water tight sidewalk doors with automatic opening and closing device and safety guard gates, twelve 17x24-in. No. 16 gauge swing bail ash cans, ash can truck and steel ladder.

The electrical contractor at the building shall provide and install all wiring and switches up to the service lugs on motor.

Gilco Type JE Ash Crane, Non-telescoping, Electrically Operated, Fig. 16



Type JE Ash Crane, Fig. 16

This machine is used at a door or window and swings the ash can clear through and lowers on to grade or direct to truck. The window should not be less than 5 ft. high to clear can and hoist.

The mast is fixed about 8 in. from wall to center and the can swings on a 2 ft. 6-in. radius. This radius may be varied if conditions require it for better operation.

The lower bearing is bolted to floor, the top one to ceiling or a bracket on wall. Capacity, 300 lb. at 60 ft. per minute. The hoisting unit has totally enclosed worm drive running in oil, magnetic brake, automatic upper hook-travel limit. Motor 1½ hp., fully enclosed and single speed reversing controller, operated by pendent cords from floor or grade.

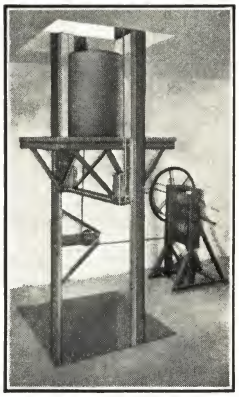
How to Specify—Furnish and install, where shown on plans, one Gilco Type JE Electric Power Operation Non-telescoping Ash Hoist to swing can through doorway. Height to suit boiler room and doorway. Also twelve 17x24-in. No. 16 gauge swing bail ash cans; ash can truck and steel ladder.

Gilco Type PS1 Hand Operated Platform Lift, Fig. 18 (Capacities 500 and 750 Lb.)

This is a simple, strong and durable machine used mainly in an areaway outside the building for handling merchandise and ashes.

The platform is made of hardwood bolted to steel angle frame through steel cover strip. The under frame is built up of steel angles forming a rigid structure. Guides are heavy steel angles, bolted to floor and door frame. Sheaves are of large diameter and fitted with roller bearings. The hoisting machine has compound gearing, steel sides, and supporting frame, steel hoisting wheel, powerful band brake on machined brake pulley. Steel pawl holds the load at any point.

Hoisting machine may be placed on either side, front or back to suit floor space available. The maximum platform size on the 500-lb. capacity is 3 ft. 6 in. x 3 ft. 6 in. and on the 750-lb. capacity 4x4 ft. The platform size is 4 in. less in width than the clear opening and 2 in. less front to back. A steel bow to automatically open the doors may be fitted to platform if desired.



Type PS1 Hand Operated Platform Lift, Fig. 18

How to Specify—Furnish and install, where shown on plans, one Gilco Sidewalk Platform Lift, Type PS1. Capacity [500] [750] lb., Platform size (state size), with Gilco flush watertight double leaf sidewalk doors (and opening bow on platform).

Sidewalk Doors

Gilco double-leaf sidewalk doors are constructed of heavy diamond pattern steel plates on steel supporting frame of either plain type or watertight construction with drainage gutter. All corners are welded. Hinges are bronze heavy pattern flush type.

ESTABLISHED 1889

JOHN W. KIESLING & SON, INC.

INCORPORATED 1923

Manufacturers of Hand Operated Platform Ash Hoists and Sidewalk Elevators

TELEPHONE
HADDINGWAY 3-8070

1797-1803 Atlantic Avenue
BROOKLYN, N. Y.

For Sales Representatives, See Our Pages on Dumbwaiters and Elevators

"ALL-STEEL" BALL BEARING SIDEWALK ELEVATOR OR ASH HOIST

Chain Drive or Direct Drive

Principal Features

This is a *full ball bearing* sidewalk elevator, *i.e.,* not only is the machine full ball bearing, but the cold rolled steel shafting to which the drums are secured also revolves in ball bearings, which require no lubrication. The dangerous practice of crawling into the pit to oil the drum shaft babbit bearings, customarily used with other types, is eliminated.

The winding machine can be placed on either side or in direct alignment. The fibre lined band brake is of the positive toggle locking type. Each platform is equipped with an "arch" which automatically opens the sidewalk doors as the elevator rises, and closes them as the elevator descends.

Doors

We recommend that Kiesling Flush Watertight Doors be included with Elevator, as the dimensions of these two items are governed by each other.

Five Year Guarantee

This "All-Steel" Ball Bearing Sidewalk Elevator or Ash Lift is guaranteed for *five years* against defective material and workmanship.

How to Specify

Provide where indicated on plans and in accordance with the manufacturer's specifications and drawings, "All-Steel" Ball Bearing Sidewalk Elevator (or Ash Lift) Size No..... [with Sidewalk Doors] as manufactured by JOHN W. KIESLING & SON, INC., 1797 Atlantic Avenue, Brooklyn, N. Y.

Manufacturer's Specifications

Machine—*Ball bearing, band brake.* The machine is assembled and set as a complete unit in a self-contained iron frame.

Steel Tracks (Cold Drawn)—Four *cold drawn* steel tracks guide the car.

Platform—All-steel, diamond checkered steel plate flooring.

Steel Trusses—Used to support the overhead sheaves.

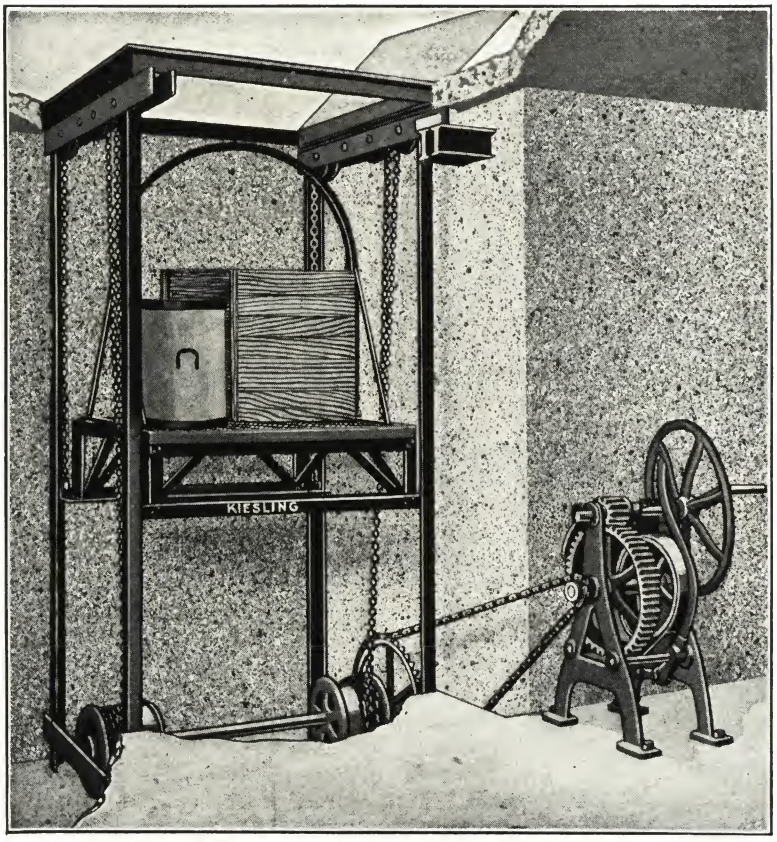
Drums—Drums are of cast iron. Drum shafting revolves in ball bearings.

Steel Arch—The arch is securely bolted to the steel platform.

Steel Chain—B.B.B. quality; breaking strain 2.5 tons each.

Scope of Use and Various Installations

First Nat'l Bank, Amityville, N. Y.	Morgan French Co.
Peoples Bldg. & Loan Bank, Ashtabula, Ohio	Hopkins & Dentz
Security Trust Co., Erie, Pa.	Henry Shenk Co.
Hangar Club, New York, N. Y.	Cross & Cross
Playland Casino, Rye Beach, N. Y.	Walker & Gillette
Sewage Disposal Plant, Spring Lake, N. J.	State Architect, N. J.
Childs' Restaurants, New York, N. Y.	Pruitt & Brown
Liggett Drug Store, Royal Oak, Mich.	Walter T. Williams
Foltis-Fischer Restaurants, New York, N. Y.	Edmund Djorup
Electrical Supply Store, Brooklyn, N. Y.	Koch & Wagner
Public School, Mt. Vernon, N. Y.	Tooker & Marsh
High School, Lindenhurst, N. Y.	Lewis Inglee



Sidewalk Elevator or Ash Hoist With All-Steel Platform

Our all-steel platform with flooring of diamond checkered plate is no more costly than the wooden platform

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside Dimensions of car, in.		Shaft Dimensions, in.		Pit Depth in.	Capacity, lb.
	Width	Depth	Width	Depth		
1	36	36	48	38	18	500 to 1000
2	42	42	54	44	18	500 to 1500
3	48	48	60	50	18	500 to 1500
4	54	54	66	56	18	500 to 2000
5	60	60	72	62	18	500 to 2000

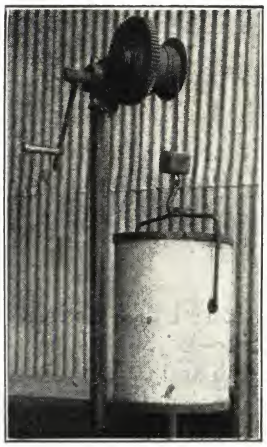
Note: Intermediate size shipped within *four* days.
Blue prints of standard stock sizes furnished on request.

SILENT HOIST WINCH & CRANE CO.

TELEPHONE
Cumberland 6-3910

GENERAL OFFICES AND WORKS
762-772 Henry Street, BROOKLYN, N. Y.

AGENTS IN
PRINCIPAL CITIES



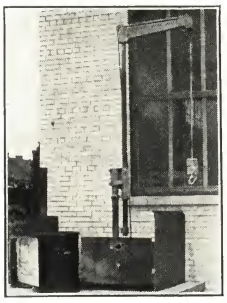
Uses

For removal of ashes, garbage, refuse and other materials. Recommended for use in apartment houses, churches, factories, office and public buildings, schools, libraries. Made in hand and electric models, with gravity lowering feature, for raising to sidewalk level, or crane type for raising high enough to dump directly into truck. Unusually simple to operate, strictly a one-man hoist, and absolutely safe at all times and under all conditions.

Left:

Model AH
Hand operated, gravity lowering

SILENT TELESCOPIC HOIST



Model AEC
Electric crane type for direct loading into truck

Features

Many new, exclusive and notable features. Made in 7 standard models. Simple, safe and economical and guaranteed first class in workmanship and material for one year. Approved by foremost architects and engineers and for public schools in New York and other cities.

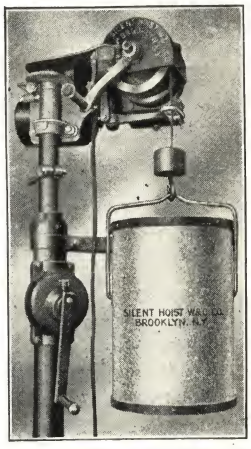
Service

Silent Hoist engineers will be glad to co-operate with information and data and in writing of specifications.

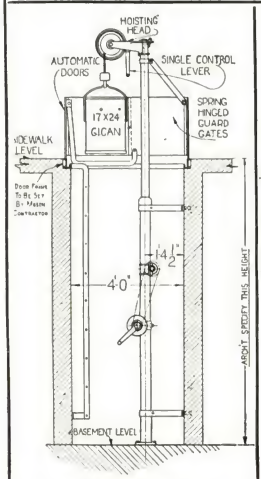
Catalogue on request.

Right:

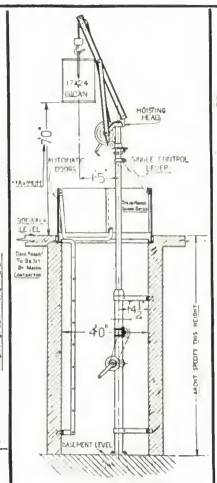
Model AE
Electric, gravity lowering



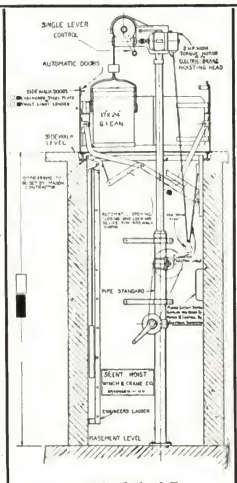
Model and Code Word	Recommended for	Specifications and Description	Remarks
Model AH Code word: "ASHAND." Hand operated, *gravity* lowering. 500 lbs. at 30 ft. per min.	For a small volume of ashes, about 5 to 10 cans daily; for a small height of lift, about 10 ft. For raising *to sidewalk* level.	Hand operated for hoisting; lowers by gravity, with automatic clutch and brake; single lever control, machine cut gears; turned drum mounted on ball bearings and hoisting head revolves on ball thrust bearings. Telescoping mechanism is self-locking and highly efficient. Weight with doors and accessories, 1200 lbs.	*For a Complete Installation* Specify a Silent Telescopic* Hoist (model and description as given to left, and if electric, advise current characteristics). Consideration should also be given for including in addition to hoist: (1) Flush Water Tight Sidewalk Doors (checkered-steel or vaultlight type if required), with condensation gutter tapped for drain connection. (To use standard doors, the opening should be 4x4 ft.). (2) Automatic Sidewalk Door Opening, Closing and Locking Device. (3) Spring Hinged Safety Guard Gates. (4) Operator's Steel Ladder. (5) Electric Warning Gong with Automatic Switch, Transformer or Batteries and Warning Sign. (6) Ash Cans (specify how many), 17x24 in. of 16-gauge galvanized iron with fixed bail or swing bail that stays put. (7) Ash Can Truck. (8) Model ACL (Patented) Continuous Ash Can Lowering Device. *Any of the 7 different models of hoists can be supplied *Non-Telescopic*, without telescoping mechanism, where it is not required to bring the hoist head down below the sidewalk level.
Model AHC Code word: "ASHANDCRAN." Hand raising, *gravity* lowering. 500 lbs. at 30 ft. per min.	For a small volume of ashes, about 5 to 10 cans daily; for a small height of lift, about 10 ft. For raising high enough to dump *into truck body.*	Has overhead, collapsible, all-steel crane. Hand operated for hoisting; lowers by gravity, with automatic clutch and brake; single lever control, machine cut gears; turned drum mounted on ball bearings and hoisting head revolves on ball thrust bearings. Telescoping mechanism is self-locking and highly efficient. Weight with doors and accessories, 1300 lbs.	
Model AE Code word: "ASHELEC." Electrically operated, power hoisting, *gravity* lowering. 500 lbs. at 60 ft. per min.	For a large volume of ashes, more than 10 cans daily; for a large height of lift, over 10 ft. For raising *to sidewalk* level.	High grade, fully enclosed worm gear reduction; single lever control for hoisting, holding and lowering. Shafts mounted on ball bearings. Mechanical clutch and brake. Certified malleable iron head with integral hood covering magnetic switch. Machined, grooved drum. 2 hp. fully enclosed motor with built-in electric brake. Upper limit switch. Telescoping mechanism self-locking, yet 95% efficient. Weight with doors and accessories 1500 lbs.	
Model AEE Code word: "ASHELECTED." Electrically operated, power hoisting and *power* lowering. 500 lbs. at 60 ft. per min.	For a large volume of ashes, more than 10 cans daily; for a large height of lift, over 10 ft. For raising *to sidewalk* level.	High grade, fully enclosed worm gear reduction. Shafts mounted on ball bearings. Certified malleable iron head with integral hood covering reversing magnetic switch. Push buttons for hoisting and lowering by power. 2 hp. totally enclosed motor with built-in electric brake. Upper limit switch. Telescoping mechanism is self-locking, yet 95% efficient. Weight with doors and accessories, 1500 lbs.	
Model AES Code word: "ASHELECSOR."	Slightly smaller than Model AEE, this model costs less.	Electrically operated, power hoisting and *power* lowering. Specification is the same as for Model AEE above, excepting only with 1 hp. motor for capacity of 250 lbs. at 60 ft. per min.	
Model AEC Code word: "ASHELECRAN." Electrically operated, power hoisting and *power* lowering. 500 lbs. at 60 ft. per min.	For a large volume of ashes, more than 10 cans daily; for a large height of lift, over 10 ft. For raising high enough to dump *into truck body.*	Has overhead, steel crane arm. High grade, fully enclosed worm geared hoist unit in basement. 2 hp. totally enclosed motor with built-in electric brake. Enclosed reversing magnetic switch provides thermal overload protection. Push button for basement or sidewalk operation (or dual control at both places, if specified). Upper limit switch. Telescoping mechanism is self-locking, 95% efficient, fully automatic, raises crane arm to height *above* grade level for *wagon or truck loading.* Weight with doors and accessories, 1700 lbs.	
Model AEB Code word: "ASHLECRABY."	Crane type, same as Model AEC except for raising *to sidewalk* level.	Specification is the same as for Model AEC above, excepting only that telescoping mechanism raises crane arm to height to bring cans *to sidewalk* level.	



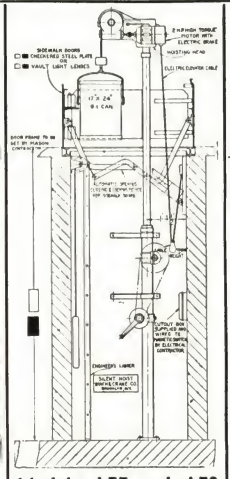
Model AH



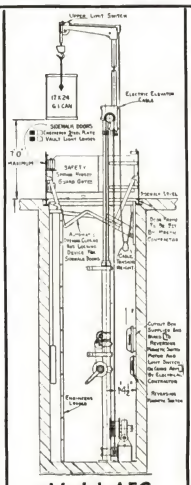
Model AHC



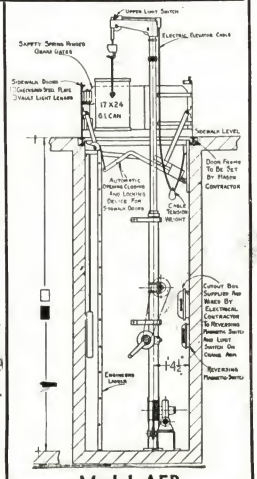
Model AE



Models AEE and AES



Model AEC



Model AEB

HERBERT MORRIS INCORPORATED

Manufacturers of Modern Telescopic and Platform Ash Hoists

FACTORIES

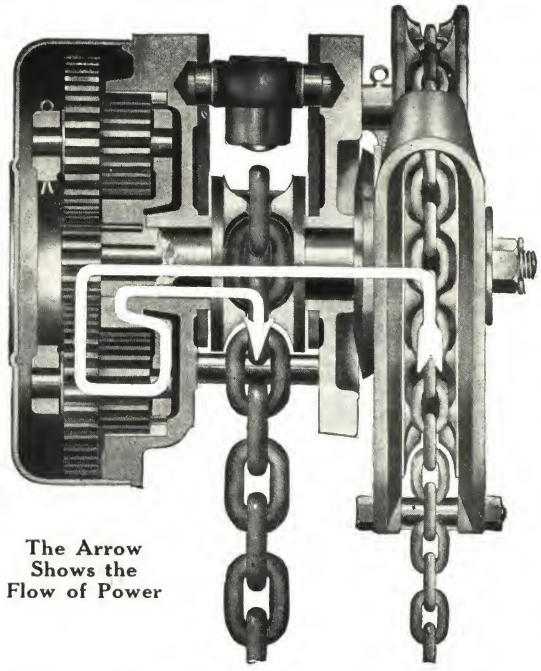
15 Lawrence Place
BUFFALO, N. Y.

1030 W. North Avenue
CHICAGO, ILL.

Exclusive Features

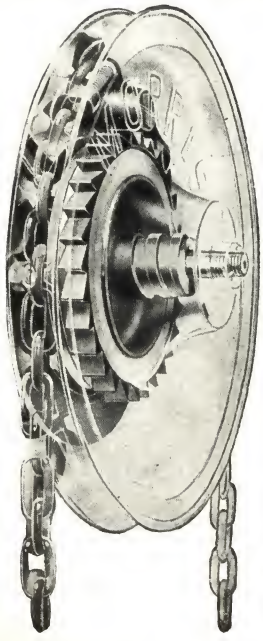
Balanced, Planetary Gears—In this arrangement of the gears, known as the epicyclic gear train, the tooth-thrusts are exactly balanced so that bearing pressures and consequent friction losses are reduced to the very minimum. Engineers recognize it as the most efficient gear train ever developed.

Steel Load Chain—All Morris ash hoists lift on steel chain. A chain is extremely flexible—it does not kink, twist nor fray. A chain is durable because it exposes the minimum possible surface to the action of rust, which may be very rapid in a damp areaway. It is good for a lifetime of service—we have never replaced a single chain.



The Arrow Shows the Flow of Power

Compact Construction—The Morris lifting gear is simple and compact. In the telescopic model the weight is kept close to the mast. This arrangement not only reduces the telescoping effort, but makes the hoisting head easier to rotate when cans are swung around on to the sidewalk or into a wagon. In the platform models this compactness permits placing the lifting gear in a narrow space beside the platform, so that no room is required on floor or in basement.

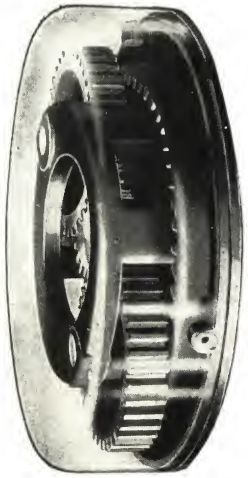


Automatic Brake—Back of the hand chain wheel is the sturdy, dependable, automatic brake, the same as used in hundreds of thousands of industrial hoists. It requires no attention whatever, either while hoisting or lowering—there are no brake handles to operate, no gear-shifting levers to manipulate. Nothing the operator can do—or fail to do—can possibly affect its safety. It is foolproof in the hands of a careless or ignorant operator. In short, it is what an automatic brake *should* be—automatic.

Operation by Pendent Hand Chain—Both the telescoping motion and the hoisting motion are obtained by pulling on an endless hand chain. This method of operation is the least tiring for the operator. It permits him to use his weight rather than his muscles. The chain acts as a flywheel, its momentum helping to keep the load going up smoothly and easily. The operator need not stand in a certain fixed position—in the case of the telescopic models he operates the hoisting head just as easily from either the basement floor or the sidewalk.

The correctness of the principle of pendent chain operation is shown by its general use on industrial cranes and hoists the world over.

Enclosed Gearing—A dust-tight, waterproof casing encloses and protects the gearing. No dirt or grit can get in. The lubricant, which need be applied only once or twice in a season, cannot get out.



There is no possibility of the operator's fingers or clothing being caught in the gears. Modern engineering practice insists on this feature wherever hoists are used.

About Specifying

Always call for Morris ash handling equipment *by name*—it has no "equal."

The exclusive features of design and construction which make Morris hoists supremely satisfactory, are not obtainable in any other equipment. Include all necessary accessories.

Guarantee

Morris ash hoists are guaranteed for one year against defective materials or workmanship.

Morris Telescopic Ash Hoists

Model "A" raises can to sidewalk level.
Model "B" raises can to wagon height.

The tubular telescopic mast is raised and lowered by pulling on the telescoping hand chain. The mast is self-sustaining, and therefore perfectly safe, at any height.

When elevated, the hoist is ready to operate. The lifting capacity is 500 lbs. The hoisting head rotates on ball bearings. Cans are raised at a speed of 30 ft. a minute by pulling lightly on the hoisting chain. The operator may stand either on the sidewalk or on the floor of the areaway, whichever is more convenient.

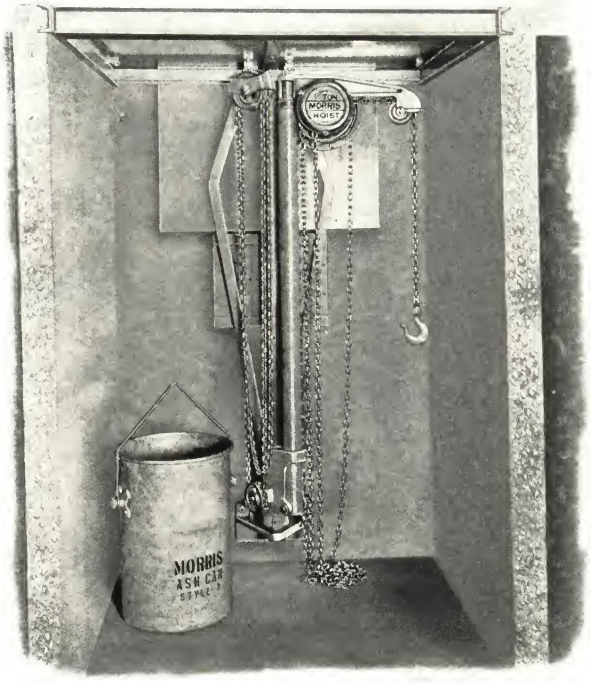
The Model "B" hoist has longer telescoping pipes, permitting the hoisting head to rise to the additional height necessary for conveniently dumping cans into a wagon. There is no crane arm to be propped up—no cannon-ball on the lifting hook. Operation is exactly the same as the Model "A" grade-level hoist illustrated.

Automatic doors, when furnished, open and close as the telescoping mast is raised or lowered. A counterweight makes their operation practically effortless. Guard gates may be fitted to one or both ends.

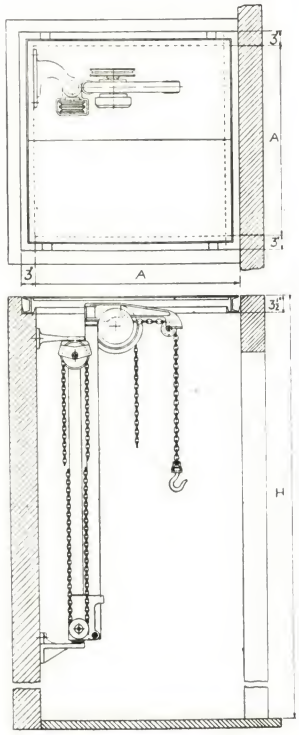
Electric warning gong. When specified a 5-in. extra-loud warning gong is mounted within the counterweight. It rings while the doors are in motion and requires no outside wiring or connections whatever, being actuated by dry cells.

Advantages—Easy to install, because no part of the hoist extends below the floor. Easy to operate—just a light pull on the pendent chain raises or lowers the mast or the cans. No open, exposed gearing—gears run in oil for silence, safety and long life. Safety not dependent on the operator—no levers, pins, catches or brake handles to manipulate.

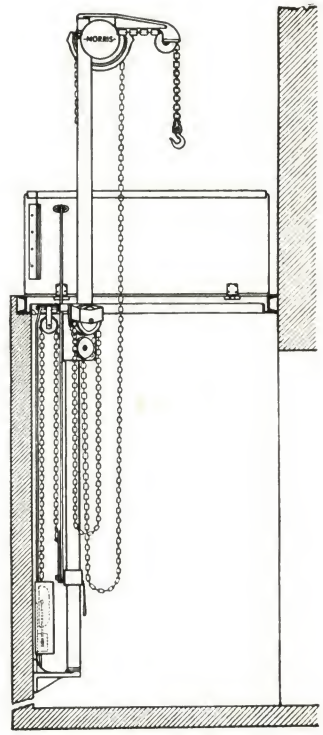
Open
Hoisting head rotates on ball bearings. Note its neat, compact appearance, with weight close to the mast, not at end of arm



Closed
No part of hoist extends below floor. This feature greatly reduces cost of installing



With Non-automatic Doors
Min. opening
A = 3 ft.



With Automatic Doors
Min. opening
A = 3 ft. 6 in.

Specification—Furnish and install a Morris [Model A] [Model B] telescopic ash hoist with enclosed gears operated by pendent chain and lifting on a steel chain. Include Morris [plain] [watertight] double-leaf steel doors, automatic door opening and closing device, safety guard gates at [one end] [both ends], electric warning gong, Morris steel ladder with safety treads, Morris roller bearing ash can truck and ..... Morris style ..... seamless drawn steel ash cans.

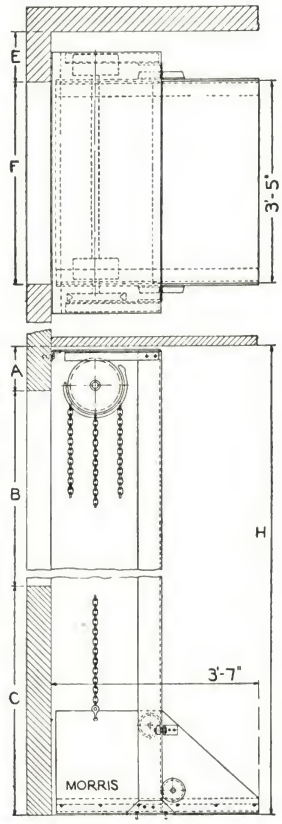
Morris Platform Hoists—General Description

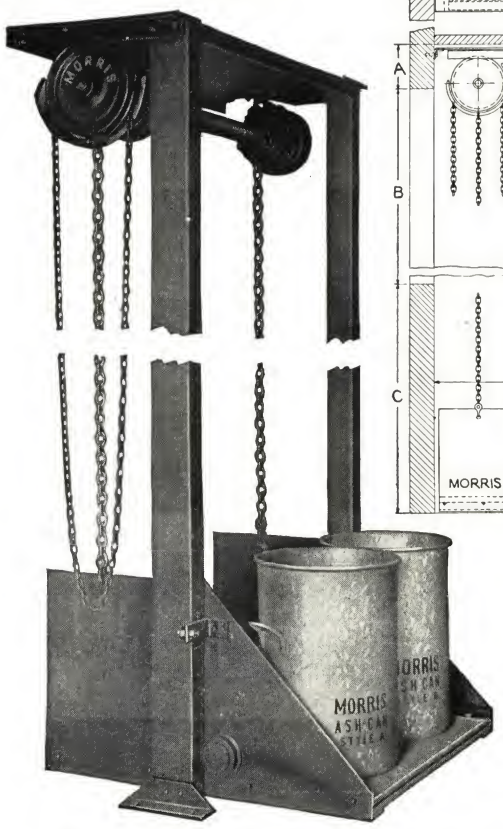
Capacity 1000 lbs., or 4 cans.

Roller bearing platform cannot bind or lift unevenly regardless of how the load is distributed. The enclosed, high speed lifting gears are placed at the top, above the dust and out of the way. They exert a directly vertical lift on the platform through two $\frac{7}{16}$-in. steel chains. Operation is by pendent hand chain. An automatic foolproof brake holds the load when the operating chain is released. There are no catches, stops, handles or other devices to operate. Mechanism is self-contained—no separate winch or cables to line up. Any model may be built for either right-hand or left-hand operation.

Pitless Type Platform Hoist

In this model the platform is placed *between* the guides. The top plate and gears are placed *above* the door or window opening to which the platform is to travel. Dimension "A" is 10 in. When down, the platform is only 2 in. above the floor, so that no pit is required for this model. It occupies the least space in the basement or boiler room; where space is very limited, the platform may be kept elevated and the floor space between the guides used for other purposes.





Morris Pitless Type Platform Hoist

Specification—Furnish and install a Morris Pitless type platform ash hoist, with roller bearing platform, enclosed twin gears operated by pendent chain and lifting on two steel chains. Include Morris steel ladder with safety treads, Morris roller bearing ash can truck and ..... Morris Style "A" seamless drawn steel ash cans.

Basement Type Platform Hoist

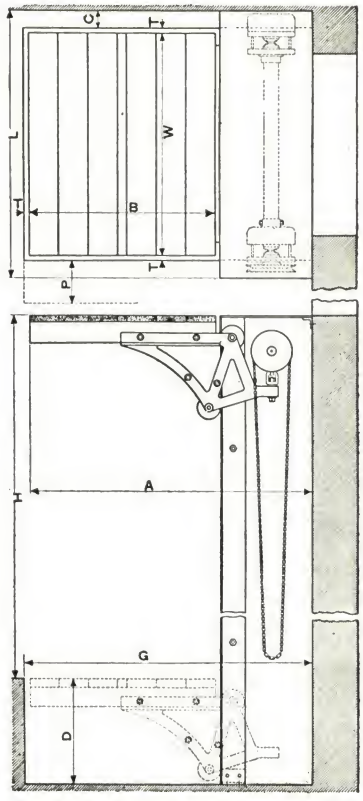
In this model the lifting gears and top plate are placed level with the door or window sill.

Basement Type Platform Hoist

The platform, supported by two substantial steel brackets, rises level with the top plate, and will lower level with the floor if a pit 1 ft. 9 in. deep is provided.

Installation is a very simple matter. Two bolts hold the top plate to the wall, two floor bolts anchor the guides. The twin lift hoist and the platform are then attached and the hoist is ready to use.

Specification—Furnish and install a Morris Basement type platform ash hoist, with roller bearing platform, enclosed twin gears operated by pendent hand chain and lifting on two steel chains. Include Morris steel ladder with safety treads, Morris roller bearing ash can truck and ..... Morris Style "A" seamless drawn steel ash cans.

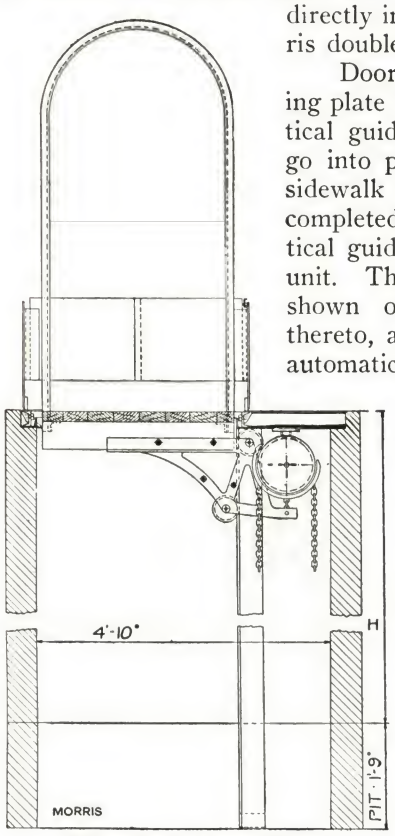


A	4′ 9″	D	1′ 9″	P	1′ 6″
B	3′ 2″	G	4′ 10″	T	1″
C	2½″	L	4′ 5″	W	3′ 10″

Morris Sidewalk Type Platform Hoist

Capacity 1000 lbs., or 4 cans.

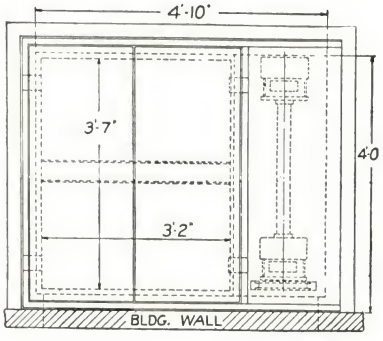
This convenient hoist is inexpensive and very easy to install. It requires a space only 4 ft. x 4 ft. 10 in. Permanent alignment between the platform and the door opening is insured by building the steel top plate, to which the lifting gears and guides are attached, directly into the frame of Morris double-leaf doors.

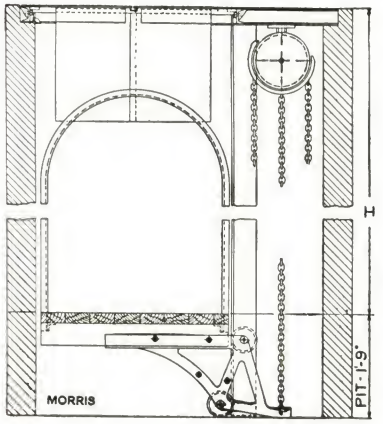


Sidewalk Platform Hoist

Door frame and supporting plate for the gears and vertical guides are a unit. They go into place like an ordinary sidewalk door. Installation is completed by attaching the vertical guides and the twin hoist unit. The doors may open as shown or at right angles thereto, and if desired may be automatically unlocked, opened, closed and locked and fitted with fixed or swinging guard gates at one or both ends. The hoisting gears may be placed either to the right of the platform, as illustrated (right-hand operation) or to the left (left-hand operation).

The platform, lifted by two heavy steel chains, travels on four large roller bearing wheels. It can not bind on the guides no matter how the load is distributed.





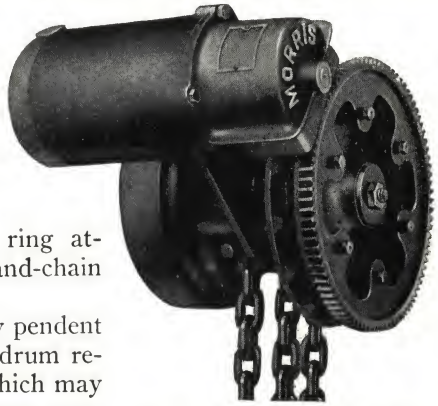
Specification—Furnish and install a Morris Sidewalk type platform ash hoist, with roller bearing platform, enclosed twin gears operated by pendent hand chain and lifting on two steel chains, built integral with Morris [plain] [watertight] double-leaf steel doors, automatic door opening and closing bow, safety guard gates at [one end] [both ends], electric warning gong, Morris roller bearing ash can truck and ..... Morris Style "A" seamless drawn steel ash cans.

Morris Motor Operated Platform Hoists

Capacity 1000 lbs., or 4 cans.

An inexpensive, but simple and practical power driven hoist.

Any Morris platform hoist may be motor operated. The driving unit is a Morris ½ hp. totally enclosed ball bearing motor with a built-in, planetary type speed-reducing gear.



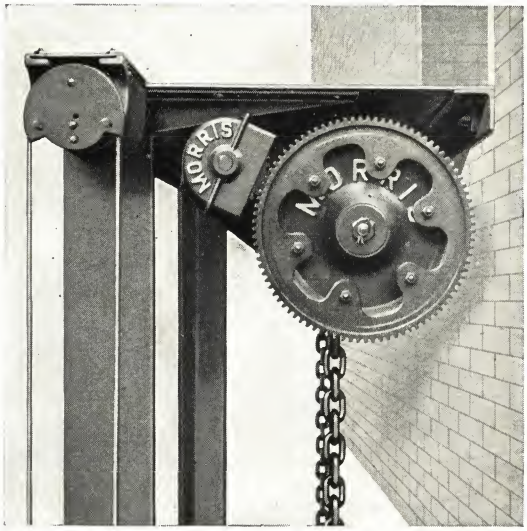
Enclosed Ball Bearing Motor Unit

This compact but highly efficient unit is bolted rigidly to the frame of the twin lift gear, which it drives through a spur ring attached to the hand-chain wheel.

Control is by pendent cords through a drum reversing switch which may be placed wherever convenient.

A foolproof mechanical brake, the operation of which is not affected by interruption of the current supply, sustains the platform at all times.

Safety is further insured by an ingenious slipping clutch which positively prevents damage to the motor or lifting gears in case of accidental overhoisting or overlowering. This feature also guards against overloading the platform.



Motor and Twin Gears Are Placed Directly Under Top Plate—Out of the Dirt—Out of the Way

Dimensions of Morris motor operated hoists are the same as those given on the preceding pages for hand operated platform hoists, except that the 4 ft. 10 in. dimensions of the basement and sidewalk types must be increased to 5 ft. 3 in.

Lifting speed approximately 9 ft. per minute.

Specification—Use specification for equivalent hand operated platform hoist (pitless type, basement type or sidewalk type) and insert "motor operated." State current supply. Not made for single phase.

Morris Window Ash Hoist

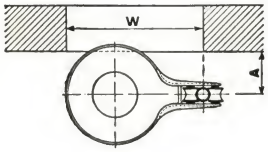
Capacity 250 lbs., or 1 can.

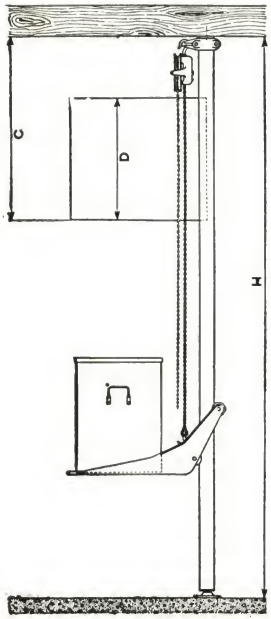
This is a low cost, fast operating hoist for handling a moderate volume of ashes. The platform travels 1 ft. for each 4 ft. of hand chain pulled. The lifting gear is a high speed chain block, mounted at the top of the mast where it gives a directly vertical lift on the load. No effort is wasted by introducing idlers. The brake of course is entirely automatic, holding the load whenever the operating chain is released.

Morris Window Ash Hoist

The platform does not slide, but travels freely on two large rollers. The tubular mast is mounted on a ball-and-socket floor bearing. A touch rotates both mast and platform when can is to be swung into window opening. A window only 27 in. square is large enough, and top may be flush with ceiling.

Any handyman can install one of these hoists in an hour or two.

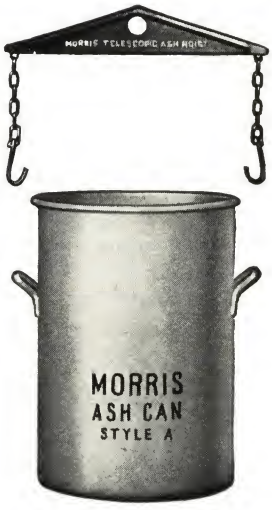




MINIMUM DIMENSIONS

A	8½	in.
D	27	in.
W	27	in.
C (hand op.)	27	in.
C (electric)	30	in.

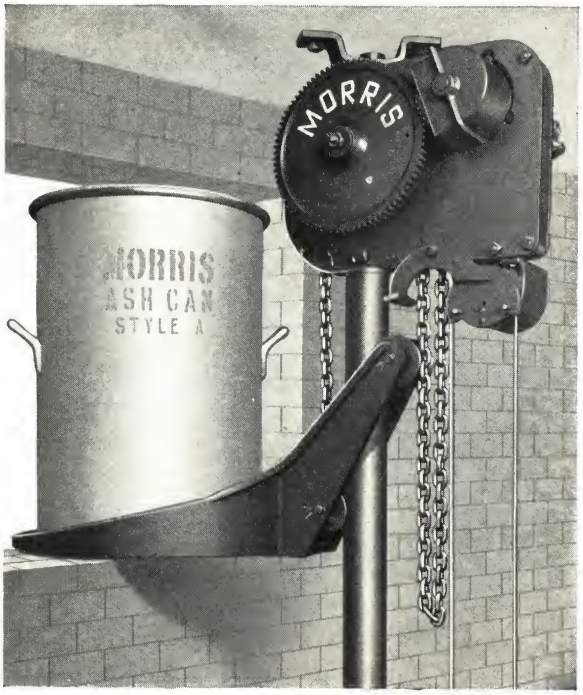
Specification — Furnish and install a Morris Window ash hoist, with high speed gears operated by pendent chain and lifting on a steel chain. Include Morris roller bearing ash can truck and ..... Morris Style "A" seamless drawn steel ash cans.



Morris Motor Operated Window Ash Hoist

Capacity 250 lbs., or 1 can.

This is an efficient power operated lift at low cost. The power unit is a ½ hp. totally enclosed ball bearing motor, with built-in speed-reducing gear. It is direct-geared to the enclosed, planetary lifting gears. The brake is mechanical, automatic, and foolproof. Pendent control cords operate the hoist through a drum reversing switch. The current is shut off automatically when the platform reaches the top. Lifting speed 20 ft. per minute.



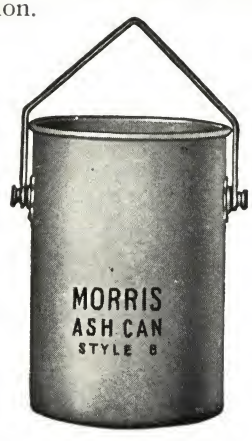
Motor Operated Window Ash Hoist

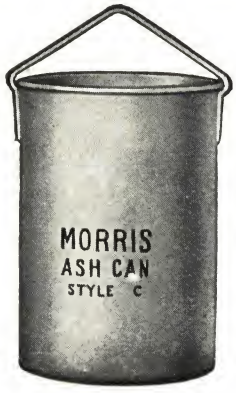
Specification—Use the specification at the foot of preceding column and insert "motor operated." State current supply. Not made for single phase.

Morris Seamless Drawn Steel Ash Cans

Size inside, 16x24 in.; weight 45 lbs. each. Each can is drawn from a single plate of 12 gauge steel. (Most ash cans are made of much lighter material, usually 16 or 18 gage.) Trunnions or handles are cast steel, brazed on. The bottoms are raised to provide a good handhold for emptying.

When Style "A" cans are to be handled on a telescopic hoist, include a Morris ash can bail in the specification.





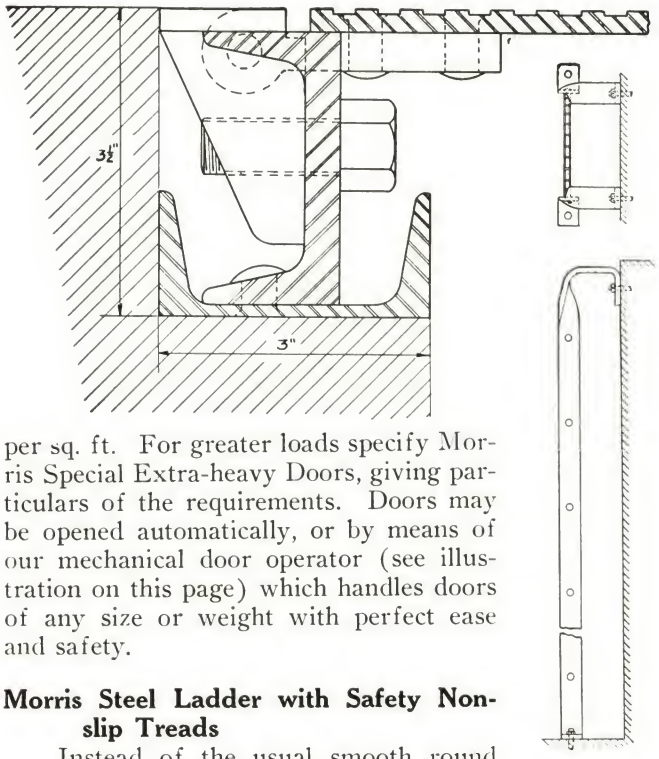
Morris Double-leaf Sidewalk Doors

These doors are made in two types—the *plain door* without gutter, and the *watertight door*, with gutter and elbow connection for ¾-in. drain.

The drawing shows the watertight door. The gutter is a *channel*, which effectively prevents leakage back of the frame, a weakness of many so-called watertight doors.

The door frame is a heavy channel weighing 6 lbs. per ft., with a web ⅜ in. thick. All corners are welded. Door leaves are ¼-in. steel plates with improved raised-tread surface. Hinges are extra heavy cast bronze, with bronze hinge pins which cannot rust or bind. They are self-aligning, perfectly flush, and readily removable after doors are set.

Morris standard doors sustain a load of 300 lbs.



per sq. ft. For greater loads specify Morris Special Extra-heavy Doors, giving particulars of the requirements. Doors may be opened automatically, or by means of our mechanical door operator (see illustration on this page) which handles doors of any size or weight with perfect ease and safety.

Morris Steel Ladder with Safety Non-slip Treads

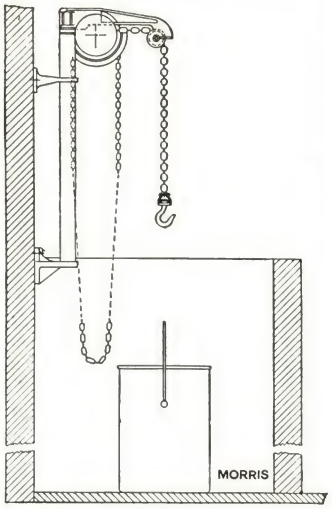
Instead of the usual smooth round iron rungs, these ladders have treads specially formed to prevent slipping. The side rails are forged back to the wall, leaving no sharp corners to catch the clothing.

Morris Roller Bearing Ash Can Truck

Adjustable for any size of can. It grips the can by the top rim, lifting it directly off the floor without preliminary tilting. It enables a man to handle the heaviest can with one hand. The frame is tubular, galvanized. The wheels are 10-in. diameter—large enough to roll easily, even on a rough boiler room floor.

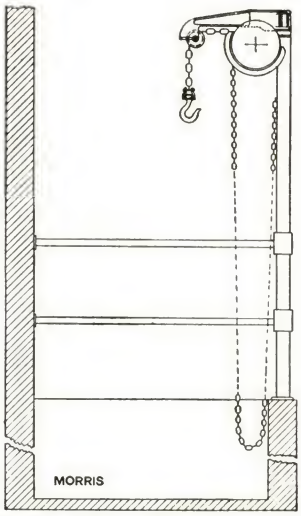
Weight 35 lbs.

Other Morris Ash Hoists



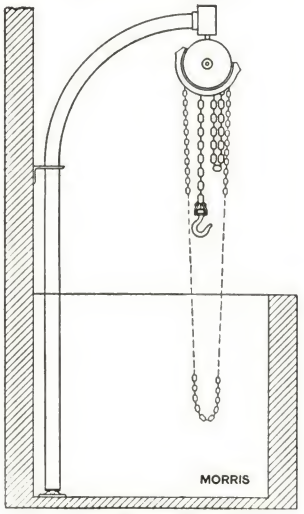
Wall Type Non-telescopic

Includes pipe and two wall brackets with bolts. Mount at any desired height above grade



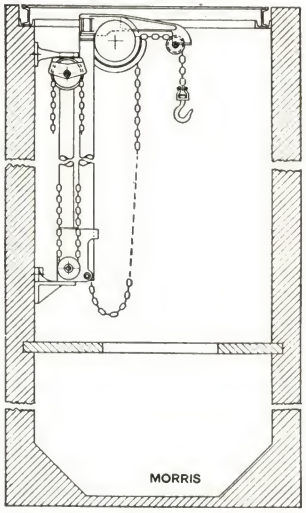
Railing Type Non-telescopic

Mounted in 2½-in. corner pipe of pipe railing, to be extended 4 ft. above top rail



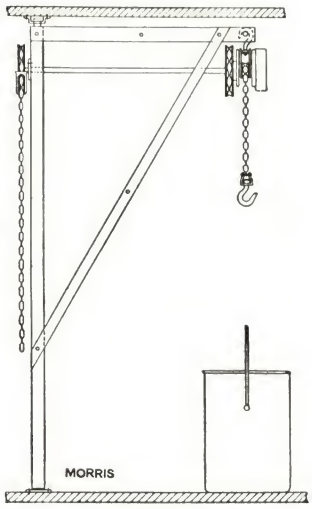
Davit Hoist

With steel suspension plates and non-removable high speed triple gear chain block. Enclosed gears, automatic brake



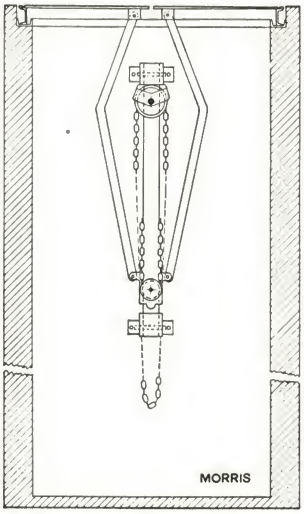
Model "A" Telescopic Screenings Hoist

Grade level. If cans are to be raised to wagon height, specify Model "B"



Jib Type

With high speed triple gear hoist and extended hand chain. For swinging cans through elevated door or window



Mechanical Door Operator

Opens and closes old or new sidewalk doors of any size or weight, with ease and perfect safety

WASHBURN & GRANGER, INC.

Manufacturers of Ash Can Hoists and Equipment

50 Church Street, NEW YORK, N. Y.

Dean Products

Ash Can Hoists: Telescopic, Air, Steam, Hydraulic, Electric or Hand Power.

Ash Cans and Hand Trucks.

Sidewalk Safety Doors and Door Opening Devices.

Also manufacturers of Boiler Castings and Fronts, steel or cast iron; Boiler Room Floor Plates; Ash Hopper Gates; Flat Suspended Arches; Blast Gates; Manhole, Trench and Sump Pit Covers, Frames and Plates; Ash Pit or Cleanout Doors; Metal Ladders; Wood Patterns; Cast Iron Industrial Track; Cut-off or Hopper Valves.

For Dean Incinerators and Armored Flooring, see Manufacturers' Index.

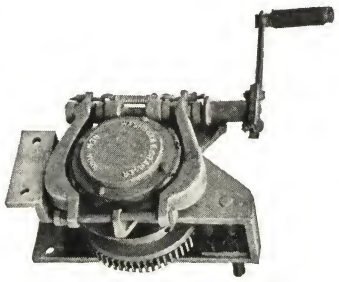
DEAN TYPE B HAND-OPERATED ASH CAN HOISTS

The Dean Type B Hoists are hand-operated and made in two styles:

Type B-1 for raising can to sidewalk only, and Type B-2 for raising can to dump directly into wagon.

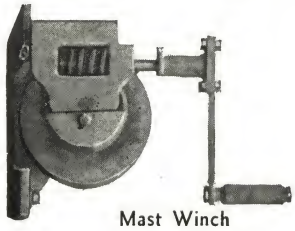
A few of the main parts are illustrated here to show their rugged construction.

Complete specifications and details are given below.

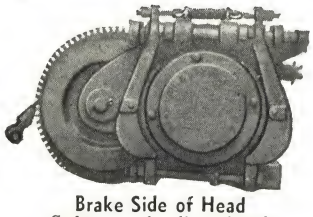


Load Winch for Type B-2

Holds mast and load in any position with hand of operator removed from winch handle



Mast Winch



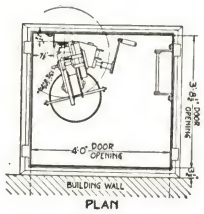
Brake Side of Head

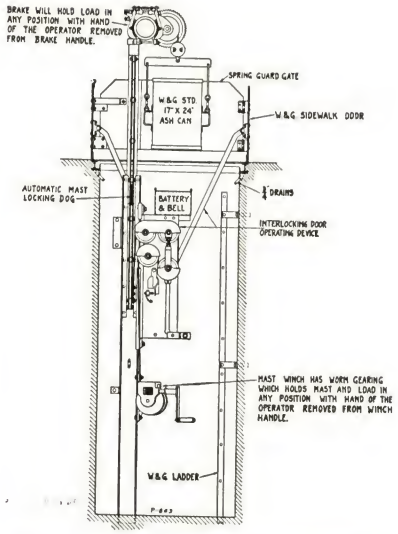
Safety pawls all enclosed

Type B Ash Can Hoist Installed

Type B-1 lifts cans to sidewalk
Type B-2 lifts cans to wagon

Specifications for Dean Type B Hand-operated Ash Can Hoists





Dean Type B-1 Hand-operated Hoist (Sidewalk Type)

Dean Type B-1 Hand-operated Hoist (Sidewalk Type)

Furnish and install where shown on the plans, one Dean model B-1 hand-operated ash can hoist, as manufactured by Washburn & Granger, Inc., 50 Church Street, New York, N. Y., designed to place the can on the sidewalk only.

Hoist shall have cut gears, bronze bushings and be equipped with a brake arranged so that the can will not drop if the hand of the operator is removed from the brake lever. Head shall be provided with a ball bearing to facilitate easy turning.

Safety pawls shall be furnished to prevent backward rotation, and a locking device to automatically lock the mast when it has been raised to its proper position. Winch for raising the mast must be worm actuated so as to permit mast to be held in any position with the hand of the operator removed from the handle.

Distance from basement floor level to pavement, approximately ..... ft. ..... in.

Dean Type B-2 Hand-operated Hoist (Wagon Type)

Furnish and install where shown on the plans, one model B-2 Dean hand-operated ash can hoist as manufactured by Washburn & Granger, Inc., 50 Church Street, New York, N. Y.

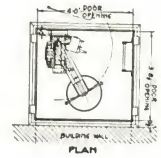
Hoist shall be capable of raising the can 5 ft. above the pavement so that the contents may be dumped directly into a wagon.

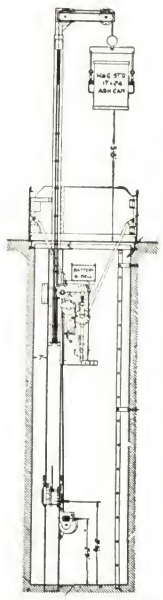
Hoist shall have cut gears, bronze bushings, and be equipped with a brake arranged so that the can will not drop if the hand of the operator is removed from the brake lever. Head shall be provided with ball bearings to facilitate easy turning.

Safety pawls shall be furnished to prevent backward rotation, and a locking device to automatically lock the mast when it has been raised to its proper position. Winch for raising the mast must be worm actuated so as to permit mast to be held in any position with the hand of the operator removed from the handle.

Distance from basement floor level to pavement, approximately .... ft. .... in.

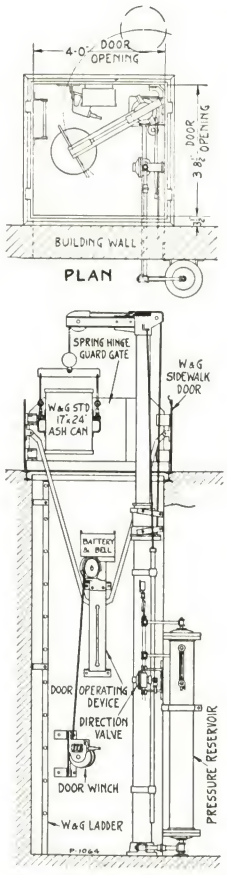
For Dean Equipment for Ash Can Hoists, see page following





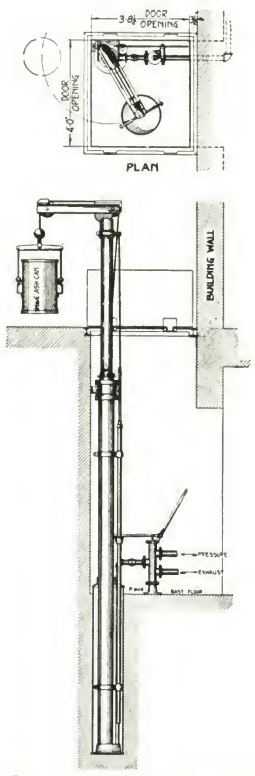
Dean Type B-2 Hand-operated Hoist (Wagon Type)

DEAN TYPES A, D AND F POWER OPERATED ASH CAN HOISTS



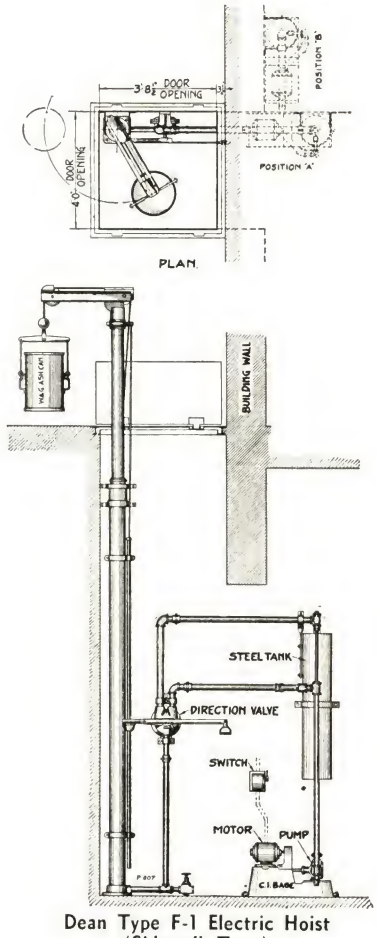
Dean Type A-1 Steam-operated Ash Can Hoist (Sidewalk Type)

Dean Type A-2 Steam-operated Ash Can Hoist (Wagon Type) similar to A-1



Dean Type D-1 Hydraulic Hoist (Sidewalk Type)

Dean Type D-2 Hydraulic Hoist (Wagon Type) similar to D-1



Dean Type F-1 Electric Hoist (Sidewalk Type)

Dean Type F-2 Electric Hoist (Wagon Type) similar to F-1

Specifications for Dean Equipment for Ash Can Hoists

Sidewalk Doors—Furnish the following Dean equipment: One steel, watertight sidewalk frame and doors, to have opening of 4 ft. x 3 ft. 8½ in.; doors shall be ¼-in. diamond top steel plates, brass hinges, set flush, and provided with mechanism so that they may be opened and closed from the boiler room floor level; frame shall be tapped for ¾-in. drain connection. Frame shall be set by the contractor for the pavement.

Ash Cans—Furnish 12 Dean ash cans, 17 in. in diameter and 24 in. high, made of No. 16 gauge steel with reinforced bottoms. Provide wrought steel handles with eye for connection to hoisting bail.

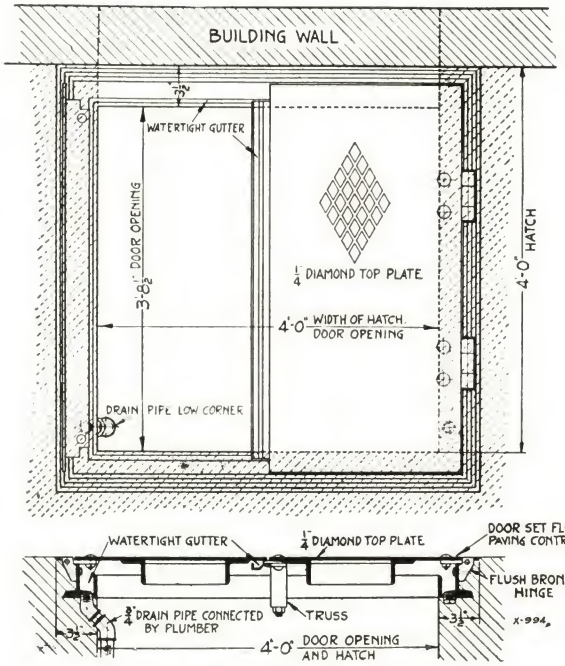
Hand Truck—Furnish one Dean ash can truck, of tubular construction, suitable for the above size cans.

Steel Ladder—Furnish and install in the hatchway one Dean steel ladder, side strips ⅜x2 in., ¾-in diameter rungs on 12-in. centers, to be 14 in. wide and .... ft. long.

Dean Ash Can

Dean Hand Truck

Steel Ladder



Installation of Dean Sidewalk Doors

D 4973

ELECTRICAL

THE ELECTRIC STORAGE BATTERY COMPANY

World's Largest Manufacturers of Storage Batteries for Every Purpose

Allegheny Avenue and Nineteenth Street, PHILADELPHIA, PA.

BRANCHES

ATLANTA, GA., 210 Walker Street, S. W.
BOSTON, MASS., 100 Ashford Street
CHICAGO, ILL., 613 Marquette Building
CINCINNATI, OHIO, 1142 Sycamore Street
CLEVELAND, OHIO, 6400 Hermann Avenue
DENVER, COLO., 1420-24 Wazee Street
DETROIT, MICH., 8051 W. Chicago Boulevard
KANSAS CITY, MO., 129 Belmont Boulevard
MINNEAPOLIS, MINN., 3 No. 15th Street
NEW YORK, N. Y., 23-31 W. 43rd Street
PHILADELPHIA, PA., 1955 W. Hunting Park Avenue
PITTSBURGH, PA., Union Trust Building
ROCHESTER, N. Y., 642 Plymouth Avenue, So.
ST. LOUIS, MO., 1058 So. Vandeventer Avenue
SAN FRANCISCO, CAL., 6150 Third Street
SEATTLE, WASH., 1041 Railroad Avenue, So.
WASHINGTON, D. C., 1823-33 L Street, N. W.

IN CANADA, Exide Batteries of Canada, Ltd., 153 Dufferin Street, TORONTO, ONT.

THE EXIDE EMERGENCY LIGHTING BATTERY SYSTEM

Exide
EMERGENCY LIGHTING BATTERY SYSTEMS

Purpose

This system will supply current to the emergency circuits—auditoriums, halls, stairways, exits, etc., of any building you plan, *instantly and automatically—without a hand touching a switch!*—whenever normal power fails. Furthermore, the Exide System *automatically recharges* a dependable Exide Battery immediately upon restoration of the normal power supply; and it *automatically maintains* the battery in a fully charged condition. There is no better means of furnishing emergency lighting protection in schools, hospitals, theatres, banks, office buildings, hotels, institutions, department stores, or any other type of public or semipublic building than the Exide Emergency Battery System.

Engineering and Operating Assistance

THE ELECTRIC STORAGE BATTERY COMPANY maintains a staff of Competent Engineers, who upon request will assist in the engineering of any Emergency Lighting Battery System installation. Engineers are available to make inspection of such installations so that the user will obtain the best operating conditions and long life of trouble-free service from both the System and Exide Emergency Lighting Batteries.

SUGGESTED SPECIFICATIONS FOR EMERGENCY LIGHTING EQUIPMENT

The following is a suggested form of general specifications.

(1) General—The electrical contractor shall supply and install in first class operating condition a complete Exide Emergency Lighting Battery System, which shall automatically and instantaneously furnish an emergency light and/or power supply whenever there is a failure in the normal (a.c.) supply.

(a) The emergency lighting system shall be designed for operation from 105-125 volt, 2 wire, single phase, 60 cycle normal supply, and shall consist of a suitable control unit and a storage battery as specified.

(b) The emergency lighting system shall have sufficient capacity to supply an emergency light and/or power load of ..... watts for ..... hours.

(2) Control Unit—The control unit shall be of a type manufactured by The Electric Storage Battery Company, and shall include the following equipment:

(a) Automatic Throw-Over Switch—A gravity type, spring accelerated, automatic throw-over switch for the instantaneous transfer of the emergency light and/or power circuits from the normal a-c. supply to the emergency (storage battery) supply upon failure of the normal supply, and to automatically return the emergency circuits to the normal supply when the latter is restored.

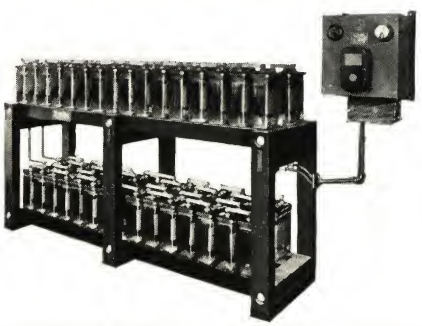
(b) Automatic Charge Equipment—The emergency supply (storage battery) shall be automatically maintained at full capacity, (1) by a high rate charger controlled by a temperature compensated charge control unit, which shall automatically (without any manual attention) recharge the battery quickly after an emergency discharge caused by normal supply failure; (2) by a permanent, copper-oxide low rate charger to maintain the emergency supply (storage battery) at full capacity under normal operating conditions.

(c) Signals—Provision shall be included in the Control Unit for the connection of reliable signals, audible and/or visible, to indicate (1) when the emergency supply is in use; (2) when there is a break at any point in the emergency supply circuit; (3) when there is a break in the copper-oxide maintenance charger circuit; (4) when the high rate charger is in operation.

(d) Additional Requirements—The Control Unit shall have the following additional equipment: (1) a hand operated switch mounted externally on the unit for control of the emergency lighting and/or power circuits; (2) a push button controlled voltmeter to indicate the voltage of the emergency supply; (3) a milliammeter to indicate the output of the maintenance charger; (4) necessary terminals and fuses, clearly marked and accessible.

(e) Assembly—The complete control and charging equipment as specified above shall be assembled as a single unit in a compact steel case, arranged for ease of installation, including provision for conduit attachments at the top and bottom of the enclosing case. The case shall have doors on both sides for easy access to any part of the equipment.

(f) Underwriters' Approval—The Control Unit shall be listed as approved by the National Board of Fire Underwriters.



A Typical Exide Emergency Lighting Battery System

(3) Storage Battery—The storage battery equipment shall be as follows:

(a) Sixty (60) cells of type ...., as manufactured by The Electric Storage Battery Company, of a construction having acid tight sealed glass jars, cell posts to be equipped with grease ring seal nuts, and connections between cells to be of lead-coated copper.

(b) The battery shall be mounted on a suitable acid-proofed rack of substantial construction, in accordance with the requirements of the National Electrical Code, as manufactured by THE ELECTRIC STORAGE BATTERY COMPANY.

(c) When fully charged, and at a temperature of 77° F. (25° C), the electrolyte being at the proper level and of a normal specific gravity of from 1.200 to 1.220, the storage battery shall have sufficient capacity to supply a rated lamp and/or power load of .... watts for a period of .... hours, with a final voltage at its terminals of not less than .... volts.

(d) There shall be furnished one battery thermometer of the vent-hole type, and one syringe type hydrometer, both as manufactured by THE ELECTRIC STORAGE BATTERY COMPANY.

(4) Guarantee—The complete emergency lighting system as specified (with the exception of the charger bulb, which carriers maker's warranty) shall be guaranteed against defects of workmanship and material for a period of one year from the date of shipment by the manufacturer.

Note: For specifications on control equipment to carry an emergency load in excess of 30 amperes, or for use with other than a 60-cell battery or 105-125-volt, 50-60-cycle, 2-wire, a-c. supply, consult THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia, Pennsylvania, or the nearest Branch listed above.

TOTAL EMERGENCY LOAD IN WATTS FOR PERIOD OF 1½, 2 AND 3 HOURS

Operating Voltage: 115 V. A. C. to 115 V. D. C., 2 wire, 1 phase, 60 cycle

Type Battery	Watts to 100 volts 1½ hours	Watts to 105 volts			Capacity control equipment amp.	Approx. shipping weight incl. racks	Dimensions standard 2 tier 2 row racks		
		1½ hours	2 hours	3 hours			H	W	L
Exide Chloride Batteries (60 Cells)									
DMGO-3	900	865	725	550	30	2835 lbs.	4′7″	1′11″	7′1″
5	1780	1740	1450	1120	30	3085 lbs.	4′7″	1′11″	7′1″
7	2680	2600	2180	1660	30	4070 lbs.	4′7″	1′11″	8′7″
9	3560	3480	2900	2240	30	4710 lbs.	4′7″	1′11″	10′0″
Exide Batteries (60 Cells)									
BTE-5	690	655	540	405	30	1080 lbs.	3′9″	15″	5′6″
7	1040	980	800	610	30	1140 lbs.	3′9″	15″	5′6″
KZHG-7	1300	1120	1020	770	30	1140 lbs.	3′9″	15″	5′6″
KXE-5	1820	1640	1360	1060	30	1770 lbs.	4′1″	1′10″	4′8″
KXF-7	2740	2450	2060	1580	30	3230 lbs.	4′4″	1′11″	7′1″
9	3560	3260	2740	2120	30	3830 lbs.	4′4″	1′11″	10′0″

PEET & POWERS, INC.

"Lister Bruston" Automatic Electric Generating Plants

SOLE AGENTS IN UNITED STATES FOR R. A. LISTER & CO., LTD.

70 East 45th Street, NEW YORK, N. Y.

Products

ELECTRIC GENERATING PLANTS with full automatic or manual control, driven by gasoline or Diesel engines.

Also Gasoline and Diesel Engines for all purposes and pumping equipment.

Uses

Electric light and power service for country houses, shooting lodges, hotels, clubs, or small communities having no other source of supply.

Standby Plants

For buildings which are already supplied by Public Service. These units can be supplied to start themselves automatically when Public Service fails, or to be started manually.

Automatic and Special Control

Both gasoline and Diesel plants, except in 50 kw. and larger, can be supplied with automatic starting and remote control or with special characteristics to meet special conditions.

Alternating or Direct Current

Plants of all capacities as required for a-c. or d-c.

Engineering Service

Engineering service in assisting in selecting and laying out the most suitable equipment for electric and water systems is provided, free of charge, by competent engineers. We are also equipped to furnish experienced and reliable men for the construction work in the installation and wiring.

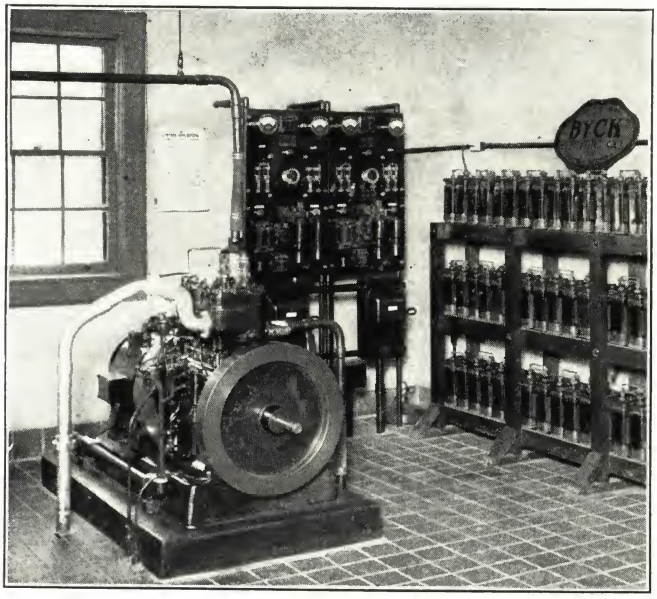
General Specifications

GASOLINE ENGINE DRIVEN PLANTS

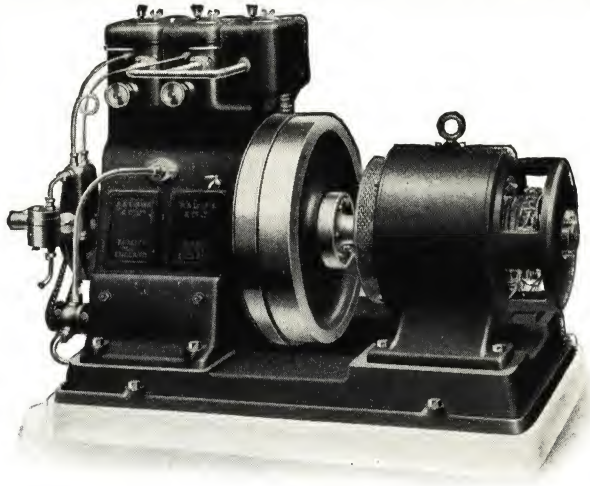
Kilowatts	R.p.m.
1	1000
1½	700
2¼ to 7½	450 to 600
30 to 50	1200

DIESEL ENGINE DRIVEN PLANTS

Kilowatts	R.p.m.
2½ and 5	600
4½ and 10	1000
20	1000
25 to 300	275 to 450



Typical Powerhouse, 110 Volts D-c. Gasoline Unit



10 Kw. Diesel Unit 1000 R.p.m.

SPECIFICATIONS OF HIGH SPEED DIESEL PLANTS

Kilowatts	2½	4½	10	20
Engine cylinders	1	1	2	4
Revs. per min	600	1000	1000	1000

SPECIFICATIONS 110-VOLTS FULL AUTOMATIC GASOLINE PLANTS

Kilowatts (continuous)	1	1½	2¼	3½	5	7½
Engine cylinders	1	1	1	1	2	2
Size of c. i. base	2'6"x1'6"	2'9"x2'0"	4'6"x2'6"	4'6"x2'6"	5'2"x2'8"	5'2"x2'8"
Wt. without battery, lbs. packed	794	1232	2940	3135	4135	4450
Battery, ampere-hours	53	53	80	80	106	160
Wt. of battery, lbs. packed	2000	2000	2214	2214	2322	3024
Length of battery rack	8'0"	8'0"	8'0"	8'0"	8'0"	12'6"

Typical Installations

Mrs. E. F. Hutton, Paul Smiths, N. Y.
J. A. Fisher, Paul Smiths, N. Y.
J. Pierpont Morgan, Raquette, N. Y.
Raquette Boys' Camp, Raquette, N. Y.
Paul D. Mills, Georgetown, S. C.
Rogers Rock Club, Lake George, N. Y.
Archer M. Huntington, Newcomb, N. Y.
Julius Forstmann, Branch, N. Y.
Masonic Home, Utica, N. Y.
Geo. Foster Peabody, Saratoga, N. Y.
Mrs. J. E. Berwind, Bridghampton, N. Y.
Wilton Lloyd Smith, Huntington, N. Y.
E. Parmalee Prentice, Williamstown, Mass.
A. C. White, Litchfield, Conn.
Geo. A. Ellis, Cordesville, S. C.
Geo. G. Barber, Wolfboro, N. H.
Henry Lockhart, Jr., Easton, Md.
Okeetee Club, Switzerland, S. C.
H. N. Torry, Savannah, Ga.
L. M. Williams, Fredericksburg, Va.
R. H. McCurdy, Yamassee, S. C.
Arthur Corlies, Hardeeville, S. C.
C. Ledyard Blair, Bermuda, B. W. I.
J. S. Frelinghuysen, Rice Hope, S. C.
Herbert Neal, Easton, Md.
D. W. Gurnett, Plymouth, Mass.
W. T. Carrington, Greenwich, Conn.
H. S. Shonnard, Georgetown, S. C.
Point O'Woods Assn., N. Y.
F. Ambrose Clark, Westbury, N. Y.
H. K. Hudson, Delta Plantation, S. C.
F. W. Fabyan, Buzzards Bay, Mass.
Ogden Reid, Munden, Va.
J. P. Knapp, Knotts Island, N. C.
W. F. B. Berger, Denver, Colo.
R. McCarrell, Washington, Pa.
Geo. D. Widener, Santee, S. C.
R. V. Place, St. Simon's Island, Ga.
R. G. Elbert, Airy Hall, S. C.

UTILITIES SERVICE, INC.

Manufacturers of Emergency Lighting Units

TROY, PA.

Emergency Lighting a Necessity

Every public building, theatre, hotel, store, hospital and institution should have an independent, absolutely reliable emergency lighting system to supply current in case of failure of regular current supply. Many States have laws making the installation of such systems compulsory and many other States will undoubtedly soon add such laws to their statutes.

Advantages of U.S.I. Sets

To meet requirements in emergency lighting, the unit must be free from maintenance and attention so it will always be reliable, fully automatic, and instantaneous in action. The U.S.I. Emergency Lighting Sets have been designed and constructed especially for emergency lighting work and are not an adaptation to this service of machines used for other purposes. These machines incorporate many patented distinctive features of design and construction not found in other units. The U.S.I. Emergency Lighting Units are all water started and use no batteries, either for starting or operating. Batteries are unreliable because they do not receive the attention and maintenance that they require. Both water and gas, used in the two types of U.S.I. Systems, are the most dependable sources of power obtainable. U.S.I. Emergency Systems also have an economic advantage as they require practically no maintenance.

In the selection of emergency lighting units it is important to know that the equipment has been properly approved. The U.S.I. Sets have received complete approval of the National Board of Fire Underwriters, of the states of Pennsylvania and Massachusetts and the Hydro Electric Power Commission of Canada.

Description of Hydro-Electric Sets

The Class "W" water started and operated units consist of generators direct connected to water wheels, which use as the source of power water supplied to the building in which they are installed. The generators are especially designed and constructed to give constant voltage from no load to full load.

These hydro-electric sets are automatically started and stopped by electrically controlled water valves which are held in the closed position by a solenoid energized by the regular current supply. Upon failure of this current, the valves open, admitting water under pressure to the water wheel which drives the generator and creates the emergency electric current.

When the regular current supply is restored, the solenoid is again energized and closes the water supply valve to the water wheel, automatically stopping the emergency unit which is then ready for further emergency service.

With the unit is furnished a double throw switch operated by the above solenoid, and which automatically switches the lights to and from regular current supply and emergency generator as may be required by current failure.

These units were formerly sold by the Enslen Hydro-Electric Company.

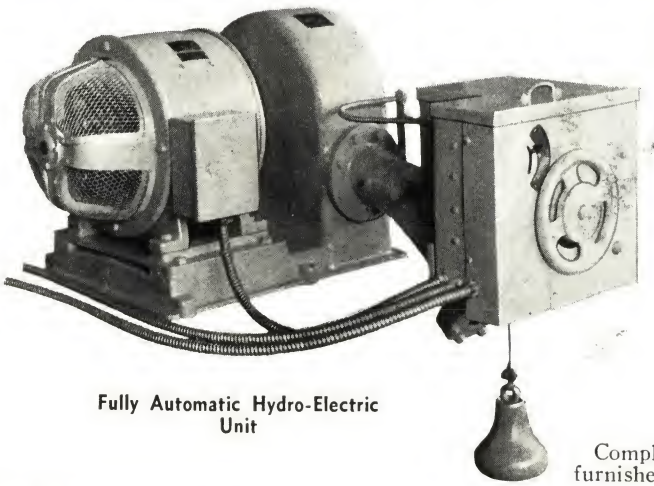
Description of Hydro-Gas-Electric Sets

The Class "WG" water started, gas operated units consist of self-governed gas or gasoline engines direct connected to generators. They are started by a water wheel which is connected to the engine crank shaft and actuated by the water supplied to the building in which the unit is installed.

The water wheel is automatically started by an electrically controlled valve. Normally, current from the regular supply energizes a solenoid holding the valve closed. Upon failure of this current the valve is automatically opened admitting water to the water wheel; the gas supply line valve is automatically opened admitting fuel to the engine; a water supply line valve is automatically opened admitting cooling water; and a double-throw switch automatically switches the lights from the regular supply circuit to the emergency generator. The water wheel revolves at proper speed to start the engine with magneto ignition.

When the generator has reached normal speed and voltage, the current therefrom energizes another solenoid which automatically closes the water supply to the water wheel.

When the regular current is restored, the fuel supply and cooling water lines are automatically closed, stopping the engine, and the lights are automatically switched to the regular current supply. The unit is now ready for further emergency service.



Fully Automatic Hydro-Electric Unit

Information Required for Quotations

In order to quote intelligently we should have the following information:

(1) Normal supply current:
If alternating current, state voltage, phase, and frequency.
If direct current, state voltage.
(2) Required load in watts.
(3) Static water pressure.
(4) Effective water pressure; i.e. gauge pressure when a valve is open and water is flowing.

Specifications

Complete specifications will be gladly furnished upon request.

HYDRO-ELECTRIC SETS

Type	Effective water pressure, lb. per sq. in.	Capacity, watts	Size of water supply pipe, in.	Size of discharge pipe to sewer, in.	Approx. floor space, in.	Approx. domestic shipping wt., lb.
1-A	20 to 40	150 to 500	2	4	30x24	450
1-B	45 to 60	620 to 1000	2	4	31x24	500
1-C	65 to 100	1125 to 2000	2	4	32x24	550
2-A	20 to 40	400 to 1200	3	4	33x30	750
2-B	45 to 60	1400 to 2000	3	4	35x30	800
2-C	65 to 100	2225 to 4800	3	4	37x30	900
3-A	20 to 40	750 to 2200	4	6	39x36	1200
3-B	45 to 60	2660 to 4000	4	6	42x36	1250
3-C	65 to 100	4500 to 8500	4	6	45x36	1550
4-A	20 to 40	1700 to 4700	5	8	48x42	2000
4-B	45 to 60	5650 to 9000	5	8	51x42	2400
4-C	65 to 100	10200 to 20000	5	8	54x42	2600

Units of other capacities can be built to order.

HYDRO-GAS-ELECTRIC SETS

Kilowatt capacity	Engine horsepower	Number of cylinders	Approx. size of water supply pipe, in*.	Approx. floor space, in.	Approx. domestic shipping weight, lb.
1	6	1	2	45x28	830
1½	6	1	2	45x28	850
2	6	1	2	45x28	900
3	15	4	2	65x30	1225
4	15	4	3	67x30	1340
5	15	4	3	70x30	1425
6	15	4	3	70x30	1525
7½	34	4	3	78x36	2030
10	34	4	4	81x36	2080
12½	34	4	4	87x36	2395
15	40	4	4	90x36	2595
20	50	4	5	98x48	2930
25	63	6	5	112x48	3430
30	75	6	5	118x48	3630

*This depends on effective water pressure.

NATIONAL ELECTRIC LIGHT ASSOCIATION

420 Lexington Avenue

NEW YORK, N. Y.

When Building Today Wire for Tomorrow

Your client of today is the Electric and Power Company's customer of tomorrow

Our Interest in the Architect

The NATIONAL ELECTRIC LIGHT ASSOCIATION, now in its 46th year, is devoted to "advancing the art and science of the production, distribution and use of electricity in public service." It has nothing to sell. Its interest is for mutual benefit to all concerned with respect to economy, efficiency and present and future needs for electric service.

There are 1500 power companies in membership which have a direct obligation to all consumers of electricity.

The electric light and power company accepts as one of its responsibilities assistance to the architect in obtaining for his clients the greatest advantage from use of electricity. The increasing demand for electric service makes it imperative that the architect forecast and provide for future wiring requirements in structures for home, commercial and public use.

The light and power companies have been encountering an increasing number of instances where owners of buildings were unable to make practical alterations to wiring installations without incurring excessive expense.

By adequately providing for the many new uses of electricity, buildings are enhanced in convenience and value, and costly alterations are avoided.

Specially trained representatives of the Electric Light and Power Company will gladly call on you or your Consulting Engineers to help you with any technical details of today—or tomorrow.

Specifications

Write to the NATIONAL ELECTRIC LIGHT ASSOCIATION, 420 Lexington Avenue, New York, N. Y., for typical wiring specifications for your files.

AMERICAN CIRCULAR LOOM COMPANY, INC.

TELEPHONE
COrtlandt 7-2383

233 Broadway
NEW YORK, N. Y.

BRANCH OFFICES

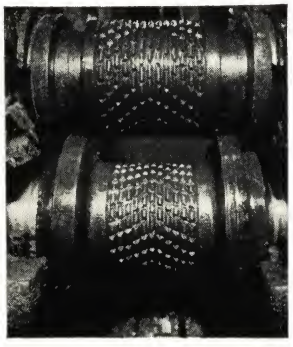
ATLANTA, GA.	CLEVELAND, OHIO	DETROIT, MICH.	PHILADELPHIA, PA.	ST. LOUIS, MO.
BOSTON, MASS.	DALLAS, TEX.	KANSAS CITY, MO.	PITTSBURGH, PA.	SAN FRANCISCO, CAL.
CHICAGO, ILL.	DENVER, COLO.	LOS ANGELES, CAL.	PORTLAND, ORE.	SYRACUSE, N. Y.

RIGID CONDUIT

Made only of "Spellerized" and "Scale-free" Pipe

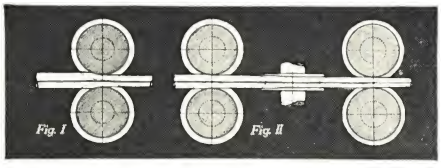
In the manufacture of rigid conduit by this company attention is called to two processes whereby the tendency to corrosion and the losses due to friction are reduced—namely, *Spellerizing* and the *Scale-free Process.*

Spellerizing consists in working the surface of the heated metal, from which the pipe is made, to a uniformly dense texture by subjecting it alternately to the action of rough and smooth faced rolls. This process, which is analogous to the kneading of dough, also facilitates the escape of confined gases which would form airholes and other irregularities. The even texture thus produced supplements the uniformity of the metal itself of the National Tube Company's *Modern* welded pipe, which we use exclusively, and reduces the tendency to galvanic action—which has been found to be the origin of corrosion.



Detail View of Spellerizing Rolls

In the Scale-free Process all the welding-scale or mill-scale is removed by passing the pipe, still hot from welding, through two sets of rolls as shown in Figs. I and II, which successively reduce the diameter of the pipe and cause the scale, which in an interval of cooling between rolls has become brittle, to fall from the sides of the pipe walls. These last rolls give the pipe its proper diameter and true circular shape. After further cooling the loose scale is blown out by compressed air or washed out with water. By removing the scale, a clean smooth surface is obtained for galvanizing or other coatings. Friction losses caused by rough interior surfaces are reduced and increased working capacity of the pipe is obtained.



The following types of rigid conduit are both made of *spellerized* and *scale-free* pipe.

XDUCT

Electrolytically applied zinc coating provides a smooth chemically pure zinc surface of remarkable uniformity of thickness and density, which assures the utmost resistance to corrosive influences. There are no projections of dross to knock off, carrying the coating with it. Zinc so applied becomes intimately adherent to the surface, and greasy or defective surfaces cannot be bridged over with the zinc.

The *spellerized* and *scale-free* tubing is thoroughly cleaned; the pure zinc coating is then applied, and, to allow the greatest facility for insertion and extraction of wires, the inner surface or raceway is coated with a highly glazed, smooth, hard conduit enamel, unaffected by acids or alkalis and of such elasticity that the tubing can be bent or subjected to other tortion without the enamel cracking, flaking or peeling.

ELECTRODUCT

Enameled both inside and outside. After thorough cleaning, the *spellerized* and *scale-free pipe* is immersed in a vat of heavy conduit enamel, which coating is then baked on. The raceway is smooth and easily fished, while both outer and inner surfaces are so protected against corrosion that the pipe, when installed, is good for the life of the job. The enamel on "Electroduct" will bend with the pipe without cracking or flaking.

"Electroduct" is full *standard* weight, uniformly round and straight. The threads are sharp and clean.

ENAMELED METALS COMPANY

SINCE 1905

Manufacturers of Pittsburgh Standard Enameled and Galvanized Conduits

PITTSBURGH, PA.

REPRESENTATIVES

BALTIMORE, MD., Electrical Sales Co., 111 Cheapside
BROOKLINE, MASS., C. Walter Jones, 148 Fuller Street
BUFFALO, N. Y., R. W. Mitscher, Ellicott Square Bldg.
CHICAGO, ILL., Wm. P. Crockett Co., 312 So. Green Street
DETROIT, MICH., A. E. Dusseau, 526 Detroit Savings Bank Bldg.
INDIANAPOLIS, IND., Scott-Jaqua Company, 202 Indiana Terminal Bldg.
KANSAS CITY, MO., Walter I. Ferguson & Co., 533 Dwight Bldg.
LOUISVILLE, KY., D. Schneider, 57 Kenyon Bldg.
MINNEAPOLIS, MINN., Ben B. Moore, 106 Third Avenue, No.
NEW YORK, N. Y., William S. Brown Electric Co., 171 Madison Avenue
ORLANDO, FLA., Robertson Supply Company, Box 1551
PHILADELPHIA, PA., Frank P. Groves & Co., 315 Bailey Warehouse, Delaware Avenue and South Street
ST. LOUIS, MO., L. A. Doxsee, 1911 Pine Street

Products

PITTSBURGH STANDARD THREAD PROTECTED ENAMELED CONDUIT; PITTSBURGH STANDARD GALVANIZED CONDUIT, either Electroplated or Hot Dipped.

Also, Couplings and Elbows, enameled and galvanized.

Pittsburgh Standard Conduits

In rigid steel conduits, the pipe itself is the basis of a substantial and permanent installation. Pipe of the finest soft steel has long been famous as the base of the high quality of Pittsburgh Standard Conduit. For ease of bending and threading it has no superior.

This heavy wall pipe has back of it many thousands of satisfactory conduit installations. Covering a period of more than a quarter-century, Pittsburgh Standard has been giving positive electrical protection in many of the country's most notable and finest buildings.

Pittsburgh Standard Galvanized Conduit

Special Cleaning

Clean pipe, free from rust and oxidation, and scrupulously rid of dirt and every particle of grease, is the foundation of good galvanizing and enameling.

In the mills of ENAMELED METALS COMPANY, the home of Pittsburgh Standard Conduits, there has been developed a special process that is virtually a guarantee of clean pipe.

After going through this special cleaning process, Pittsburgh Standard Conduit is tested for freedom from inside burrs or other possible obstructions. Each individual length of the conduit is put through two specific and thorough visual tests during manufacture.

From the selection of the finest heavy wall soft steel pipe, down through every process, no detail is overlooked in the production of the conduit, no care is too great in maintaining the Pittsburgh Standard as the world's standard in fact as well as in name.

Elbow

Inside Coating

All Pittsburgh Standard Conduit, Enameled and Galvanized, is coated inside with our *special black enamel.* This enamel is made in our own laboratories. It is baked on till it is tough, smooth, glossy and flexible . . . as even and beautiful as the finished coating on a new automobile. It is a coating that is practically proof against deterioration.

Bending Qualities

Through the use of special steel in the pipe that is used for this conduit the bending qualities are second to none. Actual tests by engineering laboratories show Pittsburgh Standard Conduit bends with as little pressure and as smoothly as any conduit on the market.

Easy Fishing

This free-sliding inside coating of Pittsburgh Standard Conduit is a genuine raceway for wiring. The facility with which the wires race through the pipe gives a new meaning to "easy fishing." It makes quick wiring, with less effort, and prevents abuse of the wires during installation.

Pittsburgh Standard Galvanized Conduit

In rigid steel galvanized conduit, the protective coating determines the life of the pipe. It is the coating that gives the final count. The zinc coating on Pittsburgh Standard Galvanized Conduit withstands *four* one-minute dips on the copper sulphate test. The Underwriters require only *two* one-minute dips. Pittsburgh Standard fulfills double the Underwriters' requirements . . . a fact that indicates the outstanding quality of this remarkable rigid conduit.

Hot Dipped Galvanized

We have always believed electroplated conduit to be the best and it is still our preferred brand. However, if the architects and engineers prefer hot dipped galvanized we are prepared to supply this wherever it is desired.

Pittsburgh Standard Thread Protected Enameled Conduit

The original enameled conduit that "reaches the job ready to install." Coated inside and out with our own *special black enamel.* Patented metal thread protector, fibre-lined, is held secure by three lugs. Keeps the threads clean, protects them during shipment, and in handling on the job—yet stripped off in an instant when ready to install.

Pittsburgh Standard Conduit bends as required without injury. It is a labor-saver for the mechanic on the job, and assures a solid, substantial installation.

CONDUO-BASE

LICENSED MANUFACTURERS

DAHLSTROM METALLIC DOOR CO.
JAMESTOWN, N. Y.

KNAPP BROTHERS MFG. CO.
CHICAGO, ILL.

UNITED METAL PRODUCTS CO.
CANTON, OHIO

Products

STANDARD CONDUO-BASE, JUNIOR CONDUO-BASE, COUNTER-TOP-CONDUO-BASE, HOUSE CONDUO-BASE and CONDUO-BASE ACCESSORIES.

Conduo Base PATENTED

TRADE-MARK

Conduo-Base

A high grade, handsome metal base with easily accessible concealed raceways for light and telephone wires, forming a continuous electric outlet raceway at the base of walls and partitions, approved by the Underwriters' Laboratories, Inc.

Advantages of Conduo-Base

Equipping a building with Conduo-Base saves (1) the cost of baseboards, (2) the cost of all prefixed outlets with their outlet boxes, conduits and wires, (3) the cost of wire moulds, (4) the cost of tearing up and patching of finished work whenever new electric outlets are required at points convenient to the ever-changing occupants' needs. It eliminates entirely the necessity of determining beforehand the location of electric outlets or the unsightly, dangerous, exposed wiring for electric equipment at a distance from a prefixed outlet.

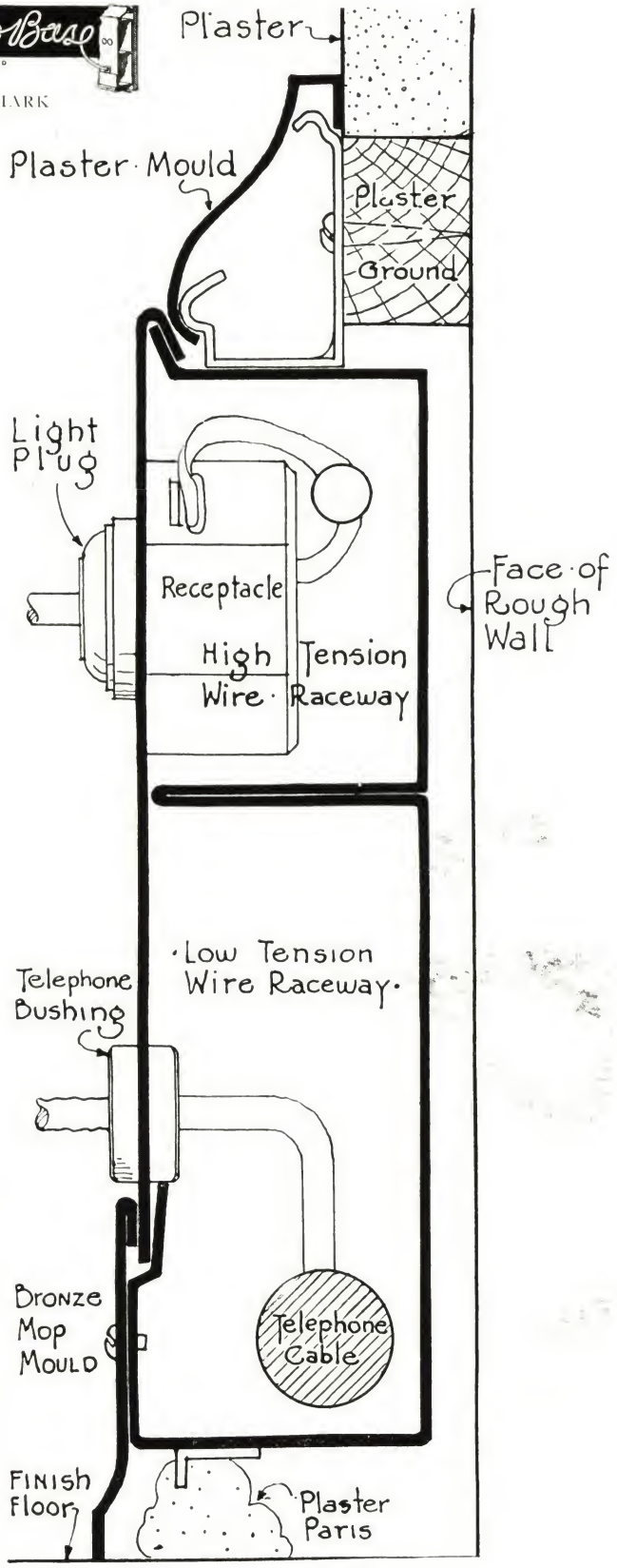
Conduo-Base provides a fireproof, concealed yet accessible, continuous outlet raceway along the entire perimeter of a room, wherein any number of new electric outlets for lamps, fans, adding or dictating machines, telephones, call systems, buzzers, etc., can be installed at the most convenient points desired with extreme ease and very little expense.

Five Minutes Work for a New Outlet

The illustration below shows the ease with which new outlets are made in Conduo-Base. The electrician taps the wires in Conduo-Base, connects same to a receptacle, mounts the receptacle to a standard punched 6-in. cover plate, and replaces the cover plate.

At Right:
Full Size Cross Section Standard Conduo-Base

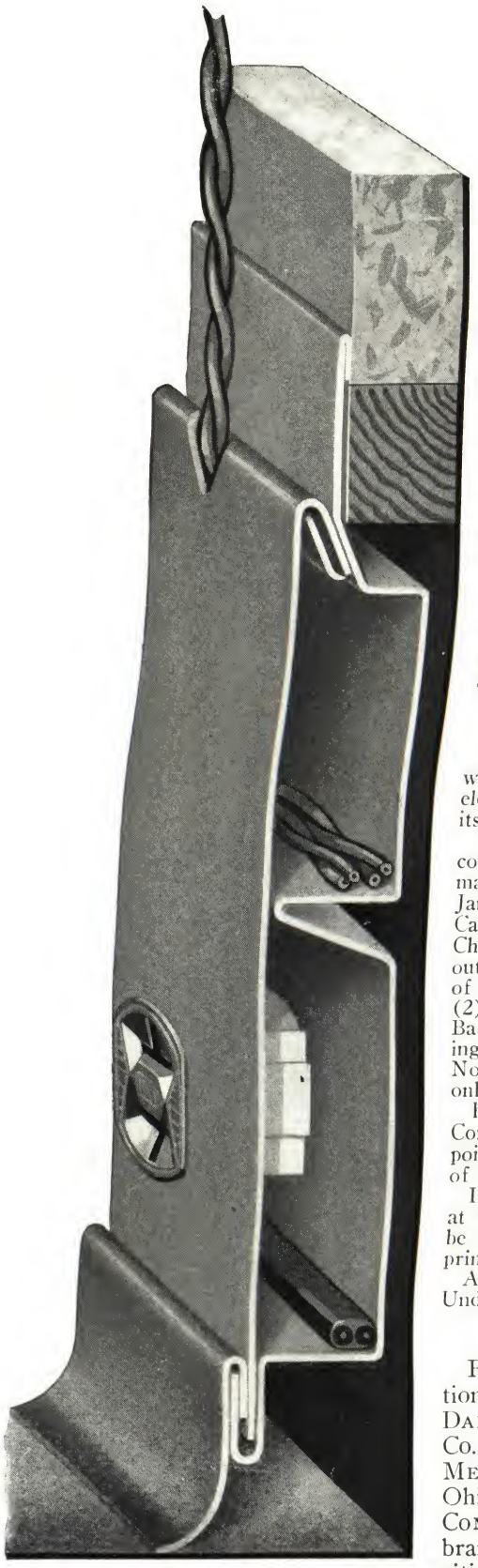
Five Minutes Work for a New Outlet



Junior Conduo-Base

A neat, flush type Conduo-Base designed to compete in cost with ordinary baseboards, thus bringing within the means of any building the advantages of Conduo-Base.

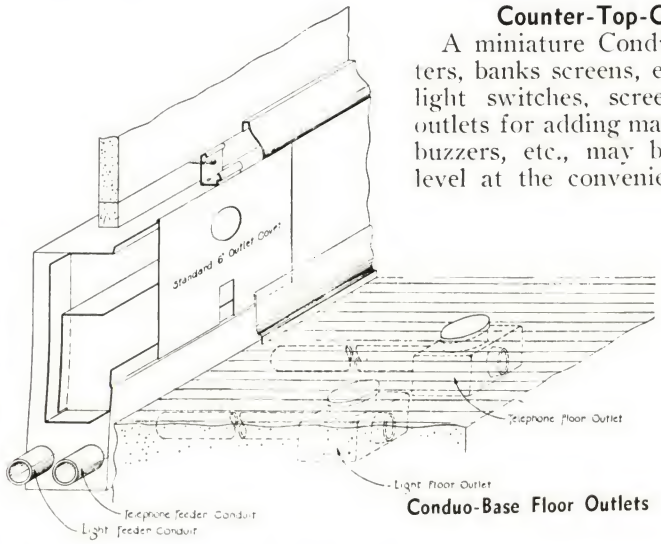
In Junior Conduo-Base the telephone wires are carried in the upper raceway, and the light wires in the lower raceway, and it is restricted to shallow-type receptacles.



Full Size Cross Section Junior Conduo-Base

Counter-Top-Conduo-Base

A miniature Conduo-Base for counters, banks screens, etc., so that screen light switches, screen door switches, outlets for adding machines, telephones, buzzers, etc., may be had at counter level at the convenience of the teller.



Conduo-Base Floor Outlets

Conduo-Base Floor Outlets

Conduo-Base provides an excellent means for a very economical system for floor outlets for both light and telephone wires.

Standard conduits fitted with floor outlet units are extended in the floor fill from Conduo-Base Conduit Terminal boxes to any desired points in the floor.

Specifications

(Note: Conduo-Base is approved by the Underwriters provided it is installed under their rules for electrical grounding, etc. We recommend, therefore, its installation by electrical contractors.)

The electrical contractor shall furnish and install complete with all its accessories, Conduo-Base of manufacture by DAHLSTROM METALLIC DOOR CO., Jamestown, N. Y., UNITED METAL PRODUCTS CO., Canton, Ohio, or KNAPP BROTHERS MFG. COMPANY, Chicago, Ill., along all walls and partitions throughout the building unless otherwise shown or specified, of types as follows: (1) Standard Conduo-Base; (2) Junior Conduo-Base; (3) Counter-Top-Conduo-Base; (4) House Conduo-Base; and of the following finishes: (a) plain; (b) grained; (c) marbleized. Note: Junior Conduo-Base comes in standard finish only.

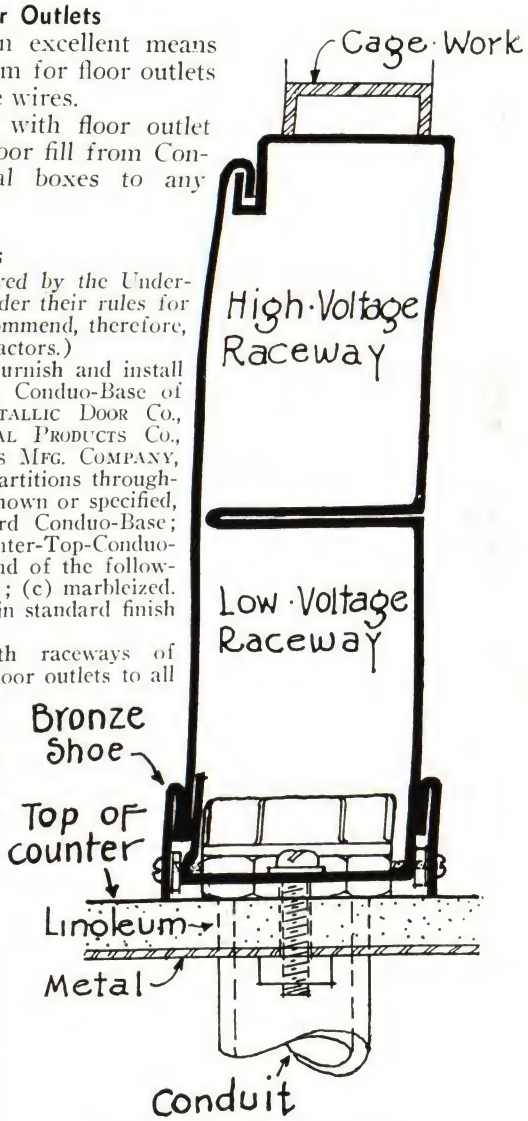
Provide feed conduits to both raceways of Conduo-Base as shown. Provide floor outlets to all points shown from both raceways of Conduo-Base.

Installation, grounding, jumpering at door and other openings shall be in strict accordance with the printed directions of manufacturers.

All Conduo-Base shall bear the Underwriters' label.

Information and Service

For prices, estimates, quotations and contracts write to DAHLSTROM METALLIC DOOR CO., Jamestown, N. Y., UNITED METAL PRODUCTS CO., Canton, Ohio, KNAPP BROTHERS MFG. COMPANY, Chicago, Ill., or their branch offices in all principal cities.



Section Counter-Top-Conduo-Base

FRETZ-MOON TUBE CO., INC.

MANUFACTURERS OF

"Enamelite," "Electro Galvite" and "Hot Dipped Galvite" Conduit, Elbows and Couplings

BUTLER, PA.

AGENT REPRESENTATIVES

BUFFALO, N. Y., Brace-Mueller-Huntley, Inc., Marine Trust Building
CHICAGO, ILL., Edward F. Meyers, 333 No. Michigan Boulevard
CINCINNATI, OHIO, A. F. Scherer, 1002 American Building
CLEVELAND, OHIO, Public Service Supply Co., 627 Union Trust Building
DETROIT, MICH., John Godleskie, 828 Book Building
INDIANAPOLIS, IND., Barrett Steel Sales Co., 508 Illinois Building
LOS ANGELES, CAL., Henry F. Boardman, Inc., 400 California Reserve Building
NEW YORK, N. Y., R. B. Corey Company, Inc., 81 Murray Street
PHILADELPHIA, PA., Wm. W. Keefer, 607 Otis Building
RICHMOND, VA., Eichel & Company, 1107 E. Main Street
ROCHESTER, N. Y., Brace-Mueller-Huntley Inc., Central Trust Building
ST. LOUIS, MO., L. T. Baldwin, 4132 Washington Avenue
SAN FRANCISCO, CAL., Fletcher-Weil Company, 100 Portrero Avenue
SEATTLE, WASH., Fletcher-Weil Company, 2315 Western Avenue
SYRACUSE, N. Y., Brace-Mueller-Huntley, Inc., Hills Building
WATERTOWN, MASS., Victor O. Lundgren, 65 Carver Road

EXPORT REPRESENTATIVE: Langguth-Olson Company, Inc., 150 Nassau Street, New York, N. Y.

Fretz-Moon Conduit

Fretz-Moon Conduit—well known to the electrical industry for its quality, uniformity and ease of installation—is made from selected mild steel skelp by a patented "continuous" process which not only assures uniformity in the steel and a smooth, tight weld that will not open, even under severe abuse, but also a smooth inside surface free from burrs or rough spots.

The threads are clean, sharp and free-running. Fretz-Moon Conduit cuts and threads easily and cleanly on the job. It is extremely ductile, therefore easy to bend. All Fretz-Moon Conduit is coated inside with hard glasslike enamel, providing a smooth, fast raceway for easy fishing of wiring—an enamel that will not crack or chip even under severe bending.

"Enamelite" (Orange Label)—Hard, black, baked-on enamel finish on inside and outside surfaces. Threads protected from enamel by protectors. The enamel is so resistant to abuse that working the conduit does not cause it to flake or chip away from the metal.

"Electro Galvite" (Red Label)—Electro-galvanized on the outside surface and threads with a heavy protective coating of pure zinc. The inside is coated with hard, baked-on black enamel.

"Hot Dipped Galvite" (Blue Label)—For locations where service is most severe or where the finest quality is required. Affords maximum protection against corrosion. Heavily galvanized with zinc both inside and outside by the hot dip process—a coating that will not peel under severe bending. Coated over the zinc inside with smooth, black, baked-on enamel.

Couplings—Finished outside to correspond with conduit. So cleanly threaded inside that they can be spun up on the conduit with the fingers. Fretz-Moon Conduit and Couplings are noted for ease and speed in fitting.

Shipments—Fretz-Moon Conduit ¼ to 1½ in. is supplied in bundles, each piece exactly 10 ft. long; other sizes up to 6 in. shipped loose. One end of each length is fitted with coupling, the other end with thread protector.

Inspection—Fretz-Moon Conduit is made under rigid control and strict supervision. Every length must not only pass close inspection and many tests (including hydrostatic test to insure perfect weld) but also the inspection of the Underwriters' Laboratories before it can receive the seal of Underwriters' standard. Fretz-Moon Conduit is guaranteed to give positive satisfaction.

Prompt Delivery—Complete stocks of conduit, elbows and couplings are carried in all large jobbing centers, making for prompt delivery.

Sharp Clean-cut Threads Save Time and Trouble

Look for the Fretz-Moon Label. It's Your Protection

PRICE LIST

Conduit							Couplings		Elbows			
Size, in.	Price per foot	Weight per foot, lb.	Diameters, in. External	Diameters, in. Internal	Thickness, in.	Threads per inch	Price each	Wt., lbs. per 100	Price each	Wt., lbs. per 100	Radius, inches	Offset, inches
¼	$ .08½	.425	.540	.364	.088	18	$ .05	6.0	$ .19	42	3.000	5.625
⅜	.08½	.568	.675	.493	.091	18	.06	9.5	.19	53	3.000	5.625
½	.08½	.852	.840	.622	.109	14	.07	11.6	.19	75	4.000	7.000
¾	.11½	1.134	1.050	.824	.113	14	.10	20.9	.25	120	4.500	7.500
1	.17	1.684	1.315	1.049	.133	11½	.13	34.3	.37	200	5.750	9.500
1¼	.23	2.281	1.660	1.380	.140	11½	.17	53.5	.45	300	7.250	10.875
1½	.27½	2.731	1.900	1.610	.145	11½	.21	74.3	.60	427	8.250	12.625
2	.37	3.678	2.375	2.067	.154	11½	.28	120.8	1.10	700	9.500	15.250
2½	.58½	5.819	2.875	2.469	.203	8	.40	172.0	1.80	1300	10.500	17.375
3	.76½	7.616	3.500	3.068	.216	8	.60	249.8	4.80	1700	13.000	19.500
3½	.92	9.202	4.000	3.548	.226	8	.80	424.1	10.60	2300	15.000	21.250
4	1.09	10.889	4.500	4.026	.237	8	1.00	474.1	12.25	2700	16.000	22.500
4½	1.27	12.642	5.000	4.506	.247	8	1.50	550.0	18.55	3100	18.000	24.375
5	1.48	14.810	5.563	5.047	.258	8	1.65	700.0	25.75	5500	24.000	32.000
6	1.92	19.185	6.625	6.065	.280	8	2.40	750.0	32.00	9000	30.000	39.750

Conduit is furnished in 10-ft. lengths, threaded both ends, with coupling screwed on one end.
Conduit is always designated by its nominal inside diameter. All weights and dimensions shown above are nominal.

GARLAND MANUFACTURING COMPANY

Manufacturers of Rigid Steel Conduit and Fittings for Electric Wiring

3003 Grant Building
PITTSBURGH, PA.

REPRESENTATIVES

ATLANTA, GA., H. C. Biglin, 138 Marietta Street
BOSTON, MASS., S. B. Condit, Jr. Co., 261 Franklin Street
CHICAGO, ILL., M. B. Austin & Co., 108-16 So. Desplaines Street
CLEVELAND, OHIO, The Henger-Fairfield Co., 1808 Columbus Road
DENVER, COLO., Sales Service Co., 1109 Broadway
LOS ANGELES, CAL., J. G. Pomeroy Co., 336 Azusa Street
NEW YORK, N. Y., Electrical Representatives, Inc., 415 Greenwich Street
PHILADELPHIA, PA., W. A. Leiser & Co., 1607 Sansom Street

Our product available through all Electrical Jobbing Houses

EXPORT DEPARTMENT: S. A. Rapier, Manager, Room 225, 56 Wall Street, NEW YORK, N. Y.

Products

"Galvaduct" Galvanized Rigid Steel Conduit; "Loricated" Enameled Rigid Steel Conduit.

Also Couplings, Elbows and other Fittings for electric wiring.

Garland Rigid Conduit

Rigid conduit installations are now generally recognized as the most permanent and the safest system for installing electric wires in all modern structures. It is the only system in which wires once installed may be easily removed and others put in their place.

Garland Rigid Conduit is made of a dead soft steel tubing which offers minimum resistance to bending, cutting and threading. All welds are thoroughly made. Threads are sharp and to an exact standard, so that no trouble is experienced in connecting lengths or fittings. Both inner and outer surfaces are thoroughly cleaned by special methods; all burrs, scale and silicate being removed so that the protective coatings adhere closely and uniformly to the tube.

Both "Galvaduct" and "Loricated" Conduits are carefully inspected during manufacture to insure the finished products conforming to the high standards established during *more than 30 years of conduit manufacture.*

These conduits are regularly examined and labeled under the supervision of the Underwriters Laboratories, Inc., meeting their every requirement with a generous margin to spare.

Every Length of Garland Rigid Steel Conduit Bears the Official Stamp of the National Board of Fire Underwriters

"Galvaduct"

The first brand of galvanized conduit manufactured in the United States.

"Galvaduct" Rigid Steel Conduit is protected from corrosion by a coating of pure zinc of uniform density and thickness, deposited by the electro chemical method, which insures a coating that will not chip or flake in bending or handling on the job.

The interior is coated with special enamel that will not become tacky, insuring a perfect raceway for fishing wires.

"Loricated"

The pioneer brand of rigid electric conduit manufactured in America.

"Loricated" Rigid Steel Conduit is treated with a high grade of furnace baked enamel which retains its flexibility and will not crack, chip or peel. This coating resists corrosion, acids, alkalis, moisture and changes of temperature.

Specifications for Conduit System

(1) All conduit used shall be "Loricated" (Black Enameled) or "Galvaduct" (Electro-galvanized) as manufactured by Garland Manufacturing Company, Pittsburgh, Pa. Each length shall bear the manufacturer's name or trade-mark and the Underwriters' label.

(2) The National Electrical Code standards shall govern the size and method of installation of conduits used on each circuit. No conduits smaller than ½ in. shall be used and all wire for the same circuit shall be run in one conduit. All conduits shall be large enough so that wires may be pulled without using mechanical devices of any kind.

(3) Conduit shall be continuous from outlet to outlet or to junction boxes or cabinets. When entering outlet boxes, etc., conduit shall be firmly fastened with approved locknuts and bushings.

(4) Conduit when cut to length on the job shall be carefully reamed to remove any possible burrs formed by the cutting tool. When installed the ends must butt in couplings.

(5) Not more than four 90° bends shall occur in any one run of rigid conduit. Where it becomes necessary to have more than four 90° bends a junction box shall be installed.

A Few Important "Galvaduct" and "Loricated" Installations

Grant Building, Pittsburgh, Pa.
Naval Academy, Annapolis, Md.
Marshall Field Building, Chicago, Ill.
Woolworth Building, New York, N. Y.
New York and New Jersey Vehicular Tunnel, New York, N. Y.
Hanna Building, Cleveland, Ohio
Rochester Trust & Safe Deposit Co., Rochester, N. Y.
Stanley Theater, Pittsburgh, Pa.
S. S. Kresge Building, Detroit, Mich.
H. J. Heinz Auditorium, Pittsburgh, Pa.
Halle Bros. Store, Cleveland, Ohio
Pennsylvania Station, New York, N. Y.
15 Mile Falls Lower Development Dam, Monroe, N. H. and Barnet, Vt.
Elizabeth Cudahy Memorial Library, Chicago, Ill.
Textile High School, New York, N. Y.
McCann's Food Store, Pittsburgh, Pa.
Ziegfeld Theater, New York, N. Y.

Installations in many other important structures in every State of the Union, as well as in many foreign countries.

NATIONAL ELECTRIC PRODUCTS CORPORATION

NATIONAL METAL MOLDING DIVISION

Manufacturers of Six Complete Wiring Systems and Fittings for Every Conceivable Requirement

PITTSBURGH, PA.

BRANCH OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

National Products Are Inspected and Listed by the Underwriters' Laboratories, Inc., and Are Distributed by Electrical Jobbers in All Parts of the Country

National Fire Stop Wires

National Fire Stop Wires are made by a new exclusive patented process so that the rubber insulation is practically hermetically sealed against those elements that destroy rubber, thereby assuring longer life of the wire and greater protection electrically and mechanically. An asphaltic saturator, free from wax of any description, is applied to the tightly woven braid and over this is applied a coating of stearin pitch which further seals the rubber and braid against moisture, and renders the wire flame-resisting. This is a decided innovation, as heretofore wires have had their braids treated with wax which is highly inflammable.

National
FIRE STOP
WIRES & CABLES
TRADE MARK REGISTERED

U. S. Patents Nos. 1,635,829; 1,772,436; 1,765,000; 1,798,486; 1,410,790; 1,536,549.
Canadian Patents Nos. 280,224; 361,475; 236,782; 244,618

Fire Stop Finished Wires Are—

(1) Fire resisting *(improves with age).*
(2) Moistureproof *(braids completely saturated).*
(3) Small size.
(4) Clean to handle.
(5) Lubricated surface *(easy fishing).*
(6) Clean stripping.
(7) Heat resisting.
(8) Tight braids *(can not slip back).*
(9) Fadeless colors.

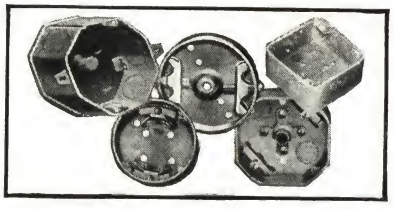
Sherarduct Rigid Steel Conduit

Spellerized rigid steel conduit impregnated and coated with zinc inside and out by the Sherardizing process and with acid-resisting solution baked into the pores of the zinc.

Bends easily around curves or offsets.

Outlet Boxes

National Outlet Boxes are furnished either Sherardized or black enameled finish. National Sherardized Outlet Boxes installed with Sherarduct Conduit will permanently safeguard the wiring system *as long as the building stands.*



Economy Rigid Steel Conduit

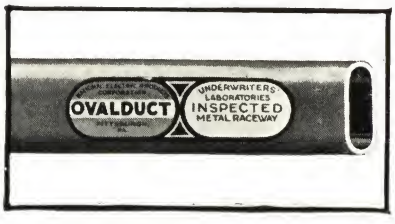
Rigid steel conduit with a tough, elastic, black enamel baked into the pores of the steel.

Thread protectors keep threads sharp and clean.

Enamel will not crack or peel off.

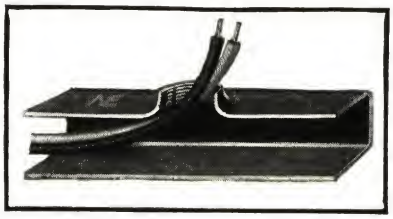
Ovalduct Underplaster Raceway

For underplaster and surface work. Will hold 3 No. 14 wires. Can be installed under ordinary thickness of plaster without channeling under body. Ovalduct fittings make it interchangeable with other wiring systems.



Nepcoduct Floor Distribution System

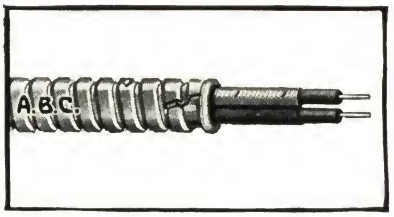
A steel duct for carrying electrical wires for light and power, signal and telephone and making the wires accessible at almost any point in the floors. A complete line of fittings for any requirement.



Ovalflex A.B.C. Flat Armored Cable

A safely bushed and insulated flat armored cable for underplaster installations and alterations.

Requires no channeling of underplaster materials — fits under plaster. Bends easily flatwise and edgewise.



THE WIREMOLD COMPANY

Manufacturers of Electrical Products

HARTFORD, CONN.

SALES REPRESENTATIVES

BOSTON, MASS., Edward Rigby, 10 High Street
NEW YORK, N. Y., The Wiremold Co., 29-31 E. 22nd Street
PHILADELPHIA, PA., E. E. Hedler, 250 No. 11th Street
PITTSBURGH, PA., H. C. Moran, 1724 Grant Building
BUFFALO, N. Y., R. W. Mitscher, Ellicott Square Building
ATLANTA, GA., H. C. Biglin, 138 Marietta Street
CHICAGO, ILL., M. B. Austin & Co., 108-116 So. Desplaines Street
DETROIT, MICH., R. J. Thorne, 4325 Commonwealth Avenue
DALLAS, TEX., The O. T. Jenkins Co., Sante Fe Building
SAN FRANCISCO, CAL., Geo. A. Gray Co., 411 Natoma Street

Products

The WIREMOLD SURFACE WIRING SYSTEM: (A) Wiremold; (B) Wiremold Fittings; (C) Wiremold Window Lighting System; (D) Wiremold Baseboard Fittings; (E) Wiremold Fixture Fittings; (F) Cove or "Built-in" Lighting. Also Wireflex "Slick-finish" Non-metallic Sheathed Cable, Wireduct "Slick-finish" Non-metallic Flexible Conduit.

WIREMOLD
TRADE MARK

"For Modernized Lighting"

Installation

Every Wiremold salesman is an expert Wiremold layout and installation man.

For installation rules, see current National Electrical Code.

Get in touch with the nearest representative listed above or write us direct. Wiremold Catalog and Wiring Guide free on request.

THE WIREMOLD SURFACE WIRING SYSTEM FOR "MODERNIZED LIGHTING"

Wiremold follows the surface and becomes a built-in part of the structure—yet the Wiremold System possesses all the advantages of any surface wiring construction in that it can be easily installed, extended or moved. The wires are at all times enclosed and protected from injury. Wiremold and Wiremold Fittings are designed to meet all surface wiring requirements.

Construction

Wiremold and Wiremold Fittings are made from high grade sheet steel. The base of Wiremold and the base plates of Wiremold Fittings are thoroughly zinc treated to prevent corrosion. The patented slip-joint "tongue and groove" method of coupling Wiremold to Wiremold Fittings provides solid connections which insure complete and permanent electrical continuity for ground return.

Finish

The cover of Wiremold and the covers of Wiremold Fittings are finished in a high quality enamel, the color of which blends well with other finishes. The enamel also serves as a ground coat for any other desired finish.

No. 500
2 No. 14

No. 700
4 No. 14

No. 1000
9 No. 14 — 7 No. 10
9 No. 12 — 6 No. 8

Cross Section Actual Sizes Wiremold Conduit

Wiremold and Wiremold Fittings

(A) Wiremold—Made in three sizes as follows:

No. 500 Wiremold—Designed for extension work requiring circuits of two wires or short runs of three wires.

No. 700 Wiremold—Designed for installations requiring circuits of four wires.

No. 1000 Wiremold—Designed for mains, subfeeders and various wire groupings, such as: telephone, radio, signal and call systems.

With No. 1000, No. 700 and No. 500 series a complete wiring system may be installed "from the panel box to the outlets."

(B) Wiremold Fittings—A very small variety of fittings is required for any one job, but there is a fitting in the Wiremold line to meet any conceivable surface wiring requirement.

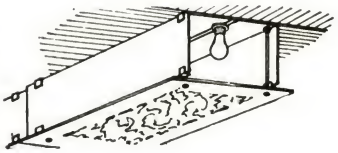
(C) Wiremold Window Lighting System—Is designed to solve store window lighting problems where appearance, ease of installation and cost are factors.

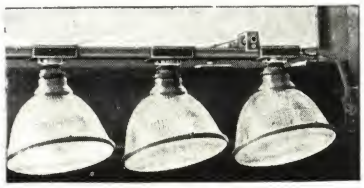
(D) Wiremold Baseboard Fittings—Are designed to wire baseboards, door and window frames, chair rails, desks and the like. These fittings when installed make a very pleasing appearance and blend so well with the trim as to be inconspicuous.

(E) Wiremold Fixture Fittings—Are designed to make hanging and removing of lighting fixtures easy and practicable. The efficiency of your lighting equipment can be maintained by keeping the fixtures clean and this maintenance is no longer a problem when your fixtures are hung the Wiremold way.

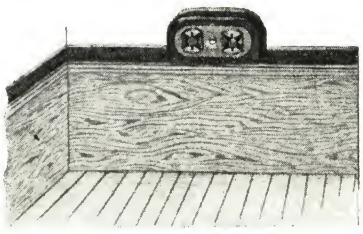
(F) Cove or "Built-in" Lighting—Wiremold and Wiremold Fittings form an ideal wiring material for this new type of lighting, because they have been designed and developed to meet just such problems as this lighting method presents.

Wiremold "Diple" Thru-Hook Connector Fitting (Patented) Cat. No. 5738-D

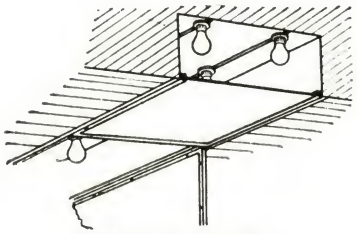




Window Lighting



Baseboard Fittings



"Built-in" Lighting

STEEL AND TUBES, INC.

ELECTRICAL DIVISION

(A Unit of Republic Steel Corporation)

Manufacturers of "Steeltubes" Rigid Threadless Thinwall Conduit

224 East 131st Street
CLEVELAND, OHIO

REPRESENTATIVES

ATLANTA, GA., 1314 Rhodes Haverty Building
I. H. Owen

BALTIMORE, MD., 912 Garret Building
T. D. Mitchell

BOSTON, MASS., 176 Federal Street
A. M. Horne

BROOKLYN, N. Y., 300 Scott Avenue
C. F. Resseguie (Eastern District Sales Manager)
F. G. Walker
J. J. Coughlin

BUFFALO, N. Y., 310 Stock Exchange Building
F. J. Banfield

CHICAGO, ILL., 1330 Peoples Gas Building
L. E. Fuller (Western District Sales Manager)
James E. Whitfield, 110 No. Underhill Street, Peoria, Ill.
George Butler, 4016 Walnut Street, Kansas City, Mo.
S. W. Sharborough, 6050 Lindell Avenue, Dallas, Tex.

CINCINNATI, OHIO, 2701 Carew Tower
R. B. Tuhey

CLEVELAND, OHIO, 224 E. 131st Street
N. B. Walsh

DETROIT, MICH., 945 Wanda Avenue, Ferndale
J. D. Benfield

LOS ANGELES, CALIF., 823 San Fernando Building
K. M. Anderson

PITTSBURGH, PA., 1747 Oliver Building
E. J. McDonagh

SAN FRANCISCO, CALIF., 525 Market Street
H. H. Benfield

SEATTLE, WASH., 422 Smith Tower
H. H. Walker

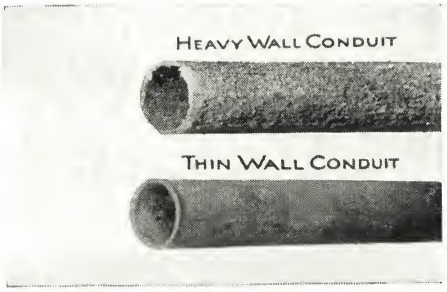
"Steeltubes"

Steeltubes

"Steeltubes" Electrical Metallic Tubing is a new rigid, thinwall, threadless conduit, developed expressly for the electrical industry, and designed to reduce installation costs. It is made from a superior grade of open hearth, cold rolled strip steel, and is electrically welded.

"Steeltubes" is protected by a dense, smooth galvanized exterior finish. The interior is sprayed with black enamel, baked to a hardness that not only makes the surface acidproof and rustproof, but provides a glasslike raceway for wire pulling.

This new conduit is a progressive step in wiring—sound from every angle—thoroughly tested in the laboratory and in actual use. Millions of feet of "Steeltubes" are now in service in factories, homes, offices, public buildings and other structures.



"Steeltubes" Resists Corrosion

The galvanized finish prevents rust for a long period of time. No threads are cut into the body of the wall to weaken it, nor is the galvanized surface fractured exposing the bare metal to the elements. The threadless feature eliminates turning of the conduit, therefore the galvanizing is not punctured by heavy pipe wrenches.

Approved for Concealed Work

Section 508 of the National Electrical Code pertaining to the use of Electrical Metallic Tubing was revised and amended by the Electrical Committee of the National Fire Protection Association at its 1931 annual meeting.

This code revision now approves "Steeltubes" for open and concealed work, and buried in concrete (except cinder fill) in all sizes up to 2 ins., inclusive.

Connecting "Steeltubes"—No Thread-cutting Required

Light Weight of "Steeltubes" Makes Installation Easy

10 Advantages of "Steeltubes"

(1) Eliminates threads
(2) Ductile and bends easily
(3) Light—yet tough and strong
(4) Resists corrosion
(5) Watertight compression joints
(6) Takes any fitting or box
(7) Reduces installation costs
(8) Approved by Underwriters
(9) Local stocks available
(10) Costs less

DIMENSIONS AND WEIGHTS OF "STEELTUBES"

Size, in.	Approx. weight per 1000 ft. without couplings, lb.	B.W. gauge	Diameter, in.	
			Internal	External
⅜	254	19	.493	.577
½	321	19	.622	.706
¾	488	18	.824	.922
1	711	17	1.049	1.163
1¼	985	16	1.380	1.508
1½	1141	16	1.610	1.738
2	1470	16	2.067	2.195

"Steeltubes" Is Lighter

"Steeltubes" eliminates two-thirds of the weight, in comparison with ordinary conduit, but gives the same inside diameter and wiring space. A standard 10-ft. length of the ½-in. size weighs only 3 lbs. This lighter weight is of especial advantage for ceiling work; also for installations where it is necessary to run the conduit many feet in the air.

Easy to Cut—Easy to Bend

An ordinary hacksaw is the only tool needed to cut "Steeltubes." The job is quickly and easily done. It is bent with a simple roll-type bender which makes a full 90 degree bend if desired, at one full sweep. Offsets and short kicks offer no difficulty. Bends can be perfectly gauged, eliminating guesswork and wastage. It can be easily straightened by using the handle of the "Steeltubes" bender or a piece of ordinary pipe—slipping it over the "Steeltubes" and applying pressure.

COUPLINGS AND CONNECTORS FOR "STEELTUBES"

"Steeltubes" Fittings provide tremendous gripping power, and assure tight connections. They are protected inside and out by cadmium plating and special galvanizing. "Steeltubes" can be used with all ordinary outlets, switch boxes and threaded or threadless conduit fittings.

Coupling with Wire Spring

Watertight Coupling with Brass Ring

"Steeltubes" Standard Coupling

"Steeltubes" Adapter for Threaded Conduit Fittings

Box Connector with Wire Spring

Watertight Connector with Brass Ring

"Steeltubes" Standard Box Connector

Bending Tools for "Steeltubes"

Standard Roll Type Bending Tool—This bending tool makes a full 90 degree bend at one sweep if desired. Assures uniform bends throughout the entire job. Marked to guide the workman in correctly gauging length of bends. Made for ⅜, ½, ¾ and 1-in. "Steeltubes."

Standard Roll Type Bending Tool

"Steeltubes Hickey" Bender—For tight corners and close bends, wherever it is necessary to "hickey" or work conduit in position after it is installed on the job. Also used for short kicks and stubbing up in concrete.

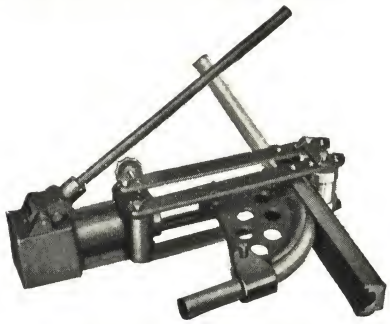
In bending, the tubing is "inched" through the hickey, taking short, uniform bites.

For ⅜, ½, ¾ and 1-in. "Steeltubes."

"Hickey" Bender

Greenlee Hydraulic Bender—Larger sizes of "Steeltubes" require more force than can be supplied with a hand tool. This hydraulic bender makes it easy to secure perfect, true bends. It saves unnecessary fittings and elbows; makes a neat, uniform conduit installation.

For 1¼, 1½ and 2-in. "Steeltubes."


Greenlee Hydraulic Bender

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

Manufacturers of Electrical Wires and Cables

SALES OFFICES

CHICAGO, 208 So. La Salle Street
CLEVELAND, Rockefeller Building
DETROIT, Buhl Building
CINCINNATI, Union Trust Building
MINNEAPOLIS—ST. PAUL, Merchants National Bank Building, St. Paul
MILWAUKEE, Bankers Building
ST. LOUIS, 506 Olive Street
KANSAS CITY, 417 Grand Avenue
OKLAHOMA CITY, Ramsey Tower
BIRMINGHAM, Brown-Marx Building
MEMPHIS, Sterick Building
DALLAS, Praetorian Building
DENVER, First National Bank Building
SALT LAKE CITY, Walker Bank Building
NEW YORK, Empire State Building
BOSTON, Statler Building
PITTSBURGH, Frick Building
PHILADELPHIA, Widener Building
ATLANTA, 101 Marietta Street
WORCESTER, 94 Grove Street
BALTIMORE, First National Bank Building
BUFFALO, 670 Ellicott Street
WILKES-BARRE, Miners Bank Building

PACIFIC COAST DISTRIBUTORS, COLUMBIA STEEL COMPANY

SAN FRANCISCO, Russ Building
LOS ANGELES, 2087 E. Slauson Avenue
PORTLAND, 777 Nicolai Street
SEATTLE, 4th Avenue So. and Connecticut Street
HONOLULU, Castle & Cooke Building

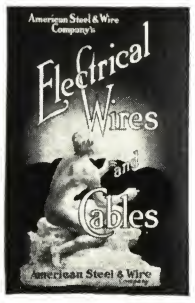
EXPORT DISTRIBUTORS, United States Steel Products Company, 30 Church Street, NEW YORK, N. Y.

Products

ELECTRIC WIRES and CABLES:

	Page
RUBBER COVERED WIRES and CABLES	1
AMERICORE RUBBER COVERED WIRES and CABLES	1
AMPARAK RUBBER COVERED WIRES and CABLES	2
AMERITE RUBBER COVERED SIGNAL WIRES	2
AMERICORE FLEXIBLE CORDS	2
AMERICORE HEATER CORDS	4
ANNUNCIATOR and OFFICE WIRE	5
AMERICORE BREWERY, PACKING HOUSE, and CANVASITE CORD	3
ELEVATOR LIGHTING and CONTROL CABLES	4
RUBBER COVERED TELEPHONE WIRE	5
WEATHERPROOF and SLOW BURNING WIRES and CABLES	6
FLAT STEEL TAPED PARK or SUBURBAN CABLES	7
BARE WIRES and CABLES, COPPER, IRON and STEEL	8

For our catalogues on Concrete Reinforcement, Triangle Mesh for Stucco Base, and Wire Rope, see Manufacturers' Index.



Facilities

The company's extensive factory facilities are well equipped with chemical, physical, and electrical laboratories, wherein the problems incident to the solution of every difficulty encountered are handled by thoroughly reliable experts and up-to-date methods. All steel and copper used is rolled and drawn in our mills and is under the company's supervision throughout every operation. All raw materials are tested and inspected before being used, the manufacturing processes are constantly checked, and finally the finished material is subjected to an exhaustive series of tests that determine beyond question whether or not it is of proper quality.

With such facilities, this company is enabled to manufacture electrical conductors of all kinds to the severest specifications and to give a standard of quality unexcelled.

Rubber Covered Wires and Cables

Used for general interior light and power wiring.

The conductor consists of uniformly soft annealed, commercially pure copper wire, insulated with code thickness of high grade vulcanized rubber protected with closely woven, strong, and elastic cotton braids saturated in waterproof compound.

All conductors are thoroughly and evenly coated with tin to protect copper from injurious effect from sulphur in rubber insulation.

Grades of Rubber Insulation—Three standard grades of rubber compound are made for rubber covered conductors. In addition, the company insulates wire to any special specification covering particular requirements such as 20%, 40%, signal wire, etc.

Americore—This grade exceeds all the requirements of the National Board of Fire Underwriters and is recommended for all service conditions within the limits of the National Electrical Code.

Amparak—This is an "intermediate" grade commonly known as *engineers'* wire. The insulation is of a high grade compound made to suit the demand of engineers and architects desiring a better wire than Americore but not so high a quality as Amerite. This grade is recommended for wiring in dwellings, office buildings, industrial plants, etc.

Amerite—This grade has always been identified as a 30% compound of the highest order. The insulation contains only the best Hevea rubber and other necessary ingredients to provide its great strength and elasticity, high insulating value and embodies the latest developments in "performance test" specifications with exceptional ageing qualities. Amerite wires and cables may be obtained in any size and finish for all services and voltages.

Americore Rubber Covered Wires and Cables

This wire is made to comply with the National Electrical Code requirements and every coil is regularly examined and labeled under the supervision of the Underwriters' Laboratories, Inc. A strictly high grade wire for interior light and power wiring.

Americore Wire

Solid tinned copper conductor

Gauge, B. & S., or cir. mils	Thickness of insulation, in., for 0 to 600 volts Type R. S.	600 to 1500 volts Type R. S.-15	1500 to 2500 volts Type R. S.-25	2500 to 3500 volts Type R. S.-35	3500 to 5000 volts Type R. S.-50	5000 to 7000 volts Type R. S.-70
14–8	3/64	6/64	8/64	10/64	12/64	16/64
7–2	4/64	7/64	9/64	10/64	12/64	16/64
1–4/0	5/64	8/64	10/64	10/64	12/64	16/64
225,000 to 500,000	6/64	9/64	10/64	11/64	12/64	16/64
525,000 to 1,000,000	7/64	10/64	10/64	12/64	12/64	16/64
Over 1,000,000	8/64	10/64	10/64	12/64	14/64	18/64

Note: Type R. S. as given above signifies single braid rubber covered wire. Double braid or tape and braid would be designated as Type R. D.

Americore Light Insulation Fixture Wire

Solid tinned copper conductor, rubber insulation, single braid, black finish

Size, B. & S. gauge	Thickness rubber, in.	Diam. over braid, in.	List No.	Standard coils, ft.
16	1/64	6/64	8006	1000
18	1/64	5/64	8008	1000
20	1/64	5/64	....	1000

Firefite, a heat resisting fixture wire, is now being made to replace the above.

Americore Twin Rubber Covered Wire

Americore Twin Rubber Covered Cable

AMERICORE TWIN RUBBER COVERED WIRES AND CABLES

Size, B. & S. gauge	Thickness rubber, in.	Solid Conductor		Stranded Conductor			Shipped on reel number
		List No.	Weight per 1000 ft., lb.	Number of wires	List No.	Weight per 1000 ft., lb.	
2	4/64	922	558	7	692	597	466
3	4/64	923	470	7	693	488	466
4	4/64	924	380	7	694	406	466
5	4/64	925	320	7	695	336	466
6	4/64	926	259	7	696	285	466
8	3/64	928	161	7	698	171	500 ft. Coils
10	3/64	930	112	7	700	122	500 ft. Coils
12	3/64	932	82	7	702	90	500 ft. Coils
14	3/64	934	63	7	704	69	500 ft. Coils

Underwriters' rules permit use of above in sizes No. 14 and larger. No. 6 and larger shipped on reels containing 1000-ft. lengths; smaller sizes shipped in coils containing 500-ft. lengths.

These sizes, solid or stranded, will have one conductor with white braid, the other conductor with black braid, covered over all with a paraffined braid finished with black wax.

Americore Cable, Stranded Tinned Copper Conductor

AMERICORE RUBBER COVERED WIRES AND CABLES

Size, B. & S. gauge	Thickness rubber, in.	Solid		Stranded			Standard packages, amounts, ft.
		List No.	Weight per 1000 ft., lb.	Number wires in strand	List No.	Weight per 1000 ft., lb.	
Single Braid							
2	4/64	812	259	7	562	276	1000 Reels
3	4/64	813	212	7	563	226	1000 Reels
4	4/64	814	175	7	564	186	1000 Reels
5	4/64	815	144	7	.....	155	1000 Reels
6	4/64	816	120	7	566	128	500 Coils
8	3/64	818	75	7	568	80	500 Coils
10	3/64	820	53	7	570	56	500 Coils
12	3/64	822	38	7	572	41	500 Coils
14	3/64	824	29	7	574	31	500 Coils
16	2/64	826	17	.....	.....	18	500 Coils
18	2/64	828	13	.....	.....	14	500 Coils
Double Braid							
4/0	5/64	850C	.....	19	867A	826	1000 Reels
3/0	5/64	850B	.....	19	868A	672	1000 Reels
2/0	5/64	850A	.....	19	869	548	1000 Reels
1/0	5/64	850	.....	19	870	451	1000 Reels
1	5/64	851	.....	19	871	362	1000 Reels
2	4/64	852	276	7	872	286	1000 Reels
3	4/64	853	222	7	873	236	1000 Reels
4	4/64	854	184	7	874	196	1000 Reels
5	4/64	855	154	7	.....	164	1000 Reels
6	4/64	856	127	7	876	135	500 Coils
8	3/64	858	81	7	878	86	500 Coils
10	3/64	860	58	7	880	61	500 Coils
12	3/64	862	43	7	882	46	500 Coils
14	3/64	864	33	7	884	35	500 Coils
16	2/64	866	19	7	.....	20	500 Coils
18	2/64	868	15	7	.....	16	500 Coils

Americore Feeder Cable

Capacity, cir. mils	Number and diam. of wires in strand, in.	Thickness rubber, in.	Diam. over tape and braid, in.	List No. single braid	Weight per 1000 ft., lb.	Shipped on reel number
250,000	37x.0822	3/32	56/64	340	1006	467
300,000	37x.0901	3/32	59/64	341	1182	467
350,000	37x.0973	3/32	62/64	342	1355	467
400,000	37x.1040	3/32	65/64	343	1533	467
450,000	37x.1103	3/32	68/64	344	1706	467
500,000	37x.1162	3/32	72/64	345	1875	467
600,000	61x.0992	7/64	79/64	346	2263	468
750,000	61x.1109	7/64	86/64	347	2774	468
1,000,000	61x.1280	7/64	96/64	348	3627	468
1,250,000	91x.1172	8/64	107/64	348A	4546	468
1,500,000	91x.1284	8/64	115/64	349	5383	468
2,000,000	127x.1255	8/64	129/64	349A	7066	.....

Shipped in reels containing 1000 ft. lengths.

Americore Rubber Covered Switchboard Cable

National Electrical Code Standard; low potential, 0-600 volts; Class A

Size, B. & S. gauge	Number of wires in strand	Thickness of rubber, in.	Diameter over single braid, in.	Diameter over double braid, in.	List No.		Weight per 1000 ft., lb.		Standard packages, amounts, ft.
					Single braid	Double braid	Single braid	Double braid	
1	259	5/64	37/64	40/64	221	271	376	406	1000
2	210	4/64	33/64	36/64	222	272	302	329	1000
3	151	4/64	30/64	33/64	223	273	231	255	1000
4	133	4/64	27/64	30/64	224	274	210	231	1000
5	82	4/64	23/64	26/64	226	276	144	163	1000
6	49	4/64	23/64	26/64	226	276	145	164	1000
8	49	3/64	19/64	22/64	228	278	87	101	500
9	40	3/64	18/64	21/64	229	279	73	87	500
10	19	3/64	17/64	20/64	230	280	61	74	500
12	19	3/64	15/64	18/64	232	282	45	57	500
14	19	3/64	14/64	17/64	234	284	34	45	500

Amerite (30%) Rubber Covered Tree Wire

This special tree wire is insulated with the best grade of 30% rubber compound, the thickness of insulation used being ample for whatever voltage required.

This insulation is protected by a layer of rubber filled tape, and over the tape there is a weatherproofed, tubular woven braid.

Amparak Rubber Covered Wires and Cables

Made in sizes and styles as above described for Americore covering, except that quality of rubber is better than code.

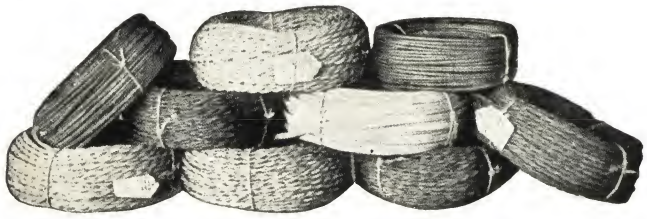
Americore Flexible Cords

The term "cord" is ordinarily applied to any small pliable cable consisting of two or more flexible conductors insulated with rubber and braided. Under this heading are included all lamp and reinforced portable cords, theater and stage, border light and heater cords.

This construction in single conductor is used for exposed fixture work and is classified and tagged as flexible fixture wire. Care should be taken not to confuse this with regular rubber covered fixture wire, which is used for concealed fixture work.

Our new Firefite heat resisting cord will replace these fixture wires, according to new Underwriters' ruling.

Flexible cord is used in short lengths for exposed wiring in offices and residences to connect the concealed wiring with drop lights and appliances of various kinds, and is used in many other places where a short flexible connection is wanted. Its use is confined to temperatures not exceeding 120° F. and voltages not exceeding 300, except that sizes 14 and larger with $\frac{3}{64}$-in. insulation may be used where difference in potential is not more than 600 volts. Size 16 must have $\frac{1}{32}$-in. insulation, and while Underwriters permit $\frac{1}{64}$-in. on size 18, it is also furnished with $\frac{1}{32}$-in., particularly on types PD, PWP and P.



Lamp Cord of All Kinds and Sizes

LAMP CORDS AND REINFORCED PORTABLE CORDS
Construction of Copper Conductors

Lamp Cord Strands (All Types)							
Size B. & S.	Number of wires	Size each wire	Wt. copper per 1000 ft. each condr.	Size B. & S.	Number of wires	Size each wire	Wt. copper per 1000 ft. each condr.
10	104	30	34.0	18	16	30	4.9
12	65	30	21.0	19	13	30	4.1
14	41	30	13.2	20	10	30	3.1
16	26	30	8.3	22	6	30	1.9

The standard colors for cotton braids on lamp and portable cords are:

Type C —Green and yellow (combination)
Type PO—Black
Type PD—Black
Type P-64—Black
Type P-32—Black

There are no standard colors for silk braids, and each order must specify the color desired.

All dry cotton braided cords are furnished with a red tracer thread in the braid on one conductor for polarity identification.

Weatherproof finished cords have raised tracer in one conductor, and in the case of three conductor cords, the second conductor has two raised tracers.

Silk covered cords, with the exception of Type C, have red tracer same as dry cotton braided cords. Type C silk covered tracer furnished only when specified.

Types—The following types are approved by the National Board of Fire Underwriters and are known as "New Code":

Type C, Trade Name, Lamp Cord—For pendant or portable use, hanging free in air, in dry places and not subject to hard usage. Construction: twisted pair, with glazed cotton or silk braid on each conductor. No outer covering. Insulation not less than $\frac{1}{32}$ in. for Nos. 16 and 18 A. W. gauge. Larger sizes same as for rubber covered wires.

Twisted Lamp Cord

Type PO, Trade Name, Parallel Lamp Cord—For portable or pendant use in offices, dwellings and similar dry places where not likely to be subjected to rough usage and where appearance is an essential feature. Construction: Parallel wires, with soft cotton braid on each conductor, glazed cotton or silk braid over the parallel wires. Insulation same as Type C except that $\frac{1}{64}$-in. rubber may be used on size 18 only.

Type "PO" Parallel Silk or Cotton Lamp Cord

Type PD, Trade Name, Twisted Portable—For pendant or portable use in offices, dwellings, or similar dry places where not likely to be subjected to rough usage and where appearance is essential. Construction: Twisted pair, with soft cotton braid on each conductor; outer covering of glazed cotton or silk. Insulation same as Type C.

Type "PD" Twisted Portable Lamp Cord

Type PWP, Trade Name, Moistureproof Reinforced Cord—For pendant or portable use in damp places. Construction: Twisted pair with soft cotton braid on each conductor; rubber jacket not less than $\frac{1}{64}$ in. thick around the twisted pair; outer covering of soft cotton, saturated with a moistureproof compound.

Type PWP-32 Moistureproof Reinforced Cord

Insulation on conductors same as Type C except that $\frac{1}{64}$-in. rubber may be used on size 18 only.

Type P, Trade Name, Reinforced Cord—For pendant or portable use in dry places, and where subject to hard usage. Construction: Twisted pair, with soft cotton braid on each conductor; rubber jacket not less than $\frac{1}{64}$ in. thick around the twisted pair; outer covering of glazed cotton or silk. Insulation on conductors same as Type C except that $\frac{1}{64}$-in. rubber may be used on size 18 only.

Specify—Thickness of rubber required on Types P or PWP, i.e., P-32, P-64 or PWP-32 and PWP-64.

Special Flexible Cords

The trade name, type, construction and finish are given in the table below. These are also approved "New Code" Americore cords.

Brewery Cord

Canvasite Cord

Packing House Cord

Special Flexible Cords
These three types are no longer approved by the underwriters

SPECIAL FLEXIBLE CORDS

Trade name	Type	Number of conductors	Conductor and insulation	Covering on each conductor	Jute fillers	Rubber jacket, in.	Number of weather-proof braids over all
Stage Cable	T	2 or 3	See below	One weather-proof braid or tape	Yes	.....	2
Border Light Cable	B	2 or more	See below	One weather-proof braid or tape	No	.....	2
American Special Brewery Cord	.....	2	See below	One dry braid	No	1/64	2
Deck Cable	.....	2	See below	One dry braid	Yes	1/32	1

Conductors and Insulations

Size		Copper conductor	Cotton wind	Insulation, Americore, in.
Stage Cable and Border Light Cable	2	133 wires	No	4/64
	4	133 wires	No	4/64
	6	49 wires	No	4/64
	8	49 wires	No	3/64
	10–14	Lamp cord strand	Yes	2/64
	16–20	Lamp cord strand	Yes	2/64
Deck Cable	10–14	7 wires	No	3/64
	16–18	7 wires	No	2/64
All others	10–14	Lamp cord strand	Yes	3/64
	16–20	Lamp cord strand	Yes	2/64

Americore Identification Marker

Our registered marker for Americore cords is an uncolored worsted tracer thread running lengthwise of the wire between the rubber and braid. Commercial cord has blue tracer.

Rubber Clad Portable Cords

Rubber clad cords are made to withstand the hardest kind of service. Used for wiring portable drills, grinders, washing machines, garage lights, trouble lights and other electrical equipment where service conditions are severe.

Types—These are as follows:

Type S, Construction—Conductors are regular lamp cord strand, cotton wound. Nos. 10, 12 and 14 are insulated with 3/64-in. 30% rubber; Nos. 16 and 18

Rubber Clad Portable Cord

with 1/32-in. 30% rubber, on each conductor. In the two-conductor cables, one conductor is insulated with red rubber, and one with black rubber. In the three-conductor cables, one conductor is insulated with red rubber, one with black rubber, and one with white rubber. Two or three conductors are twisted together with cotton fillers, and covered with a skeleton braid of hard cotton. A covering of 60% rubber is applied over all to the diameter given in the above table.

Type SJ, Construction—Junior cord is the same as regular No. 18 cord, except that each conductor is composed of 41 wires each No. 34; and that the belt of 60% rubber is thinner, making a smaller outside diameter.

We also manufacture rubber-clad mining machine and welding cables.

STANDARD PACKING LAMP AND PORTABLE CORDS

Type of wire	Standard packages		
	Cotton covered	Artificial silk covered	No braid
Single conductor—Type C	500-ft. spools	500-ft. spools	.....
Single conductor—1/64-in. rubber	1000-ft. spools	1000-ft. spools	.....
Twisted pair—Type C	250-ft. coils	250-ft. spools	.....
Twisted pair—1/64-in. rubber	250-ft. coils	500-ft. spools	.....
Parallel—Type PO	250-ft. coils	250-ft. spools	.....
Parallel—1/64-in. rubber	250-ft. coils	500-ft. spools	.....
Reinforced portable cords	500-ft. coils	500-ft. coils	.....
Rubber clad, Type S	.....	.....	250-ft. coils
Rubber clad, Type SJ	.....	.....	500-ft. coils
Brewery, Type CB	500-ft. coils	.....	.....
Canvasite, Type CC	500-ft. coils	.....	.....
Packing house, Type PKWP	500-ft. coils	.....	.....
Deck cable, Type CB	500-ft. coils	.....	.....

Hard Corded Braid

This is usually made of hard twisted cotton cord saturated with a waterproof compound. It is very flexible and possesses extreme durability under hard service conditions. It can be furnished on any size cable and is especially adapted for portable cords and mining machine cable, or tree wire.

Tubular Woven Braid

This is a loom weave, similar to that on fire hose, made up of hard twisted cotton saturated with a weatherproof compound. It is very durable and offers an excellent protection to the insulation for portable cords or tree wire.

Elevator Lighting, Control and Annunciator Cable

These cables are made to conform to National Board of Fire Underwriters' requirements. Our new standards are considerably more flexible than those usually offered. The steel supporting strands are of special design. The braids have distinctive colors so that they can be easily distinguished from one another. All one color can also be supplied.

Lighting Cables—Generally made size 14 and in two or three conductors.

Control Cables—Made size 16 and in any number of conductors from two to sixteen.

Annunciator Cables—Usually size 18, although 16 is sometimes required. The number of conductors vary from two to twenty-five or more.

Miscellaneous Flexible Cords

Weatherproof Braided Twisted Pair Cord—Insulated with Americore rubber same as Type C, except that braids have weatherproof finish.

Three-conductor Reinforced Portable Cord—Same as Type P or PWP, except that it has three conductors.

Plain Core Parallel or Twisted Lamp Cord—Consisting of two rubber covered conductors not braided, either twisted together or laid parallel, with one hard cotton or artificial silk braid over all.

Mercerized Cotton Covered Cords—Mercerized cotton braids can be furnished on any of the Americore Flexible cords.

Americore Heater Cords

We manufacture heater cords in many constructions and carry in stock three standards. Standard "E" is Duplex; Standard "F" is Twisted Pair. Both these standards meet Underwriters' specifications.

Standard "S" is a special Duplex Heater Cord which does not meet Underwriters' specifications.

Any of these standards can be furnished with soft or hard cotton braid. Our standard finish is a soft cotton braid, black in color, with two gold tracers.

Standard "E"—Each conductor is a flexible bunched strand composed of No. 34 B. & S. gauge copper wires, covered with a cotton wind, insulated with $\frac{1}{64}$-in. unvulcanized globe rubber, and covered with one wind of asbestos. Two such conductors are twisted together and covered with one dry cotton braid over all.

Standard "E" Heater Cord

Standard "F"—Each conductor is a flexible bunched strand composed of No. 34 B.& S. gauge copper wires, covered with a cotton wind, insulated with $\frac{1}{64}$-in. unvulcanized globe rubber, and covered with one wind of asbestos and one dry cotton braid. Two such conductors are twisted together to form a twisted pair.

Standard "F" Heater Cord

Standard "S"—Each conductor is a standard lamp cord strand, covered with a wind of asbestos, insulated with .025-in. vulcanized globe rubber over the asbestos. Two such conductors are twisted together, and covered over all with a dry cotton braid.

AMERICORE HEATER CORDS

Size B. & S.	Standard strand For types "E" and "F"		Lamp cord strand For type "S"		Weight per 1000 ft.		
	Number wires	Size each	Number wires	Size each	Standard "E"	Standard "F"	Standard "S"
14	104	34	41	30	46	47	.....
16	65	34	26	30	33	35	.....
17	52	34	21	30	29	30	.....
18	41	34	16	30	24	26	29
20	26	34	10	30	.....	.....	34

Annunciator and Office Wire

Annunciator Wire—Used in primary battery circuits for call bell or annunciator wiring in hotels, offices or houses. Commercially pure, soft copper wire from No. 14 to No. 22 B. & S. is used. This is insulated with two firm winds of cotton applied in opposite directions and saturated with specially prepared paraffin wax compound. The outside wrap is made of any color or combination of colors—the most common being bright and fast red or blue with white. Put up on spools weighing about 7 lbs. net.

Annunciator Wire

Size, B. & S. gauge	List No.	Length in 1 lb., ft.	Size, B. & S. gauge	List No.	Length in 1 lb., ft.
14	3114	67	20	3120	221
16	3116	101	22	3122	311
18	3118	155			

Office Wire—Standard grade consists of a copper conductor, varying in size from No. 14 to No. 20 B. & S., insulated with one wind and one braid of cotton, both of which are applied tight and even.

These two cotton covers are thoroughly saturated with our special paraffin wax compound. The outer braid is given a high polish and is made in any color or combination of colors specified. The standard colors are red and white or blue and white.

This wire is put up in coils of about 20 lbs.

Used largely by telephone and telegraph companies for inside wiring, extending from the instruments to the junction where they connect with outside wires and cables as they enter building. Also used as high grade bell and annunciator wire.

Office Wire

Size, B. & S. gauge	List No.	Length in 1 lb., ft.	Size, B. & S. gauge	List No.	Length in 1 lb., ft.
14	3314	56	18	3318	115
16	3316	80	20	3320	154

Special Annunciator and Office Wire—Special kinds furnished as specified. Also conductors of other than standard sizes, either solid or stranded. Untinned copper wire is used in the regular product, but tinned wire will be furnished if required.

Multiple Conductors—Any of these insulated wires supplied, two in parallel or twisted in pairs, in 3-conductor cables or in cables having any number of conductors. Same can be covered with one or more braids or with tape and braid and finished in any manner specified.

Rubber Covered Copper Telephone Wire

Specifications—The following are considered standard by the larger telephone companies:

No. 14 B. & S. Twisted Pair "Outside Distribution Wire"—Each conductor hard drawn tinned copper wire, insulated to a diameter of $\frac{5}{32}$ in. over rubber and covered with cotton braid, saturated with black weatherproof compound, wax finish, one conductor having a raised tracer to distinguish it from the other.

No. 14 B. & S. Twisted Pair "Outside Distribution Wire"

No. 18 B. & S. Twisted Pair "Bridle Wire"—Each conductor soft drawn tinned copper wire, insulated to a diameter of $\frac{7}{64}$ in. over rubber and covered with cotton braid, saturated with black weatherproof compound, wax finish, one conductor having a raised tracer to distinguish it from the other.

No. 18 B. & S. Twisted Pair "Bridle Wire"

No. 19 B. & S. Single Conductor Twisted Pair and Triple Conductor "Inside" or "Substation" Wire—Conductors soft drawn tinned copper insulated to a diameter of $\frac{3}{32}$ in. over rubber, covered with single hard glazed cotton braid. Single conductors are braided with plain colored cotton, while in the twisted pair one conductor contains a differently colored tracer thread, and in triple conductor two of the three wires contain different colors or different design of tracer threads, thus making no two of conductor braids alike. Sometimes a differently colored cotton braid is used, one for each conductor, for purposes of distinction.

No. 19 B. & S. Single Conductor Twisted Pair, and Triple Conductor "Inside" or "Substation" Wire

TELEPHONE WIRES, TWISTED PAIRS

Size, B. & S. gauge	Finish	Diam. over rubber, in.	List No.			Weight per 1000 ft., lb.
			No test	100 megohms	Over 100 megohms	
14	Braided	11/64	9141	9040	9040A	63
14	Braided	5/32	9145	9045	9045A	57
16	Braided	5/32	9165	9065	9065A	49
16	Braided	9/64	9169	9069	9069A	43
16	Braided	4/32	9164	9064	9064A	37
18	Braided	4/32	9184	9084	9084A	32
18	Braided	7/64	9187	9087	9087A	28
19	Braided	7/64	9197	9097	9097A	26
19	Braided	3/32	9193	9093	9093A	22
20 or 22	Braided	3/32	9120 9122	9020 9022	9020A 9022A	17
19	Plain	3/32	9193P	9093P	9093B	16
20 or 22	Plain	3/32	9120P 9122P	9020P 9022P	9020B 9022B	15

"Pot Head" Wires, Plain Telephone Conductors—Furnished in the smaller sizes, Nos. 18, 19, 20 or 22 B. & S., either single conductor or twisted pair. Soft tinned copper conductors insulated to a diameter of $\frac{3}{32}$ in. over rubber without any outer braid or protection. In case of twisted pairs, one conductor is sometimes made of a differently colored rubber than the other to discriminate between them.

"Pot Head" Wire, Plain Telephone Conductor

Telephone Cables—Made to include any number of single conductors or twisted pairs of telephone wires either plain or braided, bunched together or laid up concentrically, with a tape or cotton braid or other fibrous covering over all. Frequently incased in lead sheath, or armored. These cables vary greatly in construction and are furnished to buyers' requirements and specifications.

Rubber Covered Iron Telephone Wire, Single Conductor—These conductors are generally No. 12 or 14 B. W. G. galvanized iron wire insulated with code thickness of vulcanized rubber, either single or double cotton braid, weatherproof, saturated and wax polished.

Rubber Covered Iron Telephone Wire, Single Conductor

Weatherproof and Slow Burning Wires and Cables

These have moderate degree of insulation and are less expensive than rubber insulated conductors. Double and triple braid.

Reliance weatherproof wire meets every requirement for outdoor service, while Reliance slow burning wire is superior for indoor uses.

Wires and cables are made in strict accordance with all requirements of the National Board of Fire Underwriters, sizes varying from No. 20 B. & S. to the largest feeder cables used. Sizes No. 4/0 B. & S. and smaller are usually made of solid wires, while larger sizes have stranded conductors.

Unless hard drawn copper be specified, wires of purest grade of annealed copper, uniform in softness and having minimum conductivity of 98% Matthiessen's standard, will be used.

Reliance Weatherproof Insulation—For use outdoors where moisture is certain and where fireproof qualities are not necessary; also where, on account of small separation, bare wires would be liable to swing into contact with each other or with other low tension cables.

The wires are first covered by two or three closely and evenly woven braids of strong fibrous material, which is then completely saturated with weatherproof insulating compound. After drying thoroughly, the wire receives dressing of mineral wax, when the surface is thoroughly burnished and polished, reducing to a minimum trouble from sleet and ice.

Reliance Weatherproof Wire

Solid copper wire, double braid, black finish
National Electrical Code Standard

Reliance Weatherproof Wire

Solid copper wire, triple braid, black finish
National Electrical Code Wire

Size, B. & S. gauge	Minimum thickness of insulation, in.	List No.	Weight, lb.		Standard packages, amounts, ft.	Shipped on reel number
			Per 1000 ft.	Per mile		
0000	.0781	2140	767	4,050	2,400	467
000	.0781	2130	629	3,320	2,500	467
00	.0781	2120	502	2,650	3,200	467
0	.0781	2100	407	2,150	4,300	467
1	.0781	2101	316	1,670	1,000	422
2	.0625	2102	260	1,370	1,300	422
3	.0625	2103	199	1,050	1,600	422
4	.0625	2104	164	865	2,100	465
5	.0625	2105	135	710	2,500	422
6	.0625	2106	112	590	3,400	422
8	.0469	2108	75	395	5,000	422
9	.0469	2109	62	325	6,000	422
10	.0469	2110	53	280	2,000	Coils
12	.0469	2112	35	185	3,000	Coils
14	.0469	2114	25	130	4,000	Coils
16	.0469	2116	20	105	2,500	Coils
18	.0469	2118	16	85	3,000	Coils

Reliance Weatherproof Cable

Stranded copper conductors, double braid, black finish
National Electrical Code Wire

Reliance Weatherproof Cable

Stranded copper conductors, triple braid, black finish
National Electrical Code Wire

RELIANCE WEATHERPROOF CABLE

Stranded copper conductors, triple braid, black finish National Electrical Code Wire

Size	Minimum thickness of insulation, in.	List No.	Weight, lb.		Standard packages, amounts, ft.	Shipped on reel number
			Per 1000 ft.	Per mile		
2,000,000	.1250	2350	7008	37,000	600	468
1,750,000	.1250	2351	6193	32,700	700	468
1,500,000	.1250	2352	5380	28,400	850	468
1,250,000	.1250	2353	4508	23,800	1000	468
1,000,000	.1250	2354	3674	19,400	1320	468
900,000	.1094	2357	3332	17,600	1320	468
800,000	.1094	2359	2992	15,800	1320	468
750,000	.1094	2360	2822	14,900	1320	468
700,000	.1094	2361	2650	14,000	1320	468
600,000	.1094	2363	2235	11,800	1320	468
500,000	.1094	2365	1894	10,000	1320	468
450,000	.0938	2367	1724	9,100	1320	468
400,000	.0938	2368	1553	8,200	1320	468
350,000	.0938	2369	1345	7,100	2640	468
300,000	.0938	2370	1174	6,200	2640	468
250,000	.0938	2371	985	5,200	2640	468
0000	.0781	2340	800	4,220	2000	467
000	.0781	2330	653	3,450	2000	467
00	.0781	2320	522	2,760	3000	467
0	.0781	2300	424	2,240	3000	467
1	.0781	2301	328	1,735	1000	422
2	.0625	2302	270	1,425	1300	422
3	.0625	2303	206	1,090	1600	422
4	.0625	2304	170	900	2100	465
5	.0625	2305	140	740	3000	465
6	.0625	2306	115	610	3400	422
8	.0469	2308	78	410	5000	422

Reliance Weatherproof Iron Wire, Double Braid

Reliance Weatherproof Iron Wire, Triple Braid

For fire alarm, telephone, telegraph and burglar alarm construction where danger of short circuits with other wires or trees exists

Reliance Slow Burning Wires and Cables—Have insulation that will not carry flame. Especially useful in hot, dry places, and where wires are brought together, as on the back of a large switchboard or in a wire tower. Each insulating braid completely saturated with white, slow burning compound, and outside thoroughly slicked down and given a hard, smooth, white surface.

Reliance Slow Burning Wire, National Code Standard

Solid conductor, triple braid, white finish

Reliance Slow Burning Cable

Stranded copper conductor, three white braids

Special Weatherproof and Slow Burning Wires—A combined insulation of black weatherproof and white slow burning coverings is often required. The wires may have a single coating of each kind or three coatings, two of slow burning and one of weatherproof, or conversely. When weatherproof covering is inside, the conductor is known as "white finish weatherproof," and when flameproof covering is inside, it is called "black finish slow burning." Outside surfaces are finished smooth and hard. The white finish weatherproof wire only is approved by the National Electrical Code.

Park and Suburban Cables (Flat Steel Taped, Armorlokt, Non-magnetic Metal Tape, Non-metallic Sheath

These cables have been designed for use without conduit or other protection, and offer all the advantages of a cable in conduit at but a small part of the cost of such a system.

These cables are made with any number of conductors, or any size, either solid or stranded, and for any voltage, and may be insulated with rubber, with paper, or with cambric, as desired. The method of construction is practically the same in every case.

Single Conductor

Twin Conductor

Three Conductors

Flat Steel Taped Park or Suburban Cables

Rubber insulated

Single Conductor Armorlokt Cable

Construction—Standard construction is illustrated. The wires making up the copper conductor are tinned and insulated with Amerite rubber of required thickness and quality. Then a rubber filled tape is applied.

A lead sheath is placed over the tape to exclude moisture. An asphalt saturated jute covering is applied over the lead sheath, acting as a cushion between the armor and lead, thus protecting the lead from mechanical injury by the flat tapes or special Amorlokt tape and preventing an accumulation of moisture between the lead and armor.

A steel tape armor consisting of either two flat steel tapes, or non-magnetic metal tape, or one Armorlokt steel tape is then applied. All tapes are wound in the same direction, the outer tape overlapping the line of separation between the spirals of the inner tape, thus giving flexibility, while preventing any opening in the armor when the cable is bent, which might possibly allow an injury to the lead sheath and insulation below. This also applies to our Armorlokt tape, which is interlocked. Galvanized tapes can be furnished if required.

These cables may be furnished with non-magnetic metal armor instead of steel to meet the demand for armored cables in which faults can be easily located, and requiring a minimum of excavation in order to make repairs.

An asphalt saturated jute covering is placed outside of the steel tape armor to protect it from corrosive action of moisture or any chemicals which may be in the soil, and from electrolysis.

Leadless Laid Parkway Cables

(Triple L)—For locations where it is desirable to install buried cables of the leadless type, we offer our Leadless Laid Cables, either with or without metallic tape protection. For such cables, Amerite rubber compound is recommended for the conductor insulation with a rubber filled tape over the rubber compound.

In the single conductor type, a layer of non-hydroscopic acid and alkali resisting compound is next applied, followed by the outer protection of felt base fibrous tapes and jute yarn, heavily saturated with asphaltum compound and well compressed. This is of the non-metallic sheathed cable type.

For multiple conductor cables, the insulated and taped conductors are laid up with fillers well saturated with non-hydroscopic acid and alkali resisting compound, followed by outer protection as outlined for the single conductor cable.

If desired, one or more metal tapes may be included in the outer protection, thus offering a better mechanical protection as well as electrical shielding. This metal protection is especially desirable in the case of high voltage cables from the standpoint of safety.

Uses—

Street lighting
Railroad yard lighting
Park and ground lighting
In coal mines
Industrial plants
Railway signal service

Submarine service under lakes and rivers where tensile strength is not looked for. And many others.

Bare Wires and Cables—Copper, Iron and Steel

Copper wire for all purposes in any required shape or size; for telephone and telegraph, high voltage long distance transmission, and industrial purposes in general. Copper cables of all capacities and degrees of flexibility, hard drawn or annealed, bare or insulated.

HARD DRAWN COPPER TELEGRAPH AND TELEPHONE WIRE

Size, B. & S. gauge	Diameter, in.	Weight per mile in lb.	Size, B. & S. gauge	Diameter, in.	Weight per mile in lb.
8	.1285	264	12	.0808	104
9	.1144	209	14	.0641	66
10	.1019	166			

PROPERTIES OF HARD DRAWN COPPER WIRE
(Adopted by the A. S. T. M.)

Size, B. & S. ga.	Diameter, in.	Area, cir. mils	Tensile strength, lb. per sq. in.	Per cent elongation in 10 in.	Size, B. & S. ga.	Diameter, in.	Area, cir. mils	Tensile strength, lb. per sq. in.	Per cent elongation in 10 in.
0000	0.460	211,600	49,000	3.75	8	0.128	16,380	63,400	1.4
000	0.410	168,100	51,000	3.20	9	0.114	12,996	64,200	1.3
00	0.365	133,200	52,800	2.70	10	0.102	10,404	64,800	1.2
0	0.325	105,600	54,500	2.4	11	0.091	8,281	65,400	1.1
1	0.289	83,520	56,000	2.1	12	0.081	6,561	65,700	1.0
2	0.258	66,560	57,500	2.0	13	0.072	5,184	66,000	0.9
3	0.229	52,440	58,500	1.9	14	0.064	4,096	66,200	0.9
4	0.204	41,620	59,500	1.8	15	0.057	3,249	66,400	0.8
5	0.182	33,120	60,500	1.7	16	0.051	2,601	66,600	0.8
6	0.162	26,240	61,500	1.6	17	0.045	2,025	66,800	0.7
7	0.144	20,740	62,500	1.5	18	0.040	1,600	67,000	0.7

Perfected Telephone and Telegraph Wire

There are three standards of extra galvanized telephone and telegraph wire in general commercial use. The arbitrary designation of these different qualities, as E. B. B., B. B. and Steel, was adopted years ago. The three grades are all made from the very best materials by improved processes under the careful supervision of skilled and experienced men.

While these three grades differ in physical characteristics, there is no difference in the standard as regards galvanizing. All grades are galvanized to the highest commercial standard by our "Perfected" process.

Every bundle of wire before shipment is tested physically and electrically to insure a uniform product of high standard. The galvanizing is tested to determine if the zinc coating is continuous, tight and elastic; also of sufficient thickness. The latter test is a chemical, not merely a visual one. The life of a galvanized wire depends primarily upon the thickness and quality of galvanizing.

"Extra Best Best" (E. B. B.)—Stands highest in conductivity of any telegraph wire with a weight per mile ohm of from 4700 to 5000 lb. Uniform in quality, pure, tough and pliable. It is largely used by telegraph companies and in railway telegraph service; also for tie wires and signal bonding.

"Best Best" (B. B.)—Superior to the E. B. B. in tensile strength and equal in galvanizing, but of lower electrical value. Weight per mile ohm, 5600 to 6000 lb. This grade is used very largely by telephone companies.

"Steel"—More expressly designed for short-line telephone service, where a measure of conductivity can be exchanged for high tensile strength. Weight per mile ohm, 6500 to 7000 lb.

RESISTANCE AND WEIGHTS OF TELEGRAPH AND TELEPHONE WIRES

Size, B.W.G. gauge	Diam., in.	Weight per 1000 ft., lb.	Weight per mile, lb.	Bundles per mile	Approximate breaking strain, lb.			Average resistance per mile at 68° F. (International ohms)		
					E. B. B.	B. B.	Steel	E. B. B.	B. B.	Steel
4	.238	153	811	1/4	2,028	2,271	2,433	5.98	7.15	8.32
6	.203	112	590	1/3	1,475	1,652	1,770	8.22	9.83	11.44
8	.165	74	390	1/2	975	1,092	1,170	12.43	14.87	17.31
9	.148	60	314	1/2	785	897	942	15.44	18.47	21.50
10	.134	49	258	1/2	645	722	774	18.79	22.48	26.16
11	.120	39	206	1/2	515	577	618	23.54	28.16	32.77
12	.109	32	170	1/2	425	476	510	28.52	34.12	39.71
14	.083	19	99	1/2	247	277	297	48.98	58.59	68.18

Perfected Steel Strand

Used for guying smokestacks, telephone, telegraph and overhead transmission line poles; for supporting telephone, signal and transmission cables in overhead work and trolley wire in catenary construction; also as a ground wire in protecting transmission lines from lightning.

Perfected Steel Strand

Seven steel wires twisted into a single strand
Galvanized or extra galvanized

Diam., in.	Size of wire in.	Approx. wt. per 1000 ft. lb.	Approx. strength, lb.	Diam., in.	Size of wire in.	Approx. wt. per 1000 ft. lb.	Approx. strength, lb.
3/4	.250	1,200	16,700	7/32	.072	98.3	1,540
5/8	.207	813	11,600	3/16	.062	72.9	1,150
9/16	.188	671	9,600	5/32	.052	51.3	870
1/2	.165	517	7,400	9/64	.047	40	700
7/16	.145	399	5,700	1/8	.041	31.8	540
3/8	.125	273	4,250	7/64	.035	25	450
5/16	.104	205	3,200	3/32	.031	20	400
9/32	.093	164	2,570	5/64	.026	13	300
1/4	.080	121	1,900				

PERFECTED STEEL STRAND

Siemens-Martin Extra Galvanized		High Strength Extra Galvanized		Extra High Strength Extra Galvanized	
Diam., in.	Tensile strength, lb.	Diam., in.	Tensile strength, lb.	Diam., in.	Tensile strength, lb.
5/8	19,100	5/8	29,600	5/8	42,400
9/16	15,700	9/16	24,500	9/16	35,000
1/2	12,100	1/2	18,800	1/2	26,900
7/16	9,350	7/16	14,500	7/16	20,800
3/8	6,950	3/8	10,800	3/8	15,400
5/16	5,350	5/16	8,000	5/16	11,200
9/32	4,250	9/32	6,400	9/32	8,950
1/4	3,150	1/4	4,750	1/4	6,650
3/16	1,900	3/16	2,850	3/16	3,990
1/8	910	1/8	1,330	1/8	1,830

CRESCENT INSULATED WIRE & CABLE CO.

ESTABLISHED 1889

CRESCENT ARMORED WIRE CO., SUBSIDIARY

Manufacturers of Electrical Wires and Cables

MAIN OFFICE AND FACTORIES

TRENTON, N. J.

SALES REPRESENTATIVES

ATLANTA, GA., E. B. Glenn, 201 Red Rock Building
BALTIMORE, MD., H. E. Parsons Co., 35 So. Frederick Street
BOSTON, MASS., G. M. Hathaway & Co., 519 Atlantic Avenue
CHICAGO, ILL., Crescent Electric Sales Corporation, 622 W. Adams Street
CLEVELAND, OHIO, Henger-Fairfield Co., 1808 Columbus Road
DALLAS, TEX., Royal Smith, 912 Commerce Street
DETROIT, MICH., Hemphill & Co., 517 E. Woodbridge Street
INDIANAPOLIS, IND., A. I. Clifford, 31 E. Georgia Street
LOS ANGELES, CAL., Henger-Seltzer Co., 711 E. 14th Street
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NEW YORK, N. Y., Kearton & Nagle, 550-52 W. 36th Street
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PITTSBURGH, PA., General Sales Co., 424 Fourth Avenue
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SEATTLE, WASH., Albert S. Knight Co., 3006 Western Avenue
TUCSON, ARIZ., Joseph H. Canfield

Products

"Crescent" National Electrical Code Rubber Covered Wire and Cable.

Intermediate Grade Rubber Covered Wire and Cable.

"Imperial" 30% Para Rubber Covered Wire and Cable.

"Crescent" Lead Encased Wire and Cable.

"Crescent" Varnished Cambric Cable.

"Crescent" A.B.C. Armored Bushed Cable.

"Crescent" Lead Covered Armored Cable.

"Crescent" Flexible Metallic Conduit.

Also "Cresflex" Non-metallic Sheathed Cable; Lamp, Heater, Brewery, Canvasite, Packinghouse and Rubber Sheathed Portable Cords; Elevator Lighting, Control and Annunciator Cables; Borderlight and Stage Cables; Dampproof Office and Annunciator Wires and Cables; Special Flexible Cords, Cordage and Cables for Telephone Instruments and Radio; Magnet Wires—cotton and silk covered; Organ Wire and Cable.

Service

The completeness of the Crescent line assures you of one reliable source of supply for wire and cable ranging from light fixture wire up to 2,000,000 C.M. cable and a complete range of styles of insulation for almost every electrical purpose.

In making wire and cable for over forty years, we have gained wide and invaluable experience and have enlarged our plant at various times to take care of increasing demands for high quality wire products. Every manufacturing operation from drawing copper rod, on down to adding the final finish is completed in our own plant. To insure its high quality, a rigid inspection is made after every operation ending with the final inspection of the finished product.

The co-operation of our Engineering Staff is freely offered on all special wiring problems.

To facilitate deliveries, complete stocks are carried at our plant in Trenton, N. J. and in the various cities where our sales representatives are located.

"Crescent" National Electrical Code Rubber Covered Wire and Cable

This is a high grade wire suitable for all installations of knob-and-tube or conduit work where the working voltage does not exceed 7000.

Intermediate Grade Rubber Covered Wire and Cable

This is a better grade of insulation than National Electrical Code Wire for those architects, engineers and contractors who wish added mechanical and electrical safety and durability. All of the sizes of wires and cables in the table can be furnished in this grade or any other special grade of insulation.

"Imperial" 30% Para Rubber Covered Wire and Cable

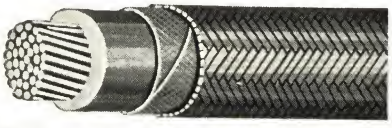
This is the best commercial grade of rubber covered wire for installations demanding maximum mechanical and electrical protection and longest life. The insulation is composed of not less than 30% (by weight) of new Hevea rubber, so compounded that it possesses the most desirable combination of strength, elasticity, slow aging and high electrical insulating properties. It is recommended for all high voltage circuits and where the additional safety warrants the greater first cost.

"Crescent" Lead Encased Wire and Cable

This wire being protected by a seamless sheath of commercially pure soft lead is not affected by extreme moisture or by corrosive fumes usually encountered in wiring industrial buildings. A well made lead encased cable, not abused, will last indefinitely and gives the most permanent kind of wiring where conditions warrant the additional cost. We are equipped to furnish all of the standard rubber covered wires and cables previously noted, as well as special cables, with a lead sheath.

No. 14 B&S Solid, Single Braid

No. 14 B&S Solid, Double Braid



500,000 C. M. Cable, Stranded, Tape and Braid

No. 14 B&S Solid, Duplex, Lead Encased

Lead Encased Cable

UNDERWRITERS' CODE REQUIREMENTS FOR WIRES IN CONDUIT—"CRESCENT" N. E. C. WIRE
(600 VOLTS WORKING PRESSURE)

Wire size B&S gauge	Conductor			Insulation thickness, 64ths in.	Approx. over-all diameter, in.	Resistance per 1000 ft. in ohms	Allowable current capacity, amperes	Conduit sizes — Number of conductors			
	Area in circular mils	Style	Diameter, in mils					1	2	3	4
Single Braid											
18	1624	Solid	40.3	1	.105	6.259	3	½	½	½	½
18	1624	Solid	40.3	2	.135	6.259	3	½	½	½	½
16	2582	Solid	50.8	1	.115	3.936	6	½	½	½	½
16	2582	Solid	50.8	2	.145	3.936	6	½	½	½	½
14	4106	Solid	64.0	3	.19	2.475	15	½	½	½	½
14	4106	Strand	7x 24 2	3	.22	2.5245	15	½	½	½	¾
12	6530	Solid	80.8	3	.21	1.557	20	½	½	¾	¾
12	6530	Strand	7x 30.5	3	.23	1.5882	20	½	½	¾	¾
10	10382	Solid	101.9	3	.24	.9792	25	½	¾	¾	¾
10	10382	Strand	7x 38.5	3	.26	.9988	25	½	¾	¾	¾
8	16509	Solid	128.5	3	.27	.6158	35	½	¾	¾	1
8	16509	Strand	7x 48.6	3	.29	.6282	35	½	¾	¾	1
Double Braid											
6	26251	Solid	162.0	4	.36	.3872	50	½	1	1¼	1¼
6	26251	Strand	7x 61.2	4	.38	.3949	50	½	1	1¼	1¼
4	41742	Solid	204.3	4	.40	.2436	70	¾	1¼	1¼	1½
4	41742	Strand	7x 77.2	4	.43	.2485	70	¾	1¼	1¼	1½
3	52633	Strand	7x 86.7	4	.46	.1970	80	¾	1¼	1¼	1½
2	66373	Strand	7x 97.4	4	.49	.1563	90	¾	1¼	1½	1½
1	83694	Strand	19x 66.4	5	.57	.1239	100	¾	1½	2	2
Tape and Braid											
1 0	105592	Strand	19x 74.6	5	.61	.09826	125	1	1½	2	2
2 0	133079	Strand	19x 83.7	5	.65	.07792	150	1	2	2	2½
3 0	167806	Strand	19x 94.0	5	.71	.06179	175	1	2	2	2½
4 0	211600	Strand	19x105.5	5	.77	.04900	225	1¼	2	2½	2½
	250000	Strand	37x 82.1	6	.86	.04147	237	1¼	2½	2½	3
	300000	Strand	37x 90.0	6	.91	.03457	275	1¼	2½	3	3
	350000	Strand	37x 97.2	6	.96	.02963	300	1¼	2½	3	3½
	400000	Strand	37x103.9	6	1.0	.02592	325	1¼	3	3	3½
	450000	Strand	37x110.3	6	1.05	.02305	362	1½	3	3	3½
	500000	Strand	37x116.2	6	1.1	.02074	400	1½	3	3	3½
	600000	Strand	37x127.3	7	1.19	.01729	450	2	3	3½	4
	700000	Strand	61x107.1	7	1.27	.01481	500	2	3½	3½	4½
	750000	Strand	61x110.9	7	1.31	.01382	525	2	3½	3½	4½
	800000	Strand	61x114.5	7	1.34	.01296	550	2	3½	4	4½
	900000	Strand	61x121.5	7	1.41	.01153	600	2	3½	4	4½
	1000000	Strand	61x128.0	7	1.51	.01036	650	2	4	4	5
	1250000	Strand	91x117.2	8	1.59	.00829	750	2½	4½	4½	6
	1500000	Strand	91x128.4	8	1.76	.00692	850	2½	4½	5	6
	2000000	Strand	91x148.2	8	1.96	.00518	1050	3	5	6	6

"Crescent" A. B. C. Armored Bushed Cable

A perfected product that has met the unqualified approval of electrical contractors and inspectors all over the country.

The twisted conductors are covered with heavy kraft paper armor thoroughly impregnated with a moistureproof compound; then covered with flexible steel armor.

The red fibre anti-short bushings, which are furnished with the cable for insertion at each termination of the armor, fulfill a long felt need for a definite and safe means for protecting the conductors from the sharp, cut edge of the steel armor.

A. B. C. Cable and the anti-short bushings, which insure maximum protection against grounds and shorts represent the last word in a good, safe, sound, and low cost wiring system.

Armored Bushed Cable
U. S. Patent No. 1687013
(Licensee)

"Crescent" Lead Covered Armored Cable

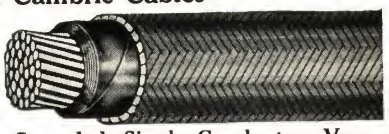
In addition to the steel armor, this type of wire has a seamless lead sheath under the armor.

It is used for installations where much moisture will be encountered.

Two-conductor, Lead Encased, Armored Wire

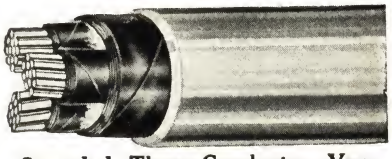
"Crescent" Varnished Cambric Cables

Insulation of varnished cambric provides maximum dielectric properties. The cambric is saturated with special non-hardening insulating varnish, which provides high dielectric strength and permanent flexibility. Varnished cambric cable will withstand a greater degree of heat than rubber covered cable, and may be covered with either lead sheath for use under moist conditions, or cotton braid for use in dry places, braid being saturated in weatherproof compounds or slow burning compounds as desired.



Stranded, Single Conductor, Varnished Cambric, Weatherproof Braid

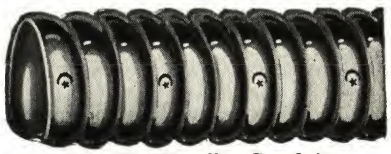
Stranded, Single Conductor, Varnished Cambric and Lead



Stranded, Three Conductor, Varnished Cambric and Lead

"Crescent" Flexible Metallic Conduit

This is made from the same high grade electro-galvanized steel strip as our armored cable, in standard sizes from $\frac{5}{16}$ to 3 in. It is chiefly used for armoring motor leads and for entering switch panels from knob-and-tube systems.



Flexible Metallic Conduit

GENERAL ELECTRIC COMPANY

Manufacturers of Wiring Materials

MERCHANDISE DEPARTMENT

BRIDGEPORT, CONN.

GENERAL ELECTRIC MERCHANDISE DISTRIBUTORS

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BIRMINGHAM, Matthews Electric Supply Co.
MOBILE, Matthews Electric Supply Co.

Arizona
PHOENIX, General Electric Supply Corp.

Arkansas
LITTLE ROCK, General Electric Supply Corp.

California
LONG BEACH, General Electric Supply Corp.
LOS ANGELES, General Electric Supply Corp.
OAKLAND, General Electric Supply Corp.
SACRAMENTO, General Electric Supply Corp.
SAN DIEGO, General Electric Supply Corp.
SAN FRANCISCO, General Electric Supply Corp.

Colorado
DENVER, Hendrie & Bolthoff Manufacturing & Supply Co.
DENVER, General Electric Supply Corp.

Connecticut
BRIDGEPORT, Southern New England Elec. Co.
HARTFORD, Southern New England Elec. Co.
NEW HAVEN, Southern New England Elec. Co.
WATERBURY, Southern New England Elec. Co.

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WASHINGTON, National Electrical Supply Co.

Florida
JACKSONVILLE, General Electric Supply Corp.
MIAMI, General Electric Supply Corp.
TAMPA, General Electric Supply Corp.

Georgia
ATLANTA, General Electric Supply Corp.
SAVANNAH, General Electric Supply Corp.

Illinois
AURORA, Aurora Electric Supply Co.
CHICAGO, General Electric Supply Corp.
CHICAGO, Commonwealth Edison Co.
CHICAGO, Metropolitan Electrical Supply Co.
QUINCY, Crescent Electric Supply Co.
ROCKFORD, Swords Electric Company
SPRINGFIELD, General Electric Supply Corp.

Indiana
EVANSVILLE, General Electric Supply Corp.
FORT WAYNE, Protective Electrical Supply Co.
INDIANAPOLIS, General Electric Supply Corp.
SOUTH BEND, South Bend Electric Company

Iowa
BURLINGTON, Crescent Electric Supply Company
DAVENPORT, Crescent Electric Supply Company
DES MOINES, General Electric Supply Corp.
DUBUQUE, Crescent Electric Supply Company
SIOUX CITY, General Electric Supply Corp.

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SALINA, General Electric Supply Corp.
WICHITA, Sutton Electric Supply Company

Kentucky
LOUISVILLE, General Electric Supply Corp.

Louisiana
NEW ORLEANS, General Electric Supply Corp.
SHREVEPORT, General Electric Supply Corp.

Maine
BANGOR, General Electric Supply Corp.
PORTLAND, General Electric Supply Corp.

Maryland
BALTIMORE, General Electric Supply Corp.

Massachusetts
BOSTON, General Electric Supply Corp.
NEW BEDFORD, General Electric Supply Corp.
PITTSFIELD, General Electric Supply Corp.
SPRINGFIELD, General Electric Supply Corp.

Michigan
DETROIT, Frank C. Teal Company
DETROIT, General Electric Supply Corp.
GRAND RAPIDS, C. J. Litscher Electric Company
KALAMAZOO, C. J. Litscher Electric Company

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DULUTH, General Electric Supply Corp.
MINNEAPOLIS, General Electric Supply Corp.
ST. PAUL, General Electric Supply Corp.

Mississippi
JACKSON, General Electric Supply Corp.

Missouri
JOPLIN, General Electric Supply Corp.
KANSAS CITY, General Electric Supply Corp.
ST. JOSEPH, General Electric Supply Corp.
ST. LOUIS, General Electric Supply Corp.

Montana
BUTTE, General Electric Supply Corp.

Nebraska
OMAHA, General Electric Supply Corp.

New Jersey
ATLANTIC CITY, General Electric Supply Corp.
JERSEY CITY, General Electric Supply Corp.
NEWARK, General Electric Supply Corp.
PATERSON, General Electric Supply Corp.

New York
ALBANY, Havens Electric Company
BINGHAMTON, Southern Tier Electrical Supply Co.
BUFFALO, General Electric Supply Corp.
NEW ROCHELLE, Royal Eastern Electrical Supply Co.
NEW YORK, General Electric Supply Corp.
(Also Borough of Brooklyn and the Bronx)
NEW YORK, E. B. Latham & Company
NEW YORK, Royal Eastern Electrical Supply Co.
(Also Borough of Brooklyn and Long Island City)
NIAGARA FALLS, General Electric Supply Corp.
ROCHESTER, General Electric Supply Corp.
SYRACUSE, Syracuse Supply Company
UTICA, Langdon & Hughes Electric Co.

North Carolina
CHARLOTTE, General Electric Supply Corp.
RALEIGH, General Electric Supply Corp.

Ohio
AKRON, General Electric Supply Corp.
CINCINNATI, General Electric Supply Corp.
CLEVELAND, General Electric Supply Corp.
COLUMBUS, General Electric Supply Corp.
DAYTON, General Electric Supply Corp.
DAYTON, Wm. Hall Electric Company
TOLEDO, General Electric Supply Corp.

Oklahoma
OKLAHOMA CITY, General Electric Supply Corp.
TULSA, General Electric Supply Corp.

Oregon
PORTLAND, General Electric Supply Corp.

Pennsylvania
ERIE, General Electric Supply Corp.
PHILADELPHIA, General Electric Supply Corp.
PITTSBURGH, General Electric Supply Corp.
SCRANTON, General Electric Supply Corp.

Rhode Island
PROVIDENCE, General Electric Supply Corp.

South Carolina
COLUMBIA, Perry-Mann Electric Co.

Tennessee
CHATTANOOGA, General Electric Supply Corp.
KNOXVILLE, General Electric Supply Corp.
MEMPHIS, General Electric Supply Corp.
NASHVILLE, General Electric Supply Corp.

Texas
ABILENE, General Electric Supply Corp.
AMARILLO, General Electric Supply Corp.
DALLAS, General Electric Supply Corp.
EL PASO, General Electric Supply Corp.
HOUSTON, General Electric Supply Corp.
SAN ANTONIO, General Electric Supply Corp.

Utah
SALT LAKE CITY, General Electric Supply Corp.

Virginia
NORFOLK, General Electric Supply Corp.
RICHMOND, General Electric Supply Corp.

Washington
SEATTLE, General Electric Supply Corp.
SPOKANE, General Electric Supply Corp.
TACOMA, Home Electric Company

West Virginia
CHARLESTON, Virginian Electric Inc.
WHEELING, Gee Electric Company

Wisconsin
APPLETON, G-Q Electric Company
LACROSSE, General Electric Supply Corp.
MADISON, Crescent Electric Supply Co.
MILWAUKEE, G-Q Electric Company

For General Office, Sales Offices, Service Shops, and Associated Companies, see our pages on Motors

Products

G-E Wiring System, G-E Wiring Devices, Code Wires, Conduit and Fittings, Fiberduct.

For G-E Electric Refrigerators, Floodlighting, Generators, Converters, Motors, Controllers, Switchboards, etc., see Manufacturers' Index.

G-E WIRING SYSTEM

GENERAL ELECTRIC WIRING SYSTEM

The General Electric Wiring System is a system of wiring, embodying adequate outlets conveniently controlled, and using General Electric materials throughout.

G-E Wiring System recommendations for adequate wiring in residences and in the living quarters of apartment houses and apartment hotels are as follows:

Provide Individual Panelboards—For each apartment or suite. Locate at an accessible point in the service quarters. This recommendation is made so that the occupant may promptly and conveniently re-establish service after an overload.

Provide One Spare Circuit—In the cutout cabinet for every five circuits or less in use. This is for future extensions which cannot be anticipated.

Provide a Lighting Outlet—For each 50 square feet of floor space in rooms having an area of less than 250 square feet. In rooms having an area of 250 square feet or more provide one lighting outlet for every 60 square feet of floor space. These should be divided between ceiling lights and wall lights to provide both general illumination and decorative lighting according to the character of the room. The purpose of this recommendation is to provide for even illumination free from glare. Closets should be included in determining areas and allotting light outlets.

Provide a Twin Convenience Outlet—For every 50 square feet of floor space. The purpose of this recommendation is to provide for the convenient use of portable lamps and appliances regardless of the furniture arrangement; and to provide for present and future developments in such devices as electrically operated phonographs, household motion-picture projection machines, radio sets, etc.

Combination Switch, Pilot Lamp and Convenience Outlet Units—Should be provided in kitchens, laundries, breakfast nooks and other service rooms for the connection and control of heating appliances. The purpose of this recommendation is to provide for a convenient means of controlling heating devices such as flat irons, ironing machines, toasters, etc., without necessitating the constant removal and replacement of the connecting plugs.

Switch Control Should Be Accessible at Every Doorway—Passage through any room and any doorway should be as convenient at night as it is during the day. The inconvenience of groping in the dark for inconveniently located switches is a common experience resulting from the omission of a sufficient number of points of control.

Fan Outlets—Should be provided in the principal living rooms. Finding a suitable place for the electric fan is always a seasonal problem in homes and more particularly in apartments. The purpose of this recommendation is to help in the solution of this problem by providing a place for the suspension of the electric fan which is both safe and convenient; and a place which can be located so as to provide the best circulation of air without regard for the location of furniture and furnishings.

Electrical Specifications for G-E Wiring System

The electrical contractor shall furnish and install the G-E Wiring System complete from the lighting company's service to all outlets; locating all outlets as indicated on the drawings.

The electrical contractor shall do all necessary cutting, trenching and filling (the words "trenching and filling" should be omitted where work of this character is not required) for the installation of his work.

The electrical contractor shall leave his work ready for the lighting company to connect to, doing all work required by their rules.

The work shall conform to the rules of the "National Electrical Code" and the local regulations governing electrical installations.

All necessary certificates shall be obtained by the electrical contractor at his expense and delivered to the architect before work is accepted.

The electrical contractor shall guarantee to make good any defects in his work which shall develop within one year of date of acceptance.

The electrical contractor shall furnish and install a complete bell system, locating bells and buzzers as indicated on the drawings. The bell system shall be operated by a bell-ringing transformer feeding from a separate circuit on the lighting distribution panel. All bells, buzzers, and push buttons shall be of high grade as approved.

The electrical contractor shall furnish and install single outlet telephone plates mounted on switch boxes at telephone outlets indicated on the drawings and run conduit to cellar from each outlet. This work shall be done in a manner acceptable to the telephone company.

Outlets shall be located as follows:

Wall light outlets: 5 ft. 6 in. above finished floor to center of outlet.

Wall switches: 4 ft. above finished floor to center of outlet.

Convenience outlets in kitchen, laundry, basement and garage, and in combinations: 4 ft. above finished floor to center of outlet.

Convenience outlets in all other locations: in baseboard, mounted horizontally.

Telephone outlets: in baseboard, mounted horizontally.

Elexit fan outlets: 6 ft. 6 in. from floor to center of outlet.

All flush plates shall be finished as directed by the architect.

Bids shall be submitted in duplicate on G-E Wiring System proposal forms.

Exceptions and Additions—*Note:* Supplementary paragraphs to cover local conditions and special applications can be introduced into these specifications under this caption.

WIRES AND CABLES

G-E Code Wire—600 Volts

Code Wires and Cables Braided—Furnished in sizes 14 to 2,000,000 cm. with thickness of insulation, depending upon size conductor, from 3/64 to 5/64 in. in three standard grades, Code, Intermediate and 30%, and special grades on order.

Code Wires and Cables Leaded—Furnished in same sizes and thicknesses of insulation as braided and same grades of insulation except lead instead of braid.

Parallel Lamp Cord—Type PO—For use as pendant cord or portable on small devices in dry places. Consists of two flexible stranded copper conductors, each wound with cotton, rubber insulated and braided; conductors are then laid parallel, and a braid of cotton or rayon is applied over all.

Twisted Lamp Cord—(Type C)—For use as pendant cord in dry places. Two extra flexible stranded copper conductors, each wound with cotton, rubber insulated and braided, and then twisted together.

Reinforced Portable Cord—Type P (Glazed Cotton or Rayon); Type P-WP (Cotton Weatherproofed)—Consists of pair of stranded copper conductors, each covered with a winding of fine cotton, rubber insulation, and cotton braid, both twisted together. A reinforcement of rubber is placed over the twisted pair, and a cotton, rayon or weatherproof braid over all.

Sizes, 10 to 18 B&S gauge. Sizes smaller than No. 18—not approved by Underwriters.

Cotton and rayon finish, for use as pendant cord, or portable for hard usage in dry places; weatherproof finish for use in damp places. Size No. 18 with 1/64 in. insulation is approved for use on portable lamps only.

Special, Portable Cord—Type PD—For use in places where not liable to rough usage. Consists of two flexible stranded copper conductors, each wrapped with cotton, rubber insulated and cotton braided; conductors are then twisted together and a glazed cotton or silk braid is applied over all.

Sizes, 10 to 18 B&S gauge.

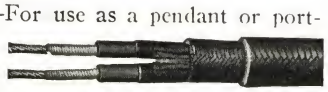
G-E Flex Portable Cord, All-Rubber Reinforced—Type S—Regular cord strand is used. Each conductor is insulated with 30% rubber and over this is applied a heavy jacket using high percentage of pure rubber. This material is particularly recommended for hard service in dry or damp places, and is suitable for use in garages and industrial service in general.

Type SJ—Same construction as Type S except that it has a lighter over-all rubber jacket and is suitable for service less severe than Type S.

Type SJ-Jr—Same construction as Type SJ except that the over-all rubber jacket is lighter. This cord is suitable for use on floor lamps, adding machines, calculators and dictating machines.

G-E Flex Special—A low priced all-rubber cord of the steam-cured type. Similar to SJ in construction. Suitable for use on cleaners, washing machines, floor polishers and similar devices where the service is not severe.

Portable Cord—Type K—For use as a pendant or portable cord in damp places. Two stranded copper conductors each covered with a winding of cotton, rubber insulation and a weatherproofed cotton braid; conductors are then twisted together with jute fillers, finished with two weatherproofed braids over all.



Deck Cable—For use in very damp places and where subject to very rough usage. Consists of two stranded copper conductors, each covered with a winding of cotton, rubber insulation and a cotton braid; conductors are then twisted, and filled with jute. A jacket of 1/32 in. rubber compound is applied over all, and finished with a single weatherproofed cotton braid. Sizes, 10 to 18 B&S gauge.

Deltabeston Wire and Cord—Asbestos Insulated

Deltabeston wires and cords are suitable for service where wires are subjected to very high temperatures.

Deltabeston insulation consists of pure asbestos fiber applied in the fibrous state, resulting in a thoroughly felted wall completely surrounding the conductor without the openings found where braided yarn is used. It is impregnated and completely filled with a special non-inflammable compound which increases the dielectric strength and makes the insulation cling tenaciously to the conductor. This insulation is fireproof—it will resist temperatures as high as the fusing temperature of the copper conductor, and further, it is so tough that it will not crack when the wire is sharply bent. Its use is an assurance against burnouts and other troubles.

All Deltabeston wires are approved by the Underwriters' Laboratories, Inc.

Deltabeston Stove Wire—Recommended for wiring electric stoves and ranges in and around ovens, boiler rooms and similar places where excessive moisture is not present.

Standard color of finish is white, but black can be supplied, if desired, at same price. Made in sizes 18 to 6 B&S gauge.

Deltabeston Heater Cord—Used in connecting electric stoves, heaters, irons and other heating appliances where the cords are likely to be exposed to high temperatures.

Made in the following types: Style A, with asbestos braid over all; Style C, with glazed cotton braid over all; Style D, with glazed cotton braid on each conductor; Style E, with glazed cotton braid on each conductor and glazed cotton braid over all. Any of these types can be furnished with braided instead of standard wire, at additional cost. Made in sizes No. 18 to 12 B&S gauge.

Deltabeston Switchboard Wire—Furnished all-asbestos insulated, sizes 18 to 4/0 B&S gauge for pressures up to 600 volts; varnished cambric and asbestos insulated with flameproof cotton braid in sizes 14 to 6 B&S gauge for pressures up to 750 volts; and varnished cambric and asbestos insulated with asbestos braid in sizes 18 to 4/0 B&S gauge for pressures up to 1500 volts.

Approved by the Underwriters' Laboratories, Inc.

Deltabeston Fixture Wire (Plain)—Recommended for all classes of fixture wiring; especially suitable for fixtures in which temperatures liable to be attained by some parts are such as to render the use of rubber covered wires or cords either undesirable or impracticable. Smooth and flexible—may be fished through fixtures with utmost ease. Standard color of finish is black. Gray, cream, old brass, or bronze finishes cost extra. Sizes, 18 to 10 B&S gauge.

Deltabeston Cotton or Art Silk Covered Fixture Wire—Same as plain, black finish fixture wire described above with an additional outer covering of art silk or cotton. Especially suited for fixtures on which wiring is exposed to view. Small diameter; neat and attractive in appearance. Furnished in single, two and three conductors in the various styles. Sizes, 18 to 12 B&S gauge.

Deltabeston Motion Picture Machine Cable—Widely used for wiring of searchlights, railway controllers, cranes, motion picture projectors and other devices in which wires are subjected to high temperatures. Flexible and extra flexible types.

CONDUIT AND FITTINGS

Rigid Conduit

G-E White (Greenfielduct)—A flexible alloy steel, hot dipped galvanized conduit coated with glyptal lacquer. Thoroughly protected inside and outside against rust. Supplied in straight lengths and elbows cut and threaded, and with couplings accurately drilled and tapped.

G-E Black (Spragueduct)—Made from exactly the same high-grade steel, pickeled, cleaned, straightened and threaded same as Greenfielduct except that it is protected by a coating of corrosion-resistant black enamel instead of zinc.

Flexible Conduit

Galvanized Flexible Steel Conduit—Single-strip and double-strip types; extremely flexible; smooth interior surface for pulling conductors. There is practically no waste when this conduit is used, as all short pieces can be clamped together by couplings.

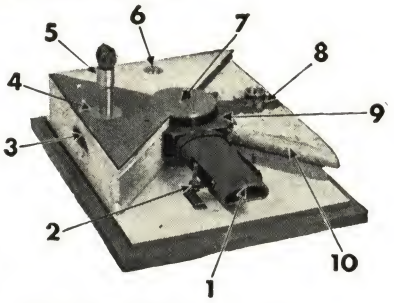
This conduit is manufactured in sizes $\frac{5}{16}$ to 3 in.

Single Strip Conduit

Fiberduct

A non-corrodible raceway for underfloor wiring designed to allow flexibility of wiring for the life of the building.

It is flexible in that it allows the establishment of outlets when and where they are desired. Consists of the duct, junction boxes, couplings, supports and outlets for single or double duct installations.



(1) G-E Fiberduct.
(2) Coupling-support with leveling screws.
(3) Oval crown 1 in. below surface molds strong concrete arch.
(4) Brass floor flange flush with linoleum.
(5) Lighting outlet, brass standpipe, bakelite head.
(6) Brass insert; grouted—cannot pull out.
(7) Adjustable-height cover recessed for linoleum.
(8) Brass insert threads into duct.
(9) Heavy, one-piece iron junction box with leveling screws.
(10) Conduit for feeder lines.

"BX" Flexible Steel Armored Conductors

G-E "BX" is manufactured in a variety of sizes, No. 14 and larger, 2 and 3-conductor. Each coil is furnished with a quantity of "Anti-Short" bushings which furnish additional protection at the point where the armor is cut.

We also manufacture and carry in stock Type "BXL" for use in damp places. In the construction of "BXL" a continuous lead sheath is applied under the steel armor.

BraidX Non-metallic Sheathed Cable

BraidX is G-E code wire (2 or 3-wire and sizes No. 14 to 6) compactly enclosed in a fire-resisting, waterproof, non-metallic sheath of high insulating quality. BraidX should be installed in continuous runs from outlet to outlet, with no taps except at outlets. In no case is an insulating support required for BraidX.

Two-wire Conductor for BraidX

Electrical Metallic Tubing

A thin wall rigid raceway manufactured from open hearth steel.

Protected externally by electro-galvanizing, internally by black enamel. Furnished in 10-ft. lengths in sizes $\frac{3}{8}$ in. to 2 in. inclusive. The tubing is not threaded but is joined together by threaded, friction grip, vapor proof couplings.

Oval Tubing

A thin wall rigid raceway for making under-plaster extensions in walls and ceilings. It is $\frac{1}{32}$ in. by $\frac{3}{32}$ in. by 10 ft.

Electro-galvanized outside, black enameled inside.

A complete line of boxes and fittings is available.

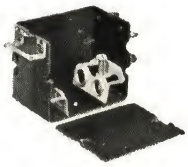
Oval BX

Similar in shape to oval tubing; similar in construction to standard BX. May be used for under-plaster extensions or for surface work. Flexible and compact, it makes a neat appearing installation for new work or for alterations. Suitable boxes and fittings are available.

Boxes and Fittings for Conduit, BX and BraidX

For use with the above we manufacture a complete line of boxes, covers and fittings including locknuts and bushings, connectors, ground clamps, fixture studs, entrance fittings, etc. Illustrations of a number of these items are shown below. Complete listing and illustrations will be found in Merchandise Department Catalogue.

SP52151
4-in. Square Outlet Box



SP6972-P
For "BX"

SP8400
Adjustable Floor Box

Bar Hanger

SP1493
Entrance Ell

SP675
Ericksen Coupling

SP1275
Pipe Strap

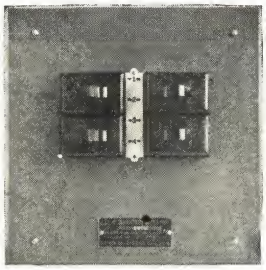
SP1525
Entrance Cap

PANELBOARDS, FUSES, SWITCHES AND FLUSH PLATES

Circuit Breaker Panelboards

For residential purposes only. Catalogue No. GE2806—4 circuit; Catalogue No. GE287—6 circuit. Each unit rated 15 amperes, 125 volts, 25-60 cycles or d-c.

G-E Automatic Circuit Breaker Panelboards provide protection for four or six circuits. They are approved for use in place of branch circuit fuse panels, bringing the greatest convenience to the user in the home.



Catalogue No. GE2806
Four Circuit
(Approximately ⅛ actual size)

The handle indicates by its position when the breaker has opened. All that is necessary to re-establish the circuit is to move the handle to the "on" position.

These panels are standard 3-wire mains—2-wire circuits. One side of each circuit is connected through the breaker. A connecting bus bar can be supplied to convert the panel for 2-wire mains. An index plate is provided for designation of the separate circuits.

National Electrical Code Standard.

Standard Wiring Symbol—▬

Fuses

Non-indicating, indicating and renewable cartridge fuses. Plug fuses.

Cartridge fuse elements 99.9 per cent pure zinc calibrated to within .0005 in., insuring uniform accuracy and dependable protection.

Fibre casings withstand most severe internal pressures insuring ample protection against fire resulting from exploding fuse casings.

Plug fuses have *Pyrex transparent tops, insuring quick detection of blown fuses. All connections made mechanically insuring freedom from open circuiting as a result of acid corrosion.

Sizes—Cartridge fuses: 1 to 600 amperes, 250 and 600 volts. Plug fuses: 3, 6, 10, 12, 15, 20, and 30 amperes, 125 volts.

How to Specify—All cartridge and plug fuses shall be of General Electric manufacture.

Local Switches

Tumbler. Brown handles. Porcelain (GE2841 type) and compound (GE2842 type) boxes. Single pole, 10 and 20 amperes; double-pole, 10 and 20 amperes; three-way; four-way.

GE1688
Black Handle
GE2513
Brown Handle

A sturdy but inconspicuous "on" and "off" indicating genuine textolite handle is employed. Operates with the sweep of the finger, arm or elbow.

GE2588
Black Handle
GE2591
Brown Handle

Positive-start, quick-make-and-break mechanism assures smooth and positive operation and freedom from freezing or burning of contacts.

Flexible phosphor bronze contact springs of ample size insure long service without heating.

Specially tested steel music wire actuating springs.

Wide mounting ears lie directly against the plaster, assuring perfect alignment of the switch with the wall. No makeshifts, such as washers or shims, necessary.

Compound box switches are totally enclosed and are designed especially for high grade installations.

When to Specify—Porcelain switches will meet most conditions satisfactorily but in installation requiring materials of unusual excellence, the compound type is the logical selection.

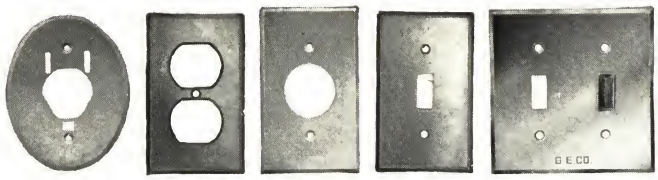
How to Specify—All flush switches shall be of General Electric manufacture, Cat. No. (*) type.

Standard Wiring Symbols—Single-pole, S^1, Double-pole, S^2. Three-way, S^3. Four-way, S^4. Combination of single-pole and pilot lamp, S^P. Combination of three-way and pilot lamp, S^{3P}. Combination of single-pole, pilot and convenience outlet, S^P ⊖▬.

Flush Plates

Brass and genuine textolite.

Brass plates are made of clear new brass, free from all blemishes and streaks. Bevels are sharp and clean cut. Combination plates with any arrangement of units can be supplied.



Brush brass is the standard finish but special finishes can be supplied.

Genuine textolite plates are made in stippled brown finish as standard. Black stippled finish can be furnished. Bevels are polished.

Non-corroding, substantial and tasteful.

Sizes—Brass plates. 0.040-in., 0.060-in. and 0.100-in. thickness.

Genuine textolite plates, 0.060 in. supported by heavy ribs.

When to Specify—Specify textolite plates for permanency of finish.

In selecting brass plates 0.060-in. metal is most satisfactory. 0.040 metal is the lowest gauge permitted by the National Electrical Code.

How to Specify—All flush plates shall be (†) gauge brass (‡) finish and of General Electric manufacture.

All flush plates shall be (§) genuine textolite and of General Electric manufacture.

*Reg. U. S. Pat. Office

*Insert catalogue number of type desired such as GE2841 or GE2842.
†Insert gauge selected: 0.040, 0.060 or 0.100.
‡Insert finish.
§Insert color—black or brown.

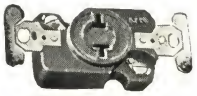
OUTLETS AND RECEPTACLES

Convenience Outlets

Side wired. Top wired.

Textolite, brown. Heavy phosphor bronze contact springs.

GE2535 Brown



GE2533 Brown

GE2536 Brown

GE2534 Brown

Double T slots. Plain surfaces, slot finding faces. Designed to provide ample wiring room and reduce the possibility of accidental grounds.

Top-wired types equipped with wide mounting ears which rest directly against the plaster. Eliminates need for washers or shims.

Side-wired types less substantial and of competitive grades. Have twin binding screws.

Capacity—10 amperes, 250 volts; 15 amperes, 125 volts.

When to Specify—Specify top-wired types when the most substantial construction is desired, and side-wired types when low first cost is paramount.

Use single types for mounting in combination with switches or pilot lamp receptacles—and twin types for all other purposes requiring a capacity of 10 amperes, 250 volts or less.

How to Specify—All single convenience outlets shall be of General Electric manufacture, Cat. No. (*) type, 10 amperes, 250 volts.

All twin convenience outlets shall be of General Electric manufacture, Cat. No. (*) type, 10 amperes, 250 volts.

Standard Wiring Symbols—Single convenience outlets ⊖═. Twin convenience outlets ⊖₂═.

Fan Outlets

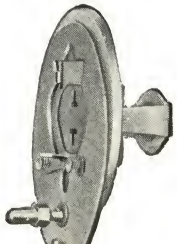
Elexit.

Double T slot. A convenience outlet when not in use for fan suspension. Rigidly locks fan in place. Fan hanger plate accommodates all makes of fans.

Rating—10 amperes, 250 volts; 15 amperes, 125 volts.

How to Specify—All fan outlets shall be fan hanger of General Electric manufacture.

Standard Wiring Symbol— (L)(X)



GE2755
Fan Outlet

Heavy Duty Flush Plug Receptacles

Two-pole and 3-pole; polarized. Porcelain and composition.

High capacity bronze contacts.

Capacities—20 amperes, 250 volts; 30 amperes, 250 volts; 60 amperes, 125 volts.

*Insert catalogue number of type desired.

When to Specify—When current consuming devices (such as platewarmers, electric ovens, electric stoves and medium size ranges) of a rated capacity larger than 15 amperes, 125 volts are to be used, separate cutout cabinets, circuits and heavy duty plug receptacles are necessary.

GE1367
20 Amp.—250 Volt

GE996
30 Amp.—250 Volt

How to Specify—All heavy duty flush plug receptacles shall be of proper capacity and of General Electric manufacture.

Standard Wiring Symbol—(▲)

Pilot Lamp Receptacles

Freely ventilated. Lower current consumption. Lamp can be renewed without removing the plate. Used with Cat. No. GE2823 brown textolite flush plate with dome.

Rating—Two-candlepower, 125 volts.

How to Specify—All pilot lamp receptacles shall be Cat. No. GE2822 of General Electric manufacture.

GE2822
Pilot Lamp

Standard Wiring Symbol—P.

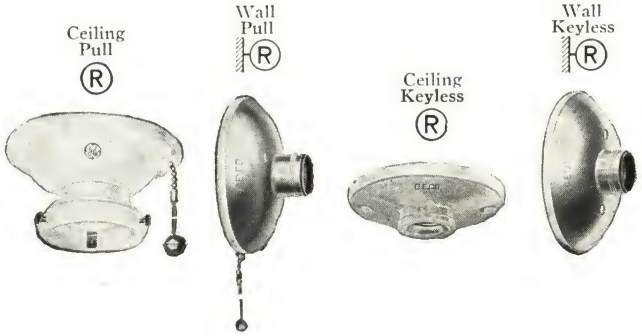
One-light Lampholders

Keyless and pull. Brass shell and porcelain.

Rating—Pull, 250 watts, 250 volts. Keyless, 660 watts, 250 volts.

When to Specify—When inexpensive lampholders are required for inconspicuous locations such as closets, pantries, service hallways, etc., specify one-piece lampholders using porcelain types in damp locations.

Standard Wiring Symbols—



How to Specify—One-light lampholders shall be porcelain in damp locations and brass shell elsewhere and of General Electric manufacture.

One-light keyless lampholders controlled by wall switches shall be Cat. No. GE088 and Cat. No. GE264.

One-light pull lampholders shall be Cat. No. GE2565 and Cat. No. GE721.

HARVEY HUBBELL, INC.

Manufacturers of Electrical Specialties

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BRIDGEPORT, CONN.

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Products—N. E. C. Standard

Approved ELECTRICAL SPECIALTIES and WIRING DEVICES to meet every requirement—Bakelite Switches in Duplex, Triplex, and Flush Toggle Type Convenience Outlets and Receptacles, Standard Wiring Devices and Electrical Specialties to meet every construction and industrial specification. Manufacturing facilities permit attention to specific problems.

HUBBELL
REG. U.S. PAT. OFF.

Hubbell Quality

For almost half a century Hubbell Quality has been accepted as a standard of measurement in wiring devices. Code requirements are but the beginning of Hubbell testing and perfection. This extra measure of quality not only benefits the user but protects the reputation and judgment of the architect and builder. Hubbell Devices can be secured throughout the world.

Hubbell Shallow Flush Toggle Switches

No. 9801

No. 9802

No. 7701
No. 7901

Bakelite enclosed shallow flush toggle switches comprise a specially designed line of switches to carry the Type "C" lamp load. Contacts will not burn or pit.

Furnished in composition, live rubber or metal handles. Fit 1½-in. switch boxes. Installed in 2-in. partitions. Supporting screwholes $3\frac{9}{32}$ in. Wide plaster ears, scored and readily removable.

Cat. No.	Description	Amperes 125 volts	Amperes 250 volts
	Enclosed Bakelite Base, Square Handle		
9801	Single pole, indicating	10	5
9802	Double pole, indicating	..	10
9803	Three-way	10	5
9804	Four-way	5	2
9805	Single pole, indicating	..	20
9806	Double pole, indicating	..	20
	Enclosed Bakelite Base and Square Metal Handle		
7901	Single pole, indicating	10	5
7902	Double pole, indicating	..	10
7903	Three-way	10	5
7904	Four-way	5	2
7905	Single pole, indicating	..	20
7906	Double pole, indicating	..	20
	With Enclosed Bakelite Base and Live Rubber Handle		
7701	Single pole, indicating	10	5
7702	Double pole, indicating	..	10
7703	Three-way	10	5
7704	Four-way	5	2
7705	Single pole, indicating	..	20
7706	Double pole, indicating	..	20

Hubbell "Duplex" and "Triplex" Switches and Plates

No. 8853 Plate with Switch

No. 9831

No. 9821

No. 8852 Plate with Switch

A distinctive and revolutionary principle in switch construction, embodying economy of material space and simplification of installation. A small, quality trigger action toggle switch movement made up in two or three units mounted in a single bakelite box small enough to be installed in a single outlet box. Easy to wire. Backed with the Hubbell guarantee of quality and performance.

HUBBELL "DUPLEX" SWITCHES—TWO UNITS
With Lateral Operating Square Composition Handles

Cat. No.	Description	Feed
8821	2 Single pole units	Common
9821	2 Single pole units	Separate
8823	1 Single pole and 1 3-way unit	Common
9823	1 Single pole and 1 3-way unit	Separate
9824	2 3-way units	Separate
9809	1 Single and 1 double pole unit	Separate
9810	1 Double pole and 1 3-way unit	Separate
9811	1 Single pole and 1 4-way unit	Separate
9812	1 3-way and 1 4-way unit	Separate
9813	2 Double pole units	Separate

HUBBELL "TRIPLEX" SWITCHES—THREE UNITS
With Square Composition Handles

Cat. No.	Description	Feed
8831	3 Single pole units	Common
9831	3 Single pole units	Separate
8833	2 Single pole and 1 3-way unit	Common
9833	2 Single pole and 1 3-way unit	Separate
9814	2 Single and 1 double pole unit	Separate

HUBBELL SINGLE PLATES

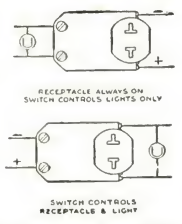
For "Duplex" Switches		For "Triplex" Switches	
8842	Sandblast bakelite, screwless, with underplate No. 8844	8843	Sandblast bakelite, screwless, with underplate No. 8844
8852	.060-in. brush brass	8853	.060-in. brush brass
8952	.060-in. "lacco" brass	8953	.060-in. "lacco" brass
8854	Mat Finish bakelite, screw type	8855	Mat Finish bakelite, screw type
8856	.040-in. brush brass	8858	.040-in. brush brass
8857	.040-in. "lacco" brass	8859	.040-in. "lacco" brass

Hubbell Combination Switches and Single Convenience Outlets

No. 8891

Fitting single gang boxes, these devices afford an opportunity to provide an extra convenience outlet wherever a switch is installed. Double T-slots in the receptacle portion take standard parallel or tandem blade attachment plug caps. Operating handles and receptacle faces are made of genuine bakelite. Switch and receptacle base is made of composition. Brown handles and receptacle faces are standard. Black furnished on special order at same price.

WIRING DIAGRAMS



Ratings given below are for switches only. Receptacles rating in all cases is 10 amperes, 250 volts; 15 amperes, 125 volts.

Wiring diagrams above show method of installing to provide variation of control.

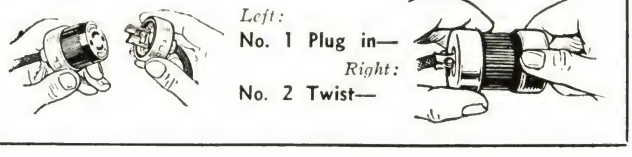
Cat. No.	Description
	Single Pole 10 amperes, 250 volts
8885	With .060 in. brass plate
8886	Without plate
8891	With sandblast bakelite plate
	Double Pole 10 amperes, 250 volts
8887	With .060 in. brass plate
8888	Without plate
8892	With sandblast bakelite plate
	20 amperes, 250 volts
8889	With .060 in. brass plate
8890	Without plate
8893	With sandblast bakelite plate
	Separate Plates
8894	.060 in. brush brass plate only
8895	Sandblast bakelite screw type plate only

Combination Convenience Outlet and Pilot Light

The combining of convenience outlets and pilot lights provides an automatic signal to warn of current left "On" in electric irons and other appliances having heating units. Desirable for use in kitchens, breakfast rooms, laundries, etc. Supplied with either brass or ornamental bakelite plates.

No. 7711

Cat. No.	Description and finish	Amperes	
		125 volts	250 volts
7711	Receptacle and pilot light complete with No. 7713 plate	15	10
7712	Receptacle and pilot light only without plate	15	10
7728	Receptacle and pilot light complete with No. 7729 ornamental bakelite plate	15	10
7713	Single .060-in. brass plate only for No. 7711	15	10
7729	Single ornamental bakelite plate only for No. 7728	15	10



Hubbell Bakelite Face Duplex Convenience Outlets

With double binding screws side wired; 10 amperes, 250 volts; 15 amperes, 125 volts.

No. 9595

A new development of the standard duplex convenience outlet. Meets the increasing demand for an outlet which can be wired to a switch for the independent control of lamps, and the other outlet to be permanently alive at all times. This arrangement overcomes the inconvenience of separately turning off each individual lamp in a room.

No. 9571 is made with an insulating barrier between the binding screws on one side of the receptacle, the other side having two uninsulated binding screws as common return.

No. 9573 is made with an insulating barrier between a set of binding screws on each side, thereby providing a two-circuit receptacle.

With Plaster Ears

Cat. No.	Description
9595	Receptacle with wide ears and double binding screws
9571	With two feeds and one return
9573	With two feeds and two returns

Supporting screwholes are spaced $3\frac{9}{32}$ in. on centers.

No. 7260 or 7137

No. 7137 duplex, side wired, black bakelite, with 4-in. steel box cover.

Finish—black japan or cadmium plated.

No. 7260 duplex, side wired, black bakelite, with 3¼-in. steel box cover.

15 amperes, 125 volts; 10 amperes, 250 volts.

No. 5566 or 5552

Hubbell Bakelite Face Single Convenience Outlets

No. 5552 single, top wired, black porcelain, polarized. 20 amperes, 250 volts.

No. 5566 single, top wired, black porcelain, polarized. 15 amperes, 125 volts; 10 amperes, 250 volts.

Hubbell "Twist-Lock" Receptacles and Cap

No. 7311 Three Wire Cap

Hubbell "Twist-Lock" Flush Receptacles and Caps offer the security of a direct electrical connection, the convenience and flexibility of a separable connection. "Twist-Lock" is impervious to kicks, jerks and vibrations. Hubbell "Twist-Lock" Devices are polarized and grounded and offer protection against shock and fire hazard.

No. 7310

THREE-WIRE "TWIST-LOCK" POLARIZED DEVICES

Cat. No.	Description	Cord hole diam., in.	Amperes, 250 volts
7310	Porcelain flush receptacle	$\frac{23}{32}$	20
7311	Composition "Cord Grip" cap, steel covered cadmium plated	$\frac{23}{32}$	20
7517	Porcelain flush receptacle with 4-in. box cover attached	$\frac{23}{32}$	20

Note: The operation of the Three-Wire "Twist-Lock" cap is illustrated in the adjacent column.

THE BRYANT ELECTRIC COMPANY

Manufacturers of "Superior Wiring Devices" Since 1888

1421 State Street, BRIDGEPORT, CONN.

BRANCHES

BOSTON, MASS., 140 Federal Street CHICAGO, ILL., 844 West Adams Street (Office and Warehouse) NEW YORK, N. Y., 60 East 42nd Street
SAN FRANCISCO, CAL., 149 New Montgomery Street (Office and Warehouse)

The Company and Its Facilities

The Company's plant at Bridgeport covers over half a million square feet of floor space, devoted exclusively to the manufacture of electrical wiring devices. The growth of the Company is due to two factors; a desire to make only the best electric wiring devices and the ability to carry out that desire.

How to Obtain Bryant Wiring Devices

Responsible representatives and distributors have been located in all parts of the world. The name of the nearest American, Canadian or Hawaiian representative will be sent on request, also information on foreign distributing channels. For complete descriptive listing of more than 2000 Bryant Devices, write for catalog No. 30.

"Spartan" Flush Receptacles

Each outlet: 15 amperes, 125 volts; 10 amperes, 250 volts

No. 120

Black porcelain single flush receptacle for plate without door. Top wiring terminals

No. 122

Black porcelain duplex flush receptacle for plate without doors. Top wiring terminals

No. 770

Brown bakelite receptacle for use with tumbler switch plate. Approved for use with composition plates only

No. 4810

Brown bakelite single flush receptacle for plate without door. Top wiring terminals

No. 4812

Brown bakelite duplex flush receptacle for plate without doors. Top wiring terminals

No. 4822

Brown bakelite duplex flush receptacle with brown bakelite plate having integral bosses. Designed for use on the better jobs where appearance counts. This type of construction eliminates any opening or space around the bosses. Top wiring terminals

No. 4831

Brown bakelite single flush receptacle for plate without door. Side wiring terminals

No. 4832

Brown bakelite duplex flush receptacle for plate without doors. Side wiring terminals. Common feed, common ground

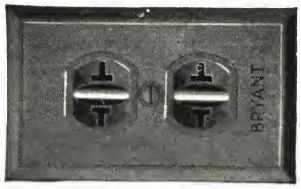
No. 4832X

Separate feed, separate ground

No. 4832Y

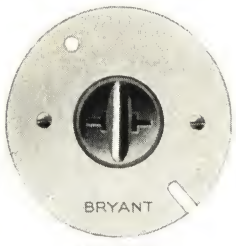
Separate feed, common ground

Brown bakelite receptacles for plates without doors. The insulating barriers in either one or both sides of the receptacles permit wiring for separate control of each outlet. Either separate feed, separate ground, or separate feed, common ground



"Spartan" Outlet Box Receptacles

Each outlet, 15 amperes, 125 volts; 10 amperes, 250 volts. Receptacles are of brown composition and side wired.



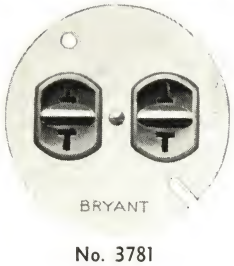
No. 3780

With Black Japanned Box Covers—

No. 3760 single, for 3¼-in. boxes.
No. 3761 duplex, for 3¼ in. boxes.
No. 4760 single, for 4-in. boxes.
No. 4762 duplex, for 4-in. boxes.

With Cadmium Plated Box Covers—

No. 3780 single, for 3¼-in. boxes.
No. 3781 duplex, for 3¼-in. boxes.
No. 4780 single, for 4-in. boxes.
No. 4782 duplex, for 4-in. boxes.



No. 3781

"D. D." Disappearing Door, Flush Receptacles, Plates and Plug

Designed especially for hotel and other installations where it is desired to restrict the use of current to only those appliances provided with the special plug necessary for making the connections.

Each outlet: 15 amperes, 125 volts; 10 amperes, 250 volts.

Left: Single composition receptacle

Right: Brass plate for No. 730 single receptacle. Made in .060-in. metal only

No. 730

No. OD361

No. 659

Bakelite plug, for either one or two cords

Left: Duplex composition receptacle

Right: Brass plate for No. 657. Made in .060-in. metal only

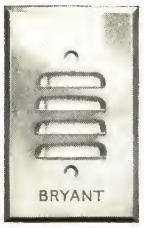
No. 657

No. OD261

No. 427

Flush Lamp Receptacle and Louvre Plate

No. 427 receptacle with No. 618 125-volt lamp.
No. 627 receptacle with No. 619 32-volt lamp.
No. OL241 louvre plate for use with flush lamp receptacles.

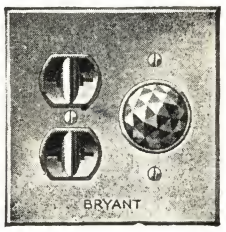


No. OL241

Receptacle and Pilot Light Combination

10 amperes, 125 volts

No. 763 combination of one duplex "Spartan" receptacle, one pilot light, and two-gang solid plate ready wired. Device is limited by the lamp used to 125 volts. Insertion of the plug illuminates the bull's-eye.



No. 763

No. OB41

Brass Jewel Plates

For use with Nos. 427 or 627 receptacles.
No. OB41—.040 in. stamped.
No. OB61—.060 in. stamped.
No. OB11—Solid.

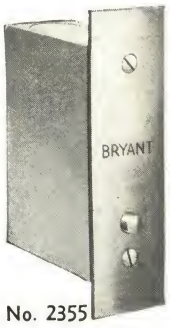
No. 746 Jewel with "S" Plate

Nos. 2959 and 3959

Switch and Pilot Light Combinations

10 amperes, 125 volts

These combinations consist of one tumbler switch and one pilot lamp with brass guard and .060-in. single gang brass plate, ready wired.
No. 2959 with D.P. tumbler switch.
No. 3959 with S.P. quadruple break tumbler switch.
The lamp is in circuit when the switch is "on," making this device especially adaptable for the control of cellar, garage, and other lights where a telltale is desired.



No. 2355

"Perkins" Self-restoring Door Switches

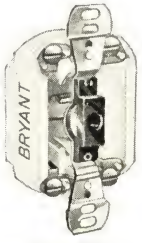
6 amperes, 125 volts; 3 amperes, 250 volts.
These switches are furnished complete with brass plates, brass strike plates and outlet boxes with knockouts for both armored cable and rigid conduit.
No. 2355 switch is "on" when door is open.
No. 2356 switch is "off" when door is open.

No. 5121

Receptacle and Pilot Lamp Combination

10 amperes, 125 volts

No. 5121—Single-gang, with .060-in. brass plate and porcelain cup. The insertion of the plug lights the lamp.



No. 2830

Radio Jack Flush Receptacle

No. 2830 Radio Jack Flush Receptacle, porcelain cup with rectangular bakelite boss. This receptacle will take any standard radio jack and is designed for use with "S" type tumbler switch plates.

No. 737

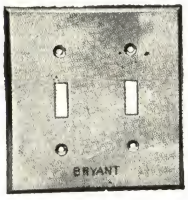
Ruby Jewels

Round, for use with "F" plates.
No. 736, solid ring.
No. 737, ventilated ring.

Rectangular, for use with "S" plates.
No. 746, solid rim.

No. 746

One-gang (Symbol "S")



Two-gang (Symbol "S")

Flush Plates

Brass Plates—

Brass flush plates can be furnished in any type, number of gangs or combinations required, made of either solid, .060-in. or .040-in. metal. Standard finish is brush brass but other finishes can be furnished when specified. For complete information regarding brass plates see Bryant Catalogue No. 30.

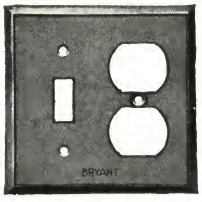
No. OS341

No. OF61

Molded Bakelite Plates—

"Hemco" plates have a rich ribbed finish; "Templus" plates have a stipple finish. These plates, complete with bakelite headed screws, can be furnished in a large number of types, gangs and combinations. They can also be furnished of black bakelite. For complete information regarding these plates, see pages 82 and 83, Bryant Catalogue No. 30.

No. OS51



No. OSV52

No. HS231

No. HG31

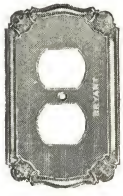
No. OS71

"DeLuxe" Wood Inlaid Plates—

Mahogany or circassian walnut inlay with dull bronze or dull silver metal borders.
No. OS71—One-gang, tumbler.
No. OS72—Two-gang, tumbler.
No. OS73—Three-gang tumbler.
No. OF71—One-gang, single receptacle.
No. OV71—One-gang, duplex receptacle.
For finishes add to catalogue number.
"WB"—walnut bronze, "MB"—mahogany bronze.
"WS"—walnut silver, "MS"—mahogany silver.

"DeLuxe" All-metal Plates—

Made of genuine bronze or nickel silver.
No. OS71B—One-gang, tumbler.
No. OS72B—Two-gang, tumbler.
No. OS73B—Three-gang, tumbler.
No. OF71B—One-gang, single receptacle.
No. OV71B—One-gang, duplex receptacle.
For metals desired, add to catalogue number:
"DB"—dull bronze, "DS"—dull silver.
Polished finishes are not recommended.



No. OV71-B

No. 2957

"Spartan" Receptacle and Switch Combinations

With Switches Operating Horizontally, Porcelain Cups—*10 amperes, 125 volts; 5 amperes, 250 volts.*

No. 2957—Double pole switch, .060-in. brass plate.
No. 3957—Single pole quadruple break switch, .060-in. brass plate.
No. 2979—Double pole switch, brown bakelite plate with integral boss.
No. 3979—Single pole quadruple break switch, brown bakelite plate with integral boss.

With Switches Operating Vertically, Bakelite Cups—*10 amperes, 250 volts.*

No. 2994—Double pole switch, .060-in. brass plate.
No. 3994—Single pole quadruple break switch, .060-in. brass plate.
No. 2989—Double pole switch, brown bakelite plate with integral boss.
No. 3989—Single pole quadruple break switch, brown bakelite plate with integral boss.

With Switches Operating Vertically, Bakelite Cups—*20 amperes, 250 volts.*

No. 2995—Double pole switch, .060-in. brass plate.
No. 3995—Single pole quadruple break switch, .060-in. brass plate.
No. 2999—Double pole switch, brown bakelite plate with integral boss.
No. 3999—Single pole quadruple break switch, brown bakelite plate with integral boss.

These switches can also be furnished with transparent handles with luminous inserts. Add "BH" to catalogue number.

No. 2979

No. 2989

No. 2994

"Bryant" Flush Tumbler Switches

No.	Description	Amperes 125 volts	Amperes 250 volts	No.	Description	Amperes 125 volts	Amperes 250 volts
	With Porcelain Cups and Plaster Ears						
	Brown Composition Handles				**Locking Type**		
3951	S.P. Indicating	10	5	3951-L	S.P. Indicating	10	5
3952	D.P. Indicating	10	10	3952-L	D.P. Indicating	10	10
3953	Three-point	10	5	3953-L	Three-point	10	5
3954	Four-point	5	2	3954-L	Four-point	5	2
3955	D.P. Indicating	20	10	3955-L	D.P. Indicating	20	10
3920	S.P. Quadruple break indicating	20	10	3920-L	S.P. Quadruple break indicating	20	10
	Enclosed Switches with Composition Cups and Plaster Ears						
	Brown Bakelite Handles				**Locking Type, Brown Bakelite Bosses**		
4961	S.P. Indicating	10	5	4961-L	S.P. Indicating	10	5
4962	D.P. Indicating	10	10	4962-L	D.P. Indicating	10	10
4963	Three-point	10	5	4963-L	Three-point	10	5
4964	Four-point	5	2	4964-L	Four-point	5	2
4966	S.P. Quadruple break indicating	20	10	4966-L	S.P. Quadruple break indicating	20	10

No. 3951

No. 3953-LT

No. 4962

No. 4962-BH

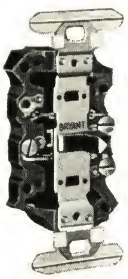
Above switches can be furnished with transparent handles with luminous inserts, add "BH" to catalogue number; or with luminous tips on handle, add "LT" to catalogue number.

One No. 3950 key is furnished with each of above locking type switches.

"Unigle," "Dugle" and "Trigle" Flush Tumbler Switches

These switches consist of one, two or three switches, with brown bakelite handles, mounted in a single gang bakelite cup. Each mechanism is rated as follows: Single pole and three point, 6 amperes, 125 volts—3 amperes, 250 volts; double pole, 10 amperes, 125 volts—5 amperes, 250 volts; four point, 3 amperes, 125 volts—1 ampere, 250 volts. Handles of single and double pole switches have *"on"* and *"off"* indications.

These switches can be furnished lock type; add "-L" to catalogue number. These switches, excepting lock type, can be furnished momentary contact; add "M" to catalogue number.



No. 2853

"Unigle" Switches—
No. 2851—Single Pole
No. 2852—Double Pole
No. 2853—Three Point
No. 2854—Four Point

"Dugle" Switches, Separate Feeds—
No. 2855—One S.P. and one 4 Pt.
No. 2856—Two Double Pole
No. 2857—One 3 Pt. and one 4 Pt.
No. 2858—One D.P. and one 3 Pt.
No. 2859—One D.P. and one 4 Pt.
No. 2880—One S.P. and one D.P.
No. 2893—Two Three Point
No. 2894—Two Single Pole
No. 2895—One S.P. and one 3 Pt.

No. 2894

"Dugle" Switches, Common Feed—
No. 2891—Two Three Point
No. 2892—Two Single Pole
No. 2896—One S.P. and one 3 Pt.

"Trigle" Switches, Separate Feeds—
No. 2864—Three Single Pole
No. 2866—Two S.P. and one 3 Pt.
No. 2867—Two S.P. and one D.P.

"Trigle" Switches, Common Feed—
No. 2860—Three Single Pole
No. 2865—Two S.P. and one 3 Pt.

No. 2860

BUSSMANN MANUFACTURING CO.

Manufacturers of Electric Fuses

ST. LOUIS, MO.

DEALERS AND DISTRIBUTERS IN EVERY PRINCIPAL CITY

Data for the Specification Writer

Poor fusing can be a source of tremendous irritation and wastefulness, hence we have issued a specification book, A. I. A. File No. 31 d 6, which contains necessary information for the proper specification of fuses. In this book the architect and specifying engineer will find: information as to proper fusing for all types and sizes of buildings; information to guide him in determining whether renewable or non-renewable fuses should be used; complete information on plug fuses; simplified specifications that are readily accepted, thus eliminating those that are lengthy and confusing.

BUSS FUSES — ELECTRICITY'S SAFETY VALVE

TRADE-MARK

Refer to Your Files

If you do not find this book entitled "Necessary Information for the Proper Specification of Fuses" in your files, send for a copy.

Brief Specification

Specify outright by name "Buss" and be protected, or specify:

Fuses shall be renewable, listed by Underwriters' Laboratories, Inc., and equipped with SUPER-LAG links of standard dimensions. The 3 to 60-ampere sizes shall have not more than 5 parts, including the link, to be renewable without tools and to have the closure and ferrule in one piece. The 65-ampere and larger sizes to have not more than 4 separate parts including the link to be handled in renewing.

The Importance of Fuses

Measured by their cost and size, fuses may seem insignificant, but—when it is realized that these simple articles are the only safety devices universally used for protection against the hazards of electrical circuits, their importance can only be compared with the importance of buying fire insurance.

Buss Super-Lag Renewable Fuses Should Be Specified Because

They eliminate many useless shutdowns caused by harmless overloads.

They save money on fuse replacements.

They eliminate need for extra set of fuses.

They are a permanent investment.

They give the greatest protection at the lowest obtainable cost.

Low Cost Maintenance

The ever increasing use of electricity in buildings of all kinds causes more frequent blowing of fuses than was formerly the case and makes the renewable fuse far more economical than the non-renewable fuse. Fuses are made to blow—they are electricity's safety valve. The use of a non-renewable fuse means actually throwing money away at every blow. With Buss Renewable Fuses, a new link puts the fuse back into service quickly and the cost of the link is but 5% of the cost of a new fuse.

Permanent Investment

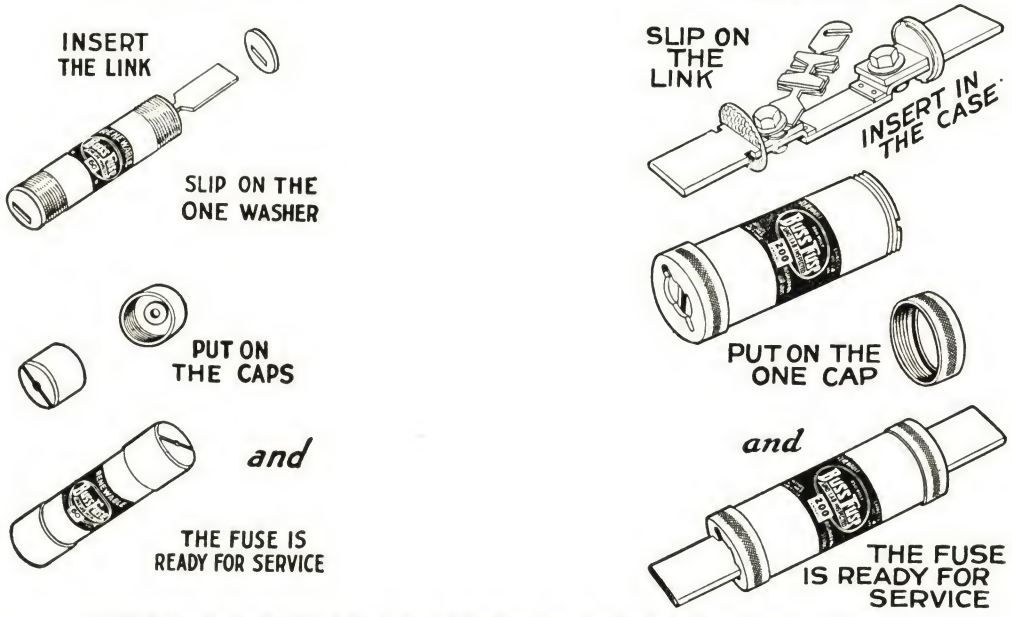
A board equipped with Buss Super-Lag Renewable Fuses can be maintained for life of board at a much less cost than if equipped with non-renewable fuses.

Blow-outs do not injure the fiber tube or metal parts of Buss Renewable Fuses because of simplicity of design and use of the highest quality of materials throughout.

The absence of small parts and the simplicity of the entire design practically eliminates the chance of poor contact with its resultant burned and charred fiber tubes.

Preferred by Maintenance Men

Buss Super-Lag Renewable Fuses are preferred by maintenance men because of their dependability, ease of renewal and long life.



DETAILS SHOWING EASE OF ASSEMBLING BUSS RENEWABLE FUSES

GENERAL ELECTRIC COMPANY

Member of Producers' Council

GENERAL OFFICE

1 River Road, SCHENECTADY, N. Y.

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HOUSTON, TEX., 1016 Walker Avenue
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JACKSON, MICH., 212 Michigan Avenue, West
JACKSONVILLE, FLA., 700 East Union Street
KANSAS CITY, MO., 1004 Baltimore Avenue
KNOXVILLE, TENN., 602 South Gay Street
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LOUISVILLE, KY., 455 South Fourth Street
MEMPHIS, TENN., 8 North Third Street
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MILWAUKEE, WIS., 940 West St. Paul Avenue
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NASHVILLE, TENN., 234 Third Avenue, North
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NEW HAVEN, CONN., 129 Church Street
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PHOENIX, ARIZ., 11 West Jefferson Street
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PITTSBURGH, PA., 535 Smithfield Street
PORTLAND, ORE., 329 Alder Street
PROVIDENCE, R. I., 76 Westminster Street
RICHMOND, VA., 700 East Franklin Street
ROANOKE, VA., 202 South Jefferson Street
ROCHESTER, N. Y., 89 East Avenue
ST. LOUIS, MO., 112 North Fourth Street
SALT LAKE CITY, UTAH, 200 South Main Street
SAN ANTONIO, TEX., 201 Villita Street
SAN FRANCISCO, CALIF., 235 Montgomery Street
SCHENECTADY, N. Y., 1 River Road
SEATTLE, WASH., 821 Second Avenue
SHREVEPORT, LA., 513 Marshal Street
SPOKANE, WASH., 421 Riverside Avenue
SPRINGFIELD, ILL., 607 East Adams Street
SPRINGFIELD, MASS., 1387 Main Street
SYRACUSE, N. Y., 113 South Salina Street
TACOMA, WASH., 1019 Pacific Avenue
TAMPA, FLA., 604 Ella Mae Street
TOLEDO, OHIO, 405 Madison Avenue
TRENTON, N. J., 143 East State Street
TULSA, OKLA., 409 South Boston Street
UTICA, N. Y., 258 Genesee Street
WASHINGTON, D. C., 800 Fifteenth Street, North West
WATERBURY, CONN., 195 Grand Street
WHEELING, W. VA., 40 Fourteenth Street
WORCESTER, MASS., 340 Main Street
YOUNGSTOWN, OHIO, 16 Central Square

FOR CANADIAN BUSINESS REFER TO CANADIAN GENERAL ELECTRIC COMPANY, LTD., TORONTO
FOR HAWAIIAN BUSINESS REFER TO W. A. RAMSAY, LTD., HONOLULU

Motor Dealers and Lamp Agencies in All Large Cities and Towns

SERVICE SHOPS

ATLANTA, 496 Glenn Street, S. W.
BUFFALO, 318 Urban Street
CHICAGO, 509 East Illinois Street
CINCINNATI, 215 West Third Street
CLEVELAND, 4966 Woodland Avenue
DALLAS, 1801 North Lamar Street
DETROIT, 700 Antoinette Street
HOUSTON, 5 N. Milam Street
KANSAS CITY, 819 East 19th Street
LOS ANGELES, 5203 Santa Fe Avenue
MILWAUKEE, WIS., 940 West St. Paul Avenue
MINNEAPOLIS, 410 Third Avenue, North
NEW YORK, 416 West 13th Street
PHILADELPHIA, 429 North Seventh Street
PITTSBURGH, PA., 16 Terminal Way
ST. LOUIS, 1009 Spruce Street
SALT LAKE CITY, 360 West Second South Street
SAN FRANCISCO, 340 First Street
SEATTLE, 1508 Fourth Avenue, South

Special service divisions are also maintained at the following works of the Company: Erie, Pa.; Ft. Wayne, Ind.; Pittsfield, Mass.; Schenectady, N. Y., and West Lynn, Mass. (River Works and West Lynn Works)

BROADCASTING STATIONS

WGY, Schenectady, N. Y. KOA, Denver, Colo. KGO, Oakland, Calif.

Distributors for the General Electric Company Outside of the United States and Canada

INTERNATIONAL GENERAL ELECTRIC COMPANY, INC.

NEW YORK, N. Y., 120 Broadway — General Sales Offices, SCHENECTADY, N. Y.

Foreign Offices and Associated Companies in Principal Cities of the World

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For Floodlighting Projectors, Electric Refrigerators, and Wiring Devices, see Manufacturers' Index

ASSOCIATED COMPANIES ALSO LISTED IN SWEET'S ARCHITECTURAL CATALOGUES

EDISON GENERAL ELECTRIC APPLIANCE COMPANY, INC.

BAILEY METER COMPANY

THE TRUMBULL ELECTRIC MFG. CO.

WARREN TELECHRON COMPANY

OTHER ASSOCIATED COMPANIES

GENERAL ELECTRIC VAPOR LAMP COMPANY

Mercury Vapor Lamps

HOBOKEN, N. J.

Sales Offices

Atlanta, Ga.
Boston, Mass.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Detroit, Mich.
Hoboken, N. J.
Hollywood, Calif.
Philadelphia, Pa.
Pittsburgh, Pa.
Rochester, N. Y.
St. Louis, Mo.
San Francisco, Calif.

LOCKE INSULATOR CORPORATION

Insulators

BALTIMORE, MD. VICTOR, N. Y.

Sales Offices

Atlanta, Ga.
Boston, Mass.
Chicago, Ill.
Dallas, Tex.
New York, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.
St. Louis, Mo.
Salt Lake City, Utah
Victor, N. Y.

HALL ELECTRIC HEATING COMPANY, INC.

Electric Heating Equipment for Homes

PHILADELPHIA, PA.

GENERAL ELECTRIC X-RAY CORPORATION

X-Ray Apparatus including Coolidge Tubes

CHICAGO, ILL.

GENERAL ELECTRIC SERVICE TO THE ARCHITECTURAL PROFESSION

The GENERAL ELECTRIC COMPANY offers an engineering service to architects for the co-ordination of elements manufactured by it to meet given needs or demands for the building trade. The services of its experts are available for any problem that may develop, or for data on special apparatus and materials. On the opposite page is a list of branch offices located at the most important centers of the country. Here expert service and information may be quickly obtained.

Electric Service

The distribution center of a building is that point from which the light and power feeders radiate to the different parts of the building. The center may be a substation taking in electric energy from a utility, or it may be a private plant, or it may be a combination of both.

The simplest distribution center may consist of a switchboard with incoming service and feeder panels. A more complicated equipment is involved if the incoming service is at a voltage higher than would be distributed through the building, so that transformers are required. A still more elaborate equipment is involved where the energy is purchased as alternating current and is to be converted into direct current by synchronous converters or motor-generator sets. The plant may include engine driven direct-current generators, or engine driven alternators, or direct-current or alternating-current turbo-generators. The GENERAL ELECTRIC COMPANY manufactures a complete line of apparatus for all of these services.

Recognizing that the requirements of electrical energy distribution in commercial buildings call for high grade equipment, securing the utmost continuity of service, high operating efficiency, low maintenance expense, and the least possible attendance, the GENERAL ELECTRIC COMPANY has designed its apparatus for such service particularly with this thought in view. Architectural engineers may specify General Electric apparatus for building equipment with a certainty that its design and application are supervised by a corps of engineers who have building service problems in mind and the experience to solve them.

The problem of whether to install direct current or alternating current in a building is one that has to be taken up in each individual instance. In general, it may be said that with the development of variable voltage control for elevators and quiet running alternating-current motors for fans, there is little need for the conversion of alternating to direct current where alternating current is purchased from the utility.

General Electric System

The GENERAL ELECTRIC COMPANY offers a complete, comprehensive electrical system to meet the varied requirements of present-day practices, and not merely a collection of apparatus and material. Some of the elements of the General Electric System are described in this volume.

SUPPLY AND DISTRIBUTION OF ELECTRIC ENERGY IN BUILDINGS

The data presented in this catalogue relate to general problems involved in the supply and distribution of electrical energy for office buildings, banks, hotels, theaters, department stores, hospitals, educational and public buildings, large apartment houses, and similar structures.

Other sections of this catalogue describe apparatus and supplies for the generation and utilization of electrical energy for such structures.

For buildings of the character defined in the first paragraph of this section, electricity is used for:

(1) Lighting.

(2) Power for elevators, pumps, fans, air compressors, ice machines, kitchen and laundry machinery, vacuum cleaners, office appliances, and miscellaneous uses.

(3) Heating.

Sources of Electrical Energy

Electrical energy for buildings is derived as follows:

Purchased Energy from a Public Utility—This may involve one, two, or even three incoming sets of supply mains, according to the degree of protection desired against possible shutdown. It may be concerned with energy purchased as alternating or direct current, or both. Proper and efficient utilization of the energy may require substation equipment for stepping down a voltage too high for interior distribution, or machines designed for conversion from alternating current or direct current.

Electrical Energy Manufactured on the Premises—To use energy obtained from this source necessitates the choice of a system, whether alternating or direct current; the selection of the type of prime mover; and the determination of the number and size of the generating units.

Combined Purchased and Manufactured Energy—Such a source of supply involves the problems of tie-in with emergency sources of energy; throw-over connections, etc.

Electrical Requirements of a Supply and Distribution System

The essential elements of a system of purchased electrical energy are:

(1) The incoming line or lines.

(2) The disconnecting switches, circuit breakers, or other protective devices, and the meters, installed by the utility company or considered as part of the incoming lines.

(3) The interior distribution center occasionally called the substation, involving as the case may be, transformers, switches, circuit breakers, relays, meters, instruments, motor-generators, synchronous converters, exciters, regulators, and their control and protective devices.

(4) A system of circuits, buses, cables and conduits between the various incoming lines and switches at the distribution center, apparatus at the distribution center and the outgoing feeders.

(5) A number of power and light feeders and their branches, with cables, conduits and devices for their control and protection. Insulated cable for complete lighting and power system, including supply and distribution cables and cable for vertical suspension in high buildings.

(6) Various distribution panels for power and light, at proper locations on the feeders.

(7) The various energy-consuming devices themselves, for light, power and heat, with their respective controlling and protective equipments.

When energy is generated at the premises there is involved in place of (1) and (2) above, or in addition thereto, the generating apparatus with its auxiliaries, and its control and protective equipment. Usually, where energy is generated on the premises, there is less substation apparatus (3).

7 G-E Induction Motors Coupled to 6 House and 1 Fire Pump, Respectively, G-E Control Equipment at Left

Steam Turbine-Generator Sets

Small steam turbine generating sets using either alternating-current generators direct connected to the turbine or direct-current generators connected to the turbine through reducing gears, are a convenient addition to the power plant, or may supplant engine driven generators altogether under special circumstances. The water rate of turbines of this type, operated as they are usually non-condensing and with only moderate pressures and superheat, is higher than that of reciprocating steam engines of corresponding capacities. However, considerations of over-all cost, space, etc., enter into the problem, especially where the exhaust steam is used for heating and the steam consumption of the turbine itself is relatively unimportant.

Built in sizes from 10 K.W. upwards.

A-C. and D-C. Generators

G-E alternators are designed for good over-all efficiency and regulation. For building services, alternators should be equipped with automatic voltage regulators. General Electric direct-current engine driven generators are designed for high

efficiency and for close maintenance of voltage with varying loads. When applying engine driven generators to lighting and power services in commercial buildings, special attention has to be paid to securing the desired flywheel effect on the engine in order to maintain the most uniform voltage on the lamps. Where the elevator load is a large proportion of the generator capacity, and especially where rheostatic controlled elevators of high starting currents are employed in a building which generates its own power, a problem is introduced that requires special study to receive satisfactory service.

Built in capacities of 15 k.w. and upwards.

Transformers

While low voltage distribution of alternating-current circuits has been the rule in commercial buildings, it is not at all uncommon to bring 2300 volts, 4600 volts, or as high as 13,200 volts into a building and transform on the premises, getting the benefit of low line losses and the best possible power rates.

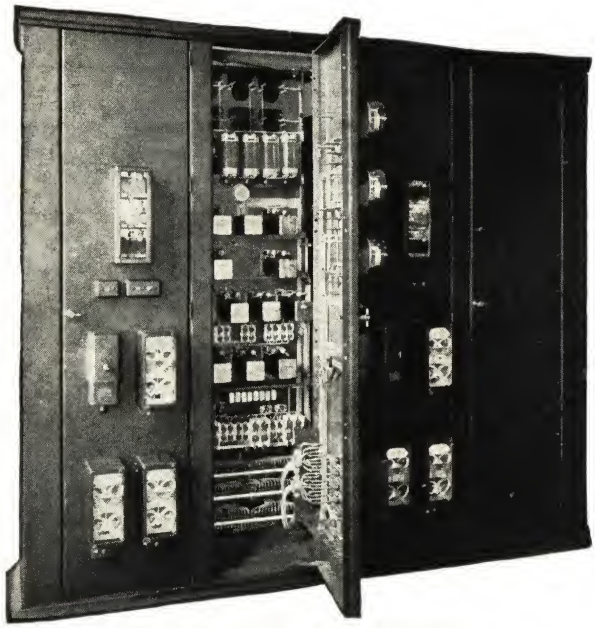
General Electric is always ready to co-operate to the fullest extent of its facilities to meet an emergency requiring short delivery on transformers for which demand is not sufficiently established to justify stocks.

SWITCHGEAR

G-E Switching Equipments

G-E Switching Equipments are manufactured to meet all different classes of requirements. A comprehensive line of standard panels has been developed and this line includes panels to meet all usual demands. When the conditions are such that standard panels cannot be applied, the company's long experience assures the best service in the selection and design of the switchboard to meet the requirements. For complete information on any equipment you are invited to consult the nearest G-E Sales Office. Publications giving either descriptive information or detail information on any equipment can be obtained from any G-E Sales Office.

Switchboard of Ebony Asbestos
Showing rectangular instruments and meters



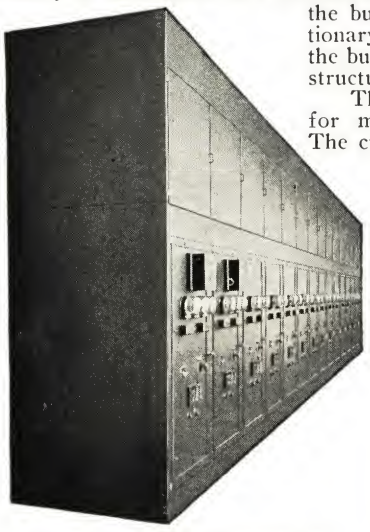
Steel Switchboard, Duplex Type
With rear panels hinged for easy access to front or rear panels (one panel swung open)

Safety Enclosed Switchgear

Safety enclosed removable truck switchgear has features which are reflected in decreased operating expenses and more satisfactory service: Factory built complete, low installation cost, economical operation, continuity of service, safety to attendants and decreased fire risk. Up to 7500 V. the buses are located in the stationary housing and above 7500 V. the buses are located in the superstructure.

The cubicles meet the demand for metal enclosed switchboard. The cubicles are easy to install, a small amount of floor space is required, no special foundations are necessary, all wiring is readily accessible on the back of the front panel, reduced maintenance costs are realized due to the dust and vermin proof construction, complete accessibility of the various parts and shipped ready for installation.

Indoor metal-clad switchgear is factory-built complete with compact unit construction, removable oil circuit breaker, live parts enclosed and high insulation. The metal-clad incorporates all the desirable features of cell mounted switchgear as well as the safe, economical and improved operating features of removable truck type switchgear.



A-c. Feeder Equipments in Cubicles
Electrically operated oil circuit breakers. (Manually operated can be furnished)

Stationary dead front switchboards with brush contact switches and air circuit breakers, and draw-out dead front switchboards with air circuit breakers, have the following advantages: safety to attendants, ease and economy of installation, and reduction of fire hazard. They are factory built complete.

Open Vertical and Bench Type Switchgear

This switchgear can be furnished with panels of natural black slate, ebony asbestos or steel and any equipment that is required for either indoor and outdoor installation.

Typical Stationary Dead Front Switchgear with Brush Contact Switches

Automatic Switching Equipments

Automatic switchgear is now available for practically all classes of service regardless of the size of the machines or units to be controlled.

Automatic supervisory equipments provide for the centralized control and indication of various types of switchgear located at outlying stations.

Automatic telemetering equipments are used to transmit readings of meters, instruments, indicators, etc., to a load supervisor's office.

G-E Switchgear Devices

Entire responsibility for the successful performance of General Electric switchgear assembly is assumed by the company, inasmuch as all of the electrical devices used to make up the complete switchboard are solely of General Electric manufacture.

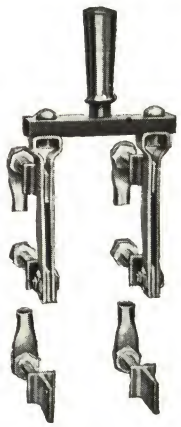
On the following page are shown a few devices representative of the complete G-E line.

G-E Switches

The complete line of G-E switches for switchboard work includes knife, disconnecting, control and brush contact types.

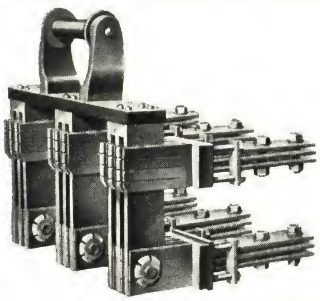
Knife—G-E knife switches are built in two types: Type LP-1 (30 to 1200 amp. inclusive) and Type LD-22 (1600 to 3000 amp. inclusive).

Type LP-1 switches are available in single, double, triple and 4-pole units, single and double throw, for circuits up to 600 volts a-c. or d-c. The 600 volt sizes are built in single pole, single and double throw units only. Single throw switches up to and including 600 amp., 250 volts d-c. and 500 volts a-c. can be supplied with provision for National Electrical Code standards fuses. Above 250 volts d-c. and 500 volts a-c. (and above 1000 amp. at any voltage) switches should be used as disconnecting devices only, usually connected in series with circuit breakers. Type LD-22 switches are also available in single, double, triple and 4-pole units, single and double throw, for circuits up to and including 600 volts d-c. or a-c.



100-Amp., Double Pole, Double Throw Knife Switch, Type LP-1

Disconnecting—All commercial types of disconnecting switches providing for various current capacities, voltages, mountings, etc., are manufactured. The insulation and normal rating are designed to meet the requirements of the A. I. E. E.



2000-Amp., Triple Pole, Single Throw Knife Switch, Type LD-22

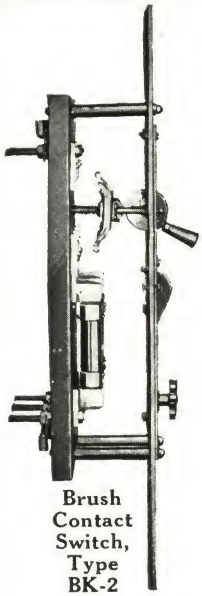
Control—Type CL-1 turn pull control switches are especially adapted for switchboard mounting and are recommended for the control of electrically operated air or oil circuit breakers. The switch is totally enclosed. The contacts of these switches will break currents of 10, 3.5 and 0.5 amp. at 125, 250 and 600 volts d-c., respectively, and currents of 15, 5 and 2 amp. at 110, 220 and 440 volts a-c. Should the mechanism of the device to be operated require heavier currents, the use of a control relay in conjunction with the control switch is recommended.

Turn Pull Control Switch with Resistor Type Indicating Lamps

Brush Contact—Brush contact switches are safety enclosed and externally operated for back or front connection. Back connected brush contact switches are used in connection with dead front switchboards as disconnecting switches or heavy capacity feeder switches.

Front connected switches are recommended for mounting in individual metal cabinets. The switches, assembled in this manner, are especially useful as feeder switches for individual motors in all industrial applications and for all power and lighting circuits coming within the range of the switch rating.

They can be furnished single, double, triple or 4-pole, in various capacities up to 600 amp. at 250 volts d-c. and a-c., or 500 volts a-c. Any standard size may be supplied with or without fusible cut-outs.



Brush Contact Switch, Type BK-2

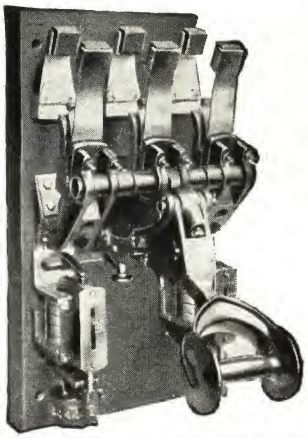
G-E Circuit Interrupting Devices

Many means are provided for closing and interrupting an electrical circuit both automatically or manually. We manufacture practically every variety and their selection therefore should be with caution sufficient to insure the correct operation both for the device and the imposition placed upon it.

Fuses—G-E enclosed and renewable enclosed type fuses are manufactured to accord with the National Electrical Code standards.

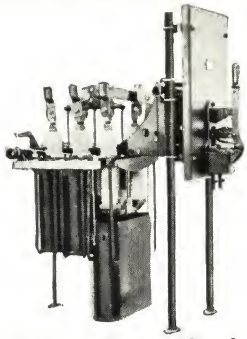
Enclosed fuses 1 to 600 amp. and renewable enclosed fuses 3 to 600 amp. can be furnished for either 250 or 600 volts.

Air Circuit Breakers—G-E air circuit breakers are of simple construction, yet positive action. Single, double, triple and four-pole breakers, with non-closable-on-overload trip-free handles, with instantaneous or time trip coils, for alternating or direct current, for voltages up to 650, are available. Ratings are based upon 20° C. rise above ambient temperature of 40° C. Underload, undervoltage and shunt trip attachments are available. Breakers may be solenoid operated or motor operated.



Type CP-108 3-pole 250-Volt, 400-Amp. Breaker

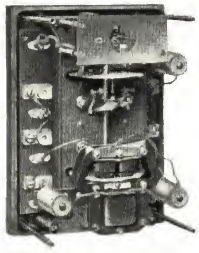
Oil Circuit Breakers—G-E oil circuit breakers include all sizes and styles commonly used, whether for the protection of motor circuits or intricate station networks. They are substantially constructed, thoroughly reliable, and conform with the standards of the A. I. E. E. and N. E. L. A. Furnished single, double and triple pole, for manual, solenoid or motor operation. Tripping may be either automatic or non-automatic. Electrically operated breakers may be adapted for under-voltage or over-voltage protection by the use of relays in the trip coil circuit. For manually operated breaker an undervoltage device is used instead of a relay.



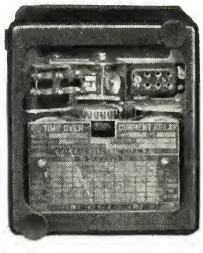
Triple Pole, Single Throw, Oil Circuit Breaker Type FK-132-A, Mounted on Panel Frame

G-E Relays

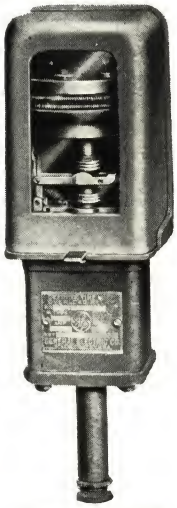
G-E relays, direct and alternating current, for protection against overcurrent, reverse current, unbalanced current, overvoltage, undervoltage, unbalanced voltage, overpower, underpower, reverse power, reverse phase, reverse polarity and abnormal temperature, are manufactured for all possible applications. Auxiliary, control and signal relays are also available. Relays may be obtained for instantaneous, time-delay or time-limit action. They are simple, durable, accurate and unusually reliable.



Polyphase, Induction, Power-directional Relay, Type IK-104 (Cover Removed)



Time, Overcurrent Relay, Type IAC



Standard-unit, Definite-time, Overcurrent Relay, Type PQ-3

Fittings and Accessories

While G-E switchgear is furnished complete, ready to install, a line of fittings and accessories is available on special order, including pipe fittings, supports, bus clamps, terminals, contact nuts, etc.

When Specifying

In order to specify correct type of switchboard panels and instruments for each installation, the architect or contractor should consult with the switchgear specialist in the nearest G-E Sales Office.

G-E MOTORS AND CONTROLS

The motors listed in the following pages are, in general, those used for "general purpose" applications.

When motors are to be "built in," or the problem of proper motor and control selection and application is of a special nature, technical information, prices, etc., are available through our nearest Sales Office.

The selection of an electric motor and control for a given application depends upon the following factors:

Available Power

Whether alternating or direct current, the voltage, and if alternating current, the number of phases, the frequency, and whether a two-, three-, or four-wire system.

Starting Conditions

In many cases the user knows, from past experience, the type and rating of motor required, or frequently the manufacturer of the machine to be driven will supply the desired information. If it is not possible to obtain accurate information as to the size motor, the amount of pull needed to start the load can usually be measured. Since the frequency of starting and the duration of the starting periods, as well as unusual starting current limitations, are vital factors in determining the type and size of control and motor, these factors should be predetermined. Otherwise, a generalization of starting conditions as light, medium, heavy, or extreme can be made. From these premises an estimate as to the proper motor and control can be made. It is desirable where definite information as to the exact requirements is not available, to make working tests before a definite selection for a particular job is decided upon.

Running Conditions

Speeds—Motors are usually selected with as high a standard normal speed as is feasible, because within limits the lower the speed of the motor, the more costly it is to build, and frequently its operating characteristics are not as good as those of higher speed standard motors. However, the increased first cost and inherent losses from mechanical transmission may offset such advantages where the driven machine operates at very low speeds.

Constant vs. Adjustable Speeds—Constant speed motors are the preferable choice in the majority of cases. Adjustable speed motors are higher in first cost and give lower operating constants. In ordinary sizes they are seldom justified unless the quantity or quality of the output of the driven machines will be materially improved.

Voltage and Frequency Range

G-E motors will operate successfully under the following conditions of voltage and frequency variations but not necessarily in accordance with the standards established for operation at normal rating:

Where the variation in voltage does not exceed 10% above or below normal.

Where the frequency variation does not exceed 5% above or below normal.

Where the sum of the voltage and frequency variation does not exceed 10% (provided the variation in frequency does not exceed 5%) above or below normal rating, as stamped on motor nameplate.

The starting and maximum running torque will vary as the square of the voltage; the speed varying directly with the frequency.

All applications for reversing service should be referred to the Company.

Quiet Operation

If motors are required to operate in places where quiet operation is desirable such as libraries, churches, theaters, hospitals, private residences, etc., the Company should be advised in full detail so that proper recommendations may be made and a suitable quiet operating motor furnished.

Secure the Recommendations of G-E Engineer Before Ordering

The Company builds a large number of different forms of motors and controllers to meet the varied requirements of service, either electrical, mechanical, or local. Salesmen and engineers are always glad to assist in selecting the particular type or form of motor to best meet the conditions.

In applying motors either where the location involves unusual physical conditions, or where the machines to be driven require other than standard characteristics, it is respectively suggested that the recommendations of the Company be always secured, as to type and form of motor best adapted to the especial conditions of the application.

General-Purpose, Polyphase, Constant Speed, Induction Motors Squirrel-Cage Type

Motor Defined

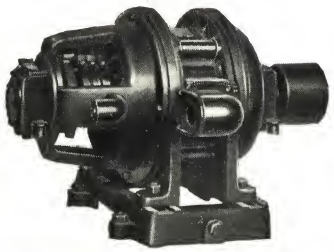
The word "motor" wherever used is intended to cover the machine without accessories, i.e., pulley, base, and starting and controlling device. Any accessories desired must be specifically mentioned.

Polyphase Adjustable Varying Speed Motor

Type M, wound rotor. 50% speed reduction. ¾ to 200 hp. 220, 440, 550 and 2200 volts.

Used largely on applications requiring an adjustable varying speed characteristic; i.e., the speed can be adjusted to any value over a considerable range but once adjusted will vary to a considerable degree with change in the load. To get maximum speed reduction, motor must be operated against rated torque.

Descriptive publications: ¾ to 10 hp., GEA-71. 10 to 200hp., GEA-5.



Alternating-current Slip Ring Motor

Polyphase Constant-speed Motors

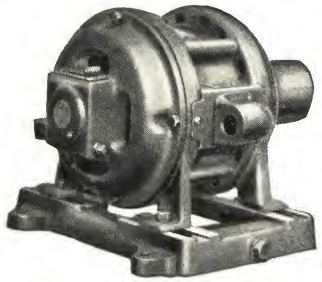
Type M, 3 and 2 phase, wound rotor. ¾ to 1000 hp. 220, 440, 550 and 2200 volts.

Adapted to heavy or frequent starting duty and to applications where low starting current is imperative.

Descriptive publication: GEA-5.

Fractional Horsepower Motors

Three-phase, Type RKT; 2-phase, Type RKQ. Sizes: ⅛, ¼, ⅓, ½ and ¾ hp. Voltages: 110 and 220. Cycles: 60, 50, 40, 30 and 25. Speeds: (60 cycle), 1200 to 3600 r.p.m. Bearings: Waste-packed bronze.



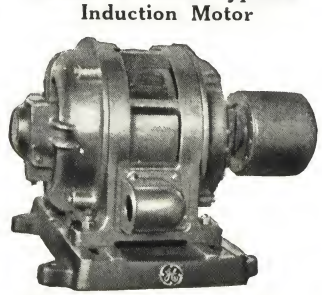
Riveted Frame Polyphase Induction Motor

Riveted Framed Polyphase Induction Motor

Type K, 3 and 2-phase. Sizes ¼ to 15 hp. Voltages: 110, 220, 440 and 550. Cycles: 60, 50, 40 and 25. Speeds (60 cycle): 450 to 3600 r.p.m. Bearings: sleeve or ball. Descriptive publication: GEA-1303.

Skeleton Frame Polyphase Induction Motor

Type K, 3 and 2-phase. Sizes: 15 to 200 hp. Voltages: 220, 440, 550 and 2200. Cycles: 60, 50, 40 and 25. Speeds (60 cycle): 360 to 3600 r.p.m. Bearings: sleeve or ball. Descriptive publication: GEA-6.



Skeleton Frame Polyphase Induction Motor

MOTOR CONTROLLERS

Illustrations Invariably Show Covers Removed

CR-1038 Enclosed Tumbler Switches

5 hp. and smaller (220 volts, 3-phase). Single, 2 or 3-phase; 550 volts and less. Single-throw; 3 or 4-pole; quick-make and quick-break. Overload protection by thermal cutouts.

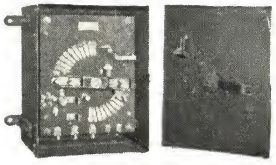
2 hp. and less. 2 or 3-pole. 600 volts, maximum. Single throw; quick-make and quick-break.

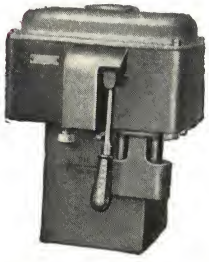
CR-1034 Standard Hand Compensators for Use with Squirrel Cage Motors

5 hp. and larger. 60 to 25 cycles. 110 to 550 volts. 2 or 3-phase. Undervoltage release: Instantaneous (standard) or time delay (extra). Overload protection; 2-pole thermal relay.

CR-1028 Enclosed Starting Rheostats

For use with wound-rotor induction motors. 15 hp. and smaller. 60 to 25 cycles. 110 to 550 volts. 2 or 3-phase.



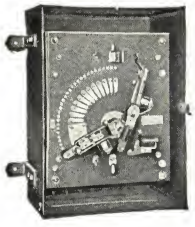


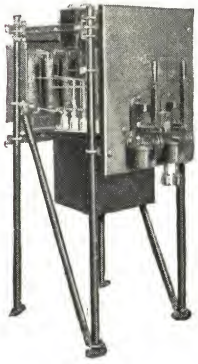
CR-1035 Oil Circuit Breakers

A useful motor switching device which will interrupt abnormally large currents. Overload and undervoltage protection optional.

CR-1203 D-c. Speed Regulating Rheostats

¼ to 50 hp. 115 and 230 volts. For shunt-wound adjustable-speed motors. Starting duty and speed control. Undervoltage protection.





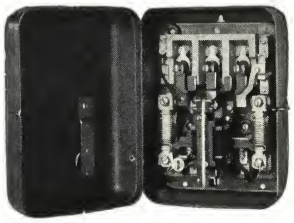
Switchboard Panels

2200 volts and less. Furnished with or without auto-transformer for reduced or full voltage start. Undervoltage and overload protection. High interrupting capacity.

CR-2931 Float Switches

For tank or sump operation. Are suitable for use in the control circuit of a-c. or d-c. magnetic starters.

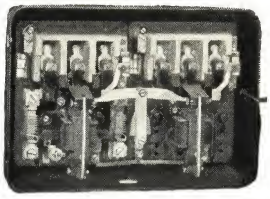
CR-7006 Remote Control Equipment for A-c. Motors

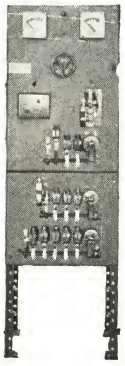


Full voltage start. For all squirrel-cage motors and primary of wound-rotor induction motors.

CR-7009 Magnetic Reversing Switches

1½ to 60 hp., 110 to 600 volts, 60 to 25 cycles, 1, 2 or 3-phase. Overload and undervoltage protection.





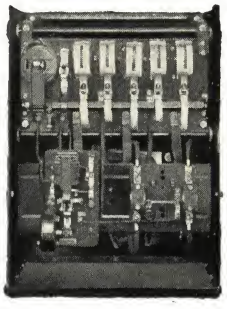
Automatic Synchronous Motor Starters

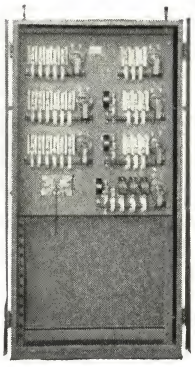
CR-7061 reduced voltage starter for use with medium and high speed synchronous motors illustrated at the left.

CR-7065 full voltage starter for use with low speed synchronous motors, 700 hp. and smaller, 220 to 2200 volts, 3 phase, 25 to 60 cycles. Overload and undervoltage protection.

CR-7051 Reduced Voltage Starters

Standard automatic starting compensators. 600 hp. and smaller, 550 volts and less, 60 to 25 cycles, 2 or 3-phase, undervoltage and overload protection. Sizes 50 hp. and smaller, mounted in dust-tight boiler-plate enclosing case are available for use in such places as mills, foundries and refineries.



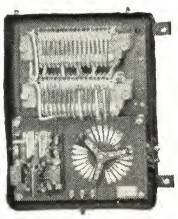


CR-7761 Remote Speed Indicating Controller for Fan Service

An enclosed controller with push button station for use with varying speed wound-rotor induction motors. 5 to 50 hp., 220 volts, 25 to 60 cycles, 3 phase. Time-limit acceleration. Undervoltage and overload protection.

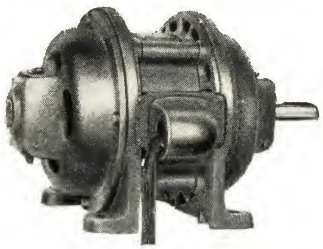
CR-7765 Controller for A-c. Wound-rotor Induction Motors for Fan Service

Standard enclosed controller. 50 hp. and smaller, 110, 220, 440 and 550 volts, 25 to 60 cycles, 3 phase. Time-limit acceleration. Undervoltage and overload protection.



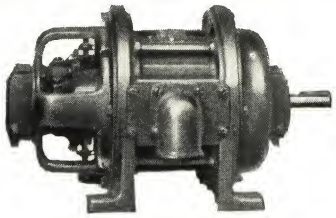
ELEVATOR MOTORS AND CONTROL

A-c. Single-phase or Polyphase Motors. D-c. Constant or Adjustable-speed Motors.



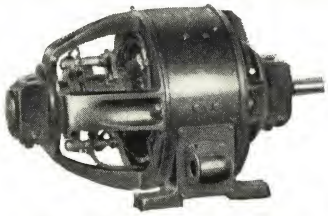
Constant-speed Polyphase Motors, Type KE

1 to 30 hp., 2 or 3-phase, 220, 440 and 550 volts, 60 cycles



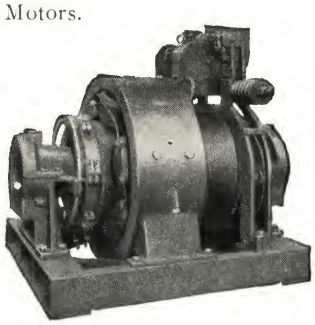
Single-phase Motors, Type SCRE

½ to 10 hp. Constant speed. 60 cycles



D-c. Reversible Elevator Motors, Type BDE and CDE

¾ to 30 hp. 115 and 230 volts. Commutating poles



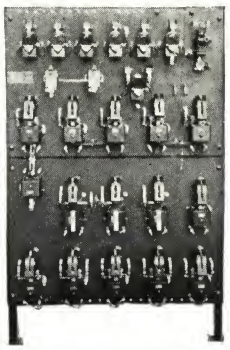
Type GTE Gearless Traction Elevator Motors

For elevator speeds of 500 ft. per minute and over. Meets the exacting requirements of modern high-speed elevator service

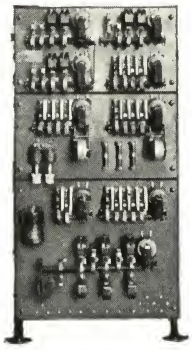
Descriptive publication: GEA-63

High-Speed Elevators—If elevator speeds of 500 ft. per minute or over are selected, a gearless elevator machine is recommended. This type of equipment uses a slow-speed, direct-current motor with a driving sheave mounted on the motor shaft. Two types of control are used for this class of service, the rheostatic type and the variable-voltage type.

The only advantage of rheostatic control over variable voltage control is a somewhat lower first cost.



Full-magnetic Control Panel for a D-c. Elevator Motor with Variable Voltage Control



Full-magnetic Control Panel for a Two-speed A-c. Elevator Motor

With variable voltage control either a-c. or d-c. power supply can be utilized.

Multi-speed Polyphase Motors—For elevators operating at speeds (up to 450 ft. per min.) motors operating at more than one basic speed are often used.

Both have squirrel edge rotors.

Descriptive publication: GEA-405 and GEA-435.

Wound Rotor Polyphase Motors—Are also built. Descriptive publication: GEA-434.

CENTRIFUGAL AIR COMPRESSORS

General Electric can furnish blowers for any volume and pressure to meet the requirements of any pneumatic system.

Advantages—

Constant pressure over a wide variation in volume.

Volume varies according to the requirements in most applications and in others can be adjusted by operating the blast gate.

Power required is lower and varies directly with the volume delivered.

Delivers a steady even flow of air free from pulsations and operates quietly without vibrations.

Superior mechanical construction; one-piece shaft eliminating couplings and belts or gears.

Forced lubrication by gear-type pump geared to shaft.

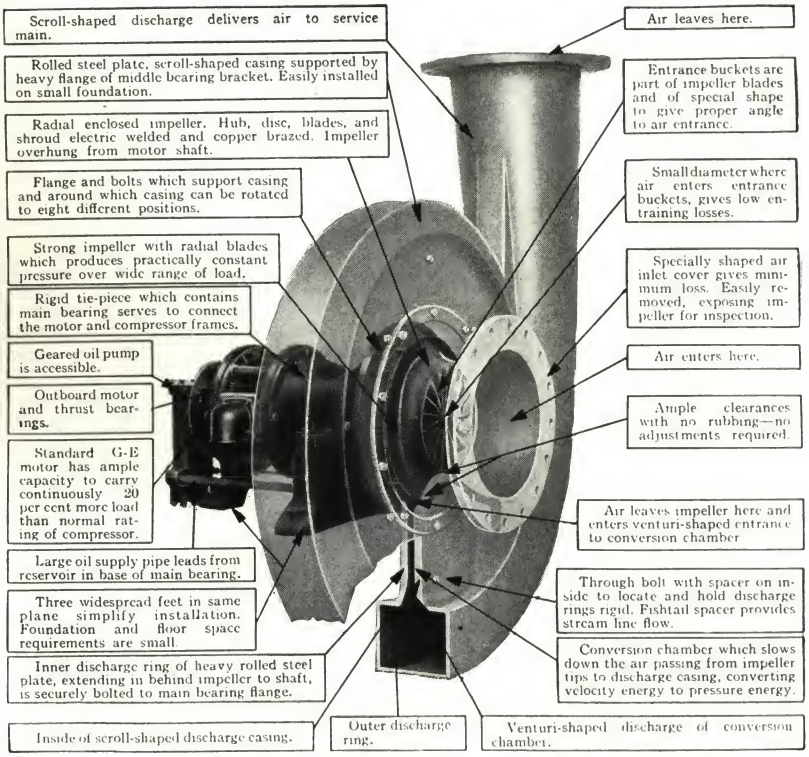
Low installation and maintenance costs.

Undivided responsibility for the success of the complete unit.

Small floor space with simple foundations.

Accessibility, as complete inspection can be made without removing piping.

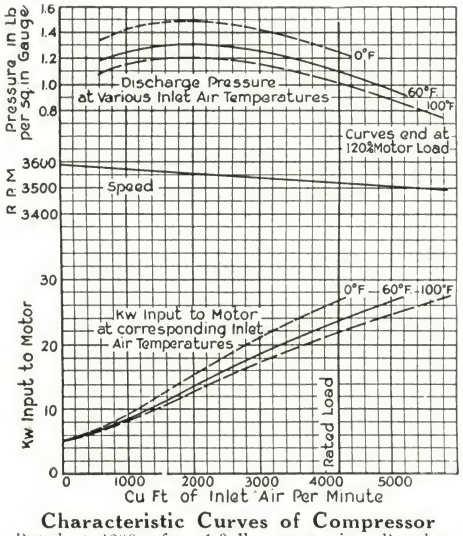
Greater number of positions of discharge opening possible, which positions can be changed by customer to suit individual requirements, saving pipe and labor and making a neater installation.



Construction Details, Single Stage Centrifugal Air Compressor

Operating Characteristics—

Curves made from tests on a listed machine show very fully the characteristics of the G-E centrifugal compressor.



Characteristic Curves of Compressor

Rated at 4200 c.f.m. 1.0 lb. per sq. in. Based on air at 14.7 lb. per sq. in. Abs. Inlet Pressure

METROPOLITAN ELECTRIC MFG. CO.

LONG ISLAND CITY, N. Y.

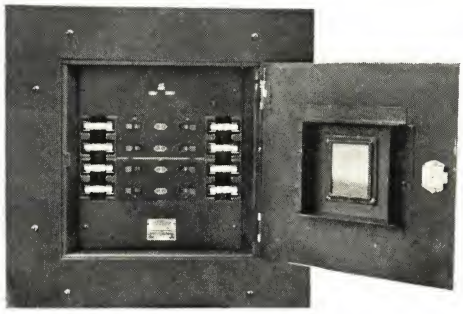
For "Facealite" Electric Mirrors and Bathroom Cabinets, see Manufacturers' Index

METROPOLITAN ELECTRICAL WIRING AND CONTROL EQUIPMENT

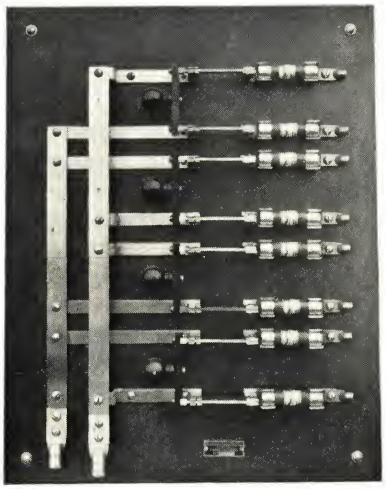
The METROPOLITAN ELECTRIC MFG. CO. manufactures an extensive line of electric switchboards, panelboards and electrical wiring equipment. The following appliances are the results of forty years experience in the production and installation of this type of equipment:

STANDARD METERING and SAFETY PANELS; FUSES; PUSH BUTTON SWITCHES and RECEPTACLES; KNIFE SWITCHES; STAGE SWITCHBOARDS; D-c. and A-c. SWITCHBOARDS; WIRING DEVICES; ACCESSORIES; FUSE BLOCKS, SWITCH PLATES; ETC.

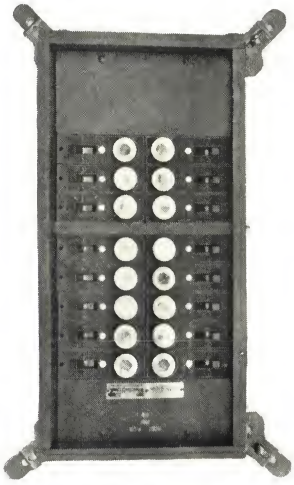
We maintain a large engineering department to design switchboards and other electrical equipment to suit your requirements. Complete information on any product upon application.



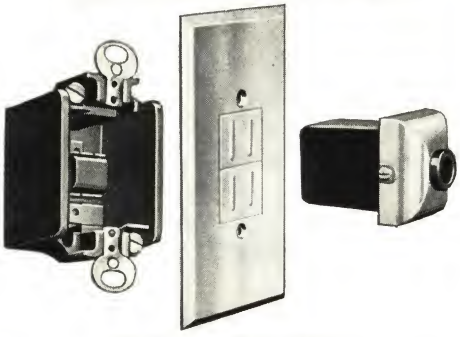
Unit Type Single Pole 30 Ampere Heavy Duty Toggle Switches. Door in Door Type



2-2 Wire 250 Volts Power Panel N.E.C. Type A. Knife Switches



3-Phase 4-Wire Naro Lighting Panel. Type N.T.S.-SN



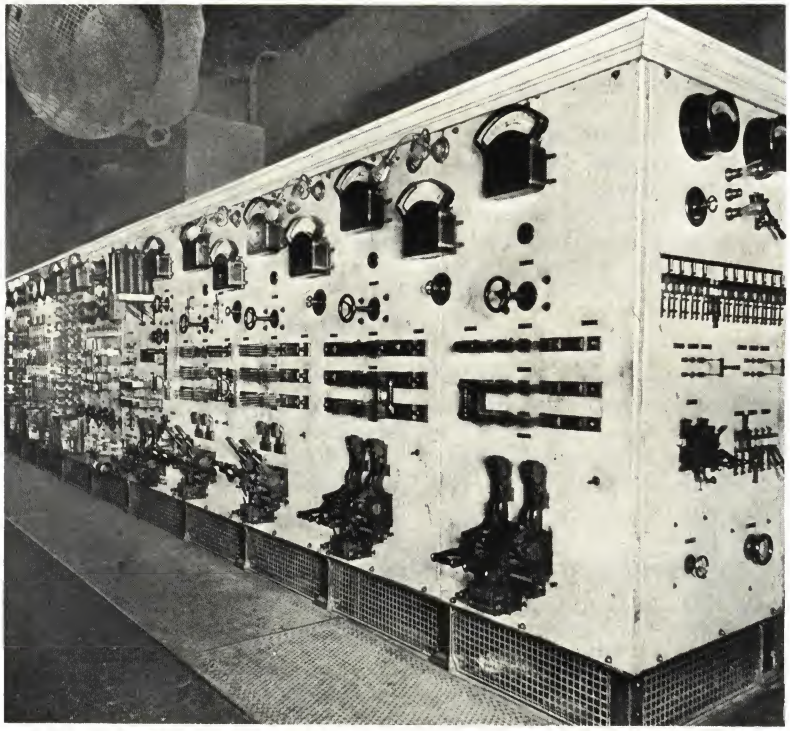
Flush Type Receptacles

30 amp. class

60 amp. class

100 to 600 amp. class

Enclosed Fuses
Renewable and Non-Renewable



A Marble Board of Unusual Appearance Installed in the Whitehall Building, New York, N. Y.

Milled Clip Knife Switch

FRANK ADAM ELECTRIC CO.

Member of the Producers' Council

GENERAL OFFICE AND FACTORY

3650 Windsor Place
ST. LOUIS, MO.

(Mail Address, P. O. Drawer 22)

DISTRICT OFFICES

ALBUQUERQUE, N. M.	CLEVELAND, OHIO	*LOS ANGELES, CALIF.	*OMAHA, NEB.	CALGARY, ALTA.
*ATLANTA, GA.	*CINCINNATI, OHIO	*MEMPHIS, TENN.	*PHILADELPHIA, PA.	HAMILTON, ONT.
*BALTIMORE, MD.	*DALLAS, TEX.	*MINNEAPOLIS, MINN.	PITTSBURGH, PA.	MONTREAL, QUE.
*BOSTON, MASS.	DENVER, COLO.	*NEW ORLEANS, LA.	†SAN FRANCISCO, CALIF.	TORONTO, ONT.
*BUFFALO, N. Y.	†DETROIT, MICH.	†NEW YORK, N. Y.	SEATTLE, WASH.	VANCOUVER, B. C.
CHICAGO, ILL.	*KANSAS CITY, MO.		TULSA, OKLA.	WINNIPEG, MAN.

Warehouse Stocks are maintained at District Office Points marked *
Branch Service Shops are located at points marked †

REPRESENTATIVE

Products

DISTRIBUTION PANELBOARDS and CABINETS: Dead Face (Safety Type); Live Face.

METER CONTROL PANELBOARDS and CABINETS.

SWITCHBOARDS for light and power: manually operated, Dead and Live Face for all types of buildings; FA Major System of Lighting Control for theaters and auditoriums.

HANGER OUTLETS: for fan, heater, picture illumination, etc.

ADJUSTABLE FLOOR BOXES.

SWITCHES: Knife, Safety Type Brush, Flush Range, Safety Type Switchfuz.

Standardization

Due to the complete standardization of interchangeable units it is possible to manufacture, on a quantity basis, a product of the highest grade materials and workmanship, and to merchandize this at an exceedingly reasonable price. The comprehensiveness of the line adapts it to every need.

Standardization also makes it possible to carry in stock, in various parts of the country, steel cabinets and panelboards ready for immediate delivery.

All products fulfill the specification requirements of the National Electrical Code and bear the approval labels of the Underwriters' Laboratories, Inc., of the National Board of Fire Underwriters.

Experience

FRANK ADAM ELECTRIC CO. are pioneers in the design and manufacture of standardized panelboards and panelboard cabinets.

Continuous specialization over a period of thirty years in the design and manufacture of panelboards and switchboards, *exclusively*, gives assurance of wide experience resulting in a product that for years has been a standard of comparison.

The Company's long established financial responsibility and integrity, coupled with the recognized high standard of quality of the product and its comprehensive adaptability, is a guaranty sufficient to justify unqualified endorsement.

Manufacturing Facilities

The administrative office and manufacturing plant are in St. Louis, Mo., centrally located as to population and served with unexcelled transportation facilities.

The plant, the largest of its kind in the country, consists of a thoroughly modern, fireproof building covering an area of approximately 2½ acres. It has been specially designed and equipped for the most efficient and economical manufacture of the company's particular specialized products.

Distribution Facilities

Unexcelled facilities for prompt, adequate service are assured through the establishment of many branch assembly plants and stock carrying warehouses strategically located in the principal distributing centers of the country.

Engineering Service

The FRANK ADAM ELECTRIC CO. maintains at its Administrative Office a comprehensive Engineering Service, supplemented by competent engineers in charge of all District Offices. Prompt advice or assistance in the selection or design of panelboard and switchboard work is always available to the architect and his consulting engineer.

TECHNICAL DATA—FUSES AND SWITCHES

Branch Circuit Fuse Connections—Fuses for branch circuits are plug type unless cartridge type are specified.

Plug fuse connections are N. E. C. Edison, 30-ampere capacity; single pole for 1-fuse and double pole for 2-fuse equipment.

Cartridge fuse connections are N. E. C. 30-ampere capacity; single pole for 1-fuse and double pole for 2-fuse equipment.

Main Service Fuses—FA Switchfuz is provided where main service fuse connections are required. This new feature disconnects the fuses for replacement, making it safety type.

Branch Circuit Switches—Branch circuit switches are FA 30-ampere, heavy duty, tumbler type switches; single pole for 1-fuse and double pole for 2-fuse equipment.

Switches are assembled in moulded unit sections with N. E. C. fuse connections.

Main Switches—Main switches are FA safety brush type, with a protecting steel cover having interlocking door over main fuse connections which cannot be opened unless the switch is disconnected.

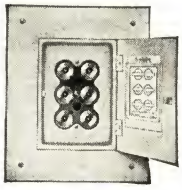
GENERAL TYPES OF PANELBOARD AND CABINET ASSEMBLIES

The panelboards here illustrated are all of the 1-fuse (solid neutral) type. For 2-fuse panelboards see FA current catalogue.

They are all of the Standardized Safety Type.

For numerical designations see diagrams FA current catalogue.

For details of construction, finish, etc. see FA current catalogue.



Type FBX

Type FBX—(F—Fuse; BX—Box) a neat, compact unit with moulded base and gutter type cabinet. Made in 4 and 6-circuit single fuse type only, with 3-wire main lugs.

Use—Smaller residences and commercial installations where the maximum demand is six branch circuits.

Type NR

Type NR—(N—solid neutral; R—residence). Moulded units are mounted on removable steel backs.

Use—Residences and other small jobs. Adapted to either 2 or 3-wire lighting service.

Note: On account of the small wiring gutter, this type of panelboard and cabinet can only be used when feeds for panel terminate in cabinet; whenever it is necessary to run risers through the cabinet use Type NR3G (1 fuse) or Type R3G (2 fuse).

Type NR3G

Type NR3G—(N—solid neutral; R—residence; 3G—3 in. gutter.)

Use—Larger residences and medium size jobs generally. Adapted to either 2 or 3-wire lighting service.

Note: This type of panelboard is made with main lugs only since they are not of sufficient width to accommodate main switches or subfeeders.

Type N2P3L—(N—solid neutral; 2—2-row; P—plug fuse; 3—3-wire mains; L—lugs only in mains.)

Use—Adapted to use where branch circuits are *not* controlled by branch circuit tumbler switches.

Note: This same panelboard with fuse connections in mains is N2P3SWF.

This same panelboard with brush type main switch and fuse connections in mains is N2P3BSF.

Type N2P3L

Type LNTP3L—(L—leader type, brown bakelite sections; N—solid neutral; T—branch tumbler switch; P—plug fuse; 3—3 wire mains; L—lugs only in mains.)

Use—Adapted to use where branch circuits are controlled by branch circuit tumbler switches.

Note: This same panelboard with fuse connections in mains is LNTP3SWF (see illustration).

This same panelboard with brush type main switch and fuse connections in mains is LNTP3BSF.

Door-in-door front furnished when so specified.

Type LNTP3L

Type LNTP3SWF

Type NTC3BSFD — (N — solid neutral; T—branch tumbler switch; C—cartridge fuses; 3—3-wire mains; BS—brush type main switch; F—fuse connections in mains; D—door-in-door front.)

Use—Adapted to use where branch circuits are controlled by branch circuit tumbler switches and where cartridge fuses are desired in lieu of plug fuses.

Note: This same panelboard with lugs only in mains is NTC3LD.

This same panelboard with fuse connections in mains only is NTC3SWFD.

Type NTC3BSFD

FA SWITCHFUZ AND FA FUSLOK (SAFETY TYPE) EQUIPMENT

Feeder Panelboards and Cabinets

Two designs of FA Safety type feeder panelboards and cabinets are available, the Switchfuz type and the Fuslok type.

Switchfuz Type—This is the latest development and consists of an assembly of the required number, capacity and type of individual Switchfuz units mounted on a heavy galvanized steel mounting back. Each Switchfuz is a self-contained unit with individual base and protecting steel cover. It is fastened to the mounting back with four screws, thus permitting it to be removed without disconnecting any other unit.

The FA Switchfuz is a combination switch and fuse unit, simple and compact in design and of the dead front safety type construction, so much in demand in electrical control equipment.

The frame is formed from a single piece of galvanized sheet steel. The cover and operating door are also made from one piece of sheet steel.

100-amp. 250-volt 3-pole FA Switchfuz Unit

Inside of the steel frame are two insulating bases, upon which are mounted the contact clips, wire terminals, fuse clips and contact blades. To disconnect the Switchfuz unit, it is only necessary to open the door. The fuses are then dead for replacement.

These Switchfuz units have been listed by the Underwriters' Laboratories, Inc., as operating switches in capacities from 30 to 600 amperes inclusive, 250 volts, a-c., 30 to 400 amperes d-c. and 600 volts, a-c. They have also been listed as disconnect switches in 800 and 1200-ampere capacities, 250 volts, a-c. and d-c.

The panelboards are regularly furnished with code thickness galvanized steel boxes, having ample wiring gutters around all four sides. Inasmuch as all live parts, including the main busbars, are totally enclosed with protecting steel covers, the one-door type of steel front is supplied.

Fuslok Type—This is similar in construction, except that all switches are of the brush contact type with quick-make and quick-break operating mechanism.

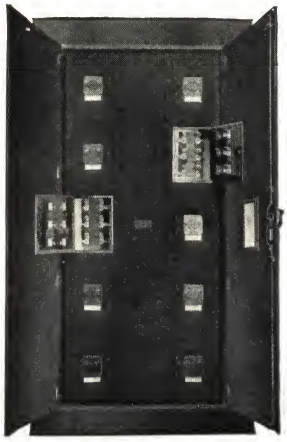
A door in the steel switch cover affords access to the fuses. This door is arranged with interlocking mechanism so that it cannot be opened when the switch is in the "on" position, nor can the switch be closed to the "on" position with the door open.

This type of panelboard is supplied with the same type of steel cabinet described above for the Switchfuz equipment.

Safety Type and Dead Front Switchboards

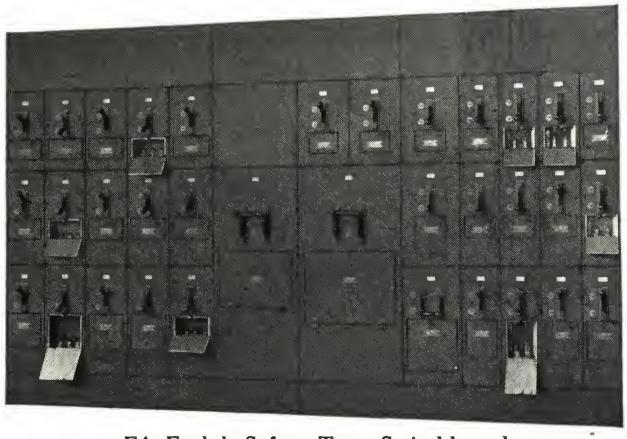
These switchboards are available in the Switchfuz type and Fuslok type.

Both types are built up of the same standardized Switchfuz or Fuslok units, mounted on formed steel supports. They are readily removable from the front of the switchboard without affecting any other unit.



FA Switchfuz Safety Type Feeder Panelboard

FA Fuslok Safety Type Feeder Panelboard



FA Fuslok Safety Type Switchboard

The safety type switchboards, in both the Switchfuz and Fuslok type, are completely enclosed in a substantial steel enclosure with doors at rear which open over the busbar and wiring compartment. This safety type switchboard is particularly desirable where the switchboard is set out in the center of a room, since it does not require any other form of enclosure to prevent access to the rear.

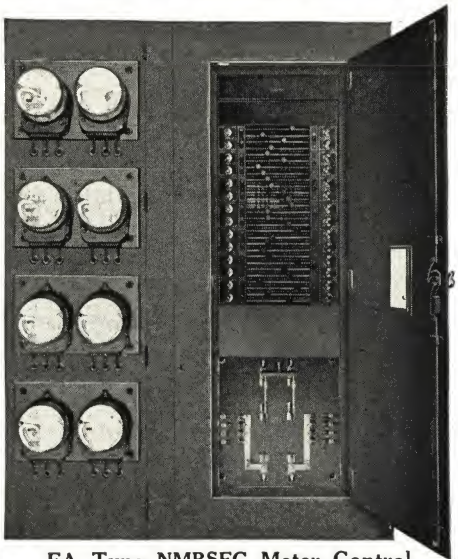
The dead front type is similar in design, except that the doors at the rear are omitted. This construction requires a protecting grille or other form of enclosure to prevent access to the rear of the switchboard.

METER CONTROL PANELBOARDS AND CABINETS

Meter control panelboards and cabinets follow in general the same standards of design and construction as the standard lighting panelboards. Two types of meter control panelboards are manufactured, the Type NMB and the Type NMW. These are of the solid neutral, single-fuse type and to obtain the two-fuse type where grounded neutral condition does not exist, the elimination of the letter "N" designates the two-fuse equipment.

Type NMB—This is the busbar type of meter control panelboard and has a vertical copper bar in the center of the panel for each meter and a horizontal bar for each branch circuit. The connection between the meter bar and branch circuit bar is made with a specially designed connecting device which can be readily moved from one meter bar to another but cannot be removed completely from the panel. This type is recommended because of its simplicity in design and flexibility in operation because any one can change the meter connections without the use of tools.

Type NMW—This is of the wire connecting type and the branch circuits must be connected to their respective meter with wire. Any changes in the metering arrangement require the services of an experienced electrician. The extra labor required to connect Type NMW panelboards will in most cases offset the saving in cost over the Type NMB; therefore, the NMB is recommended.



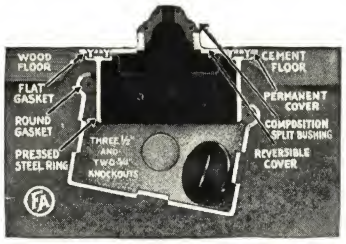
FA Type NMBSFC Meter Control Panelboard and Cabinet

Cabinets—These panelboards are furnished with three types of cabinets. Type GC is the standard gutter type without space for meters; Type SFC has additional box or boxes installed adjacent to the panel box and these boxes are fitted with hinged doors having wood meter boards for mounting meters on face of cabinets; Type SBC is similar in design to SFC except the panel box and meter boxes are increased in depth to permit mounting the meters inside of cabinet under a locked door. Cabinets are designed so that connections between branch circuits and meter busses or wires can be enclosed under separate sealable cover, if desired. An additional charge is made for these protection covers.

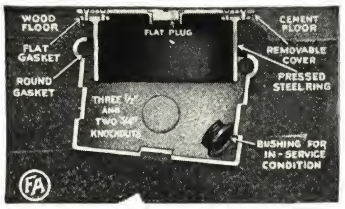
FA FLOOR OUTLETS

FA Adjustable Floor Box Type FB345—This is an adjustable, roomy and watertight unit. The box is of pressed steel with hot galvanized finish to resist corrosion and fitted with a pressed steel adjustable ring which allows for mounting the cover plate properly if the box should be out of alignment. The cover plate is in two parts, a permanent outer ring which is fastened to the adjustable steel ring and the reversible cover which is fitted with a split insulating bushing to protect the wires extending out of the box. No extra fittings are required to place this floor box in service.

FA Type FB5 Floor Box—This type is similar in every way to FB345 except the cover is not reversible and receptacle plugs cannot be disconnected without removing plate. This type was designed particularly for use as an outlet for telephone, annunciator and electric light wires that are permanently connected.



Type FB345 Floor Box



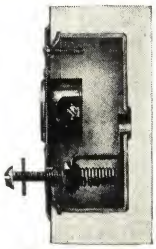
Type FB5 Floor Box

FA HANGER OUTLETS (PATENTED)

Designed especially for fan service but are adaptable as utility outlets for heaters, lights and various electrical appliances. A recent use for this unit has been to provide means for supporting and connecting radio loud speakers.

FA hanger outlets are a convenience in all types of modern buildings where safety and efficiency are desired in fan or other outlet service.

Unsightly wall brackets, standards and temporarily makeshift installations that are at the least dangerous, are eliminated.



Security Type

Hanger outlets are permanent because they are built in at the same time as the rest of the electric service equipment.

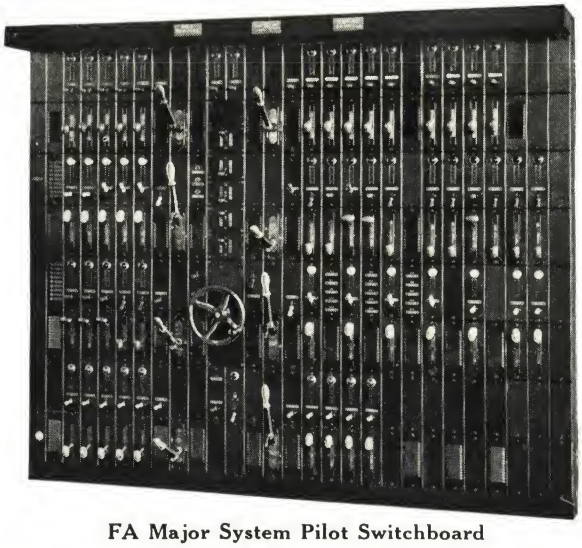
The "Security" is a complete unit furnished with a special 4-in. galvanized steel outlet box.

Type FHSB is a fitting to be used with any of the standardized NEMA outlet boxes and covers.

Both units are adjustable to provide for correct alignment if the box should not be correctly installed.

FA MAJOR PRE-SELECTIVE REMOTE CONTROL SYSTEM FOR AUDITORIUM AND STAGE ILLUMINATION CONTROL

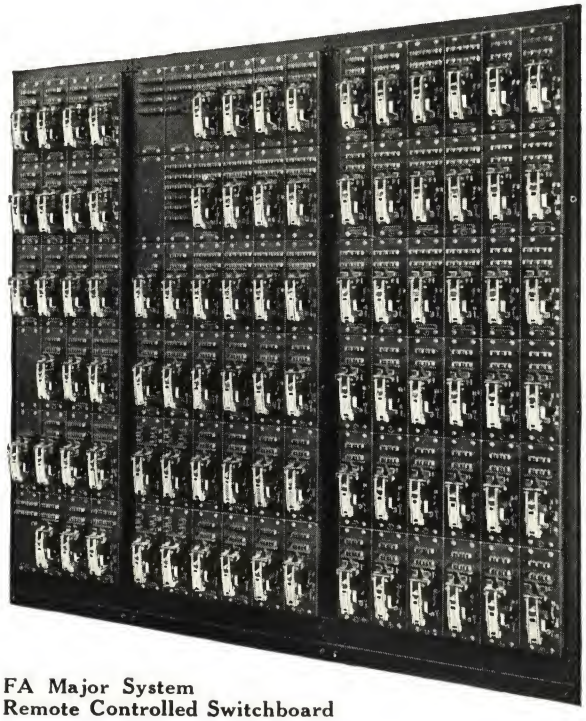
The remote control feature of this system stamps it as particularly desirable for theatres, auditoriums, fraternal buildings and schools where safe, foolproof and positive acting equipment is desired.



FA Major System Pilot Switchboard

In one composite unit on the stage are included the necessary switching and dimming controls and on which a minimum of current is actually handled. This composite unit is known as the Pilot Switchboard.

The second unit of this system upon which the heavy current capacities are opened and closed should be installed in the basement, preferably directly under the pilot switchboard. It is t rmed the Remote Controlled Switchboard. Types of this system are available for the smallest school as well as the largest and most completely equipped theatre.



FA Major System
Remote Controlled Switchboard

This equipment is strictly an engineering proposition and complete details can be obtained from the nearest FA district office.

Bulletin No. 42 the "Control of Lighting in Theatres" will be gladly furnished upon request.

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue
For References to Other Products, see Index to Manufacturers

WESTINGHOUSE PANELBOARDS

Type NAB Nofuze Panelboards

Type NAB Nofuze Panelboard

From the earliest days of the panelboard industry, fuses have been almost universally employed for branch circuit protection. These have been developed solely with a view to reduction of fire and accident hazard. Any fusible metal, so employed, has the following inherent defects:

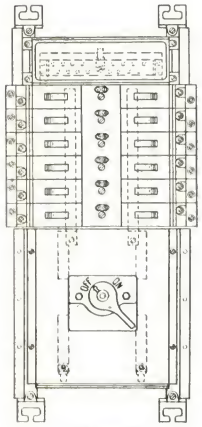
(1) Necessity for replacement on burnout. (2) Ease of replacement with higher capacity element. (3) Ease of rendering inoperable by tampering. (4) Low inverse time limit for slight overloads.

The perfection of a new type of circuit-breaker operating on the principle of de-ionization has enabled Westinghouse to place on the market a radically new type of panelboard—a control with neither switches nor fuses in the branch circuits. This circuit-breaker offers the logical solution to fuse objections and, by its construction, automatically adds to circuit protection the functions of a switch.

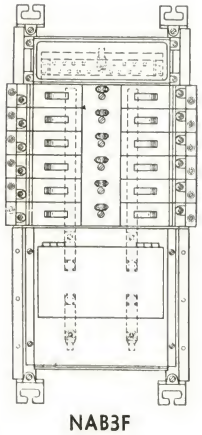
The breaker consists of an enclosed toggle mechanism which may be actuated manually or automatically. Automatic release is secured through the action of a bimetallic element which engages the tripping latch of the mechanism. The mechanism trips free from the handle and cannot be held against an overload or short circuit condition. The breaker is so calibrated that it will not trip on momentary overloads but will operate before dangerous values are reached. Due to the application of the "de-ion" principle the rupturing ability exceeds by a vast margin any conditions which may be met in service. (Continued on next page.)

SAFETY-TYPE NO-FUZE PANELBOARDS WITH SINGLE POLE, AUTOMATIC, BRANCH CIRCUIT-BREAKERS

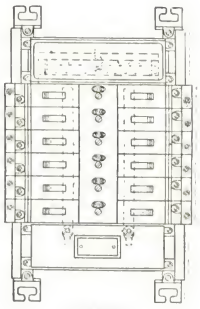
Panel—Sections of moulded asbestos composition.
Branches—*15-amp., single pole, 125-volt, Westinghouse Automatic Circuit-Breakers.
Boxes—Code gauge sheet steel with 4-in. gutters. All boxes 4⅞ in. deep, 20¼ in. wide outside dimensions.
Fronts—Code gauge sheet steel, black finish, flush or surface type.



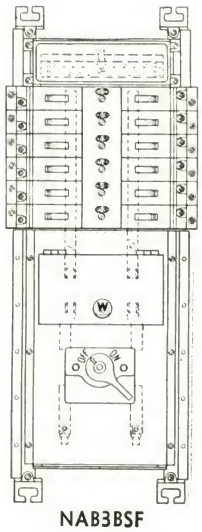
NAB3BS



NAB3F

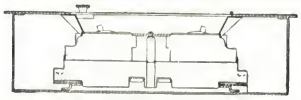


NAB3L



NAB3BSF

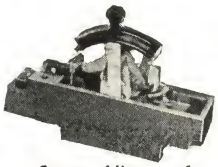
Solid Neutral—Single Door



Mains, 125/250-volt, 3-wire—Branches, 125-volt, 2-wire

No. of circuits	Main amp.	Main Lugs Only: Panel box and front Cat. No.	Main Lugs Only: Height of box, in.	Main Lugs Only: Approx. shipping wt., lb.	Unfusible Main Brush Switch: Panel box and front Cat. No.	Unfusible Main Brush Switch: Height of box, in.	Unfusible Main Brush Switch: Approx. shipping wt., lb.	Main Fuse Connections: Panel box and front Cat. No.	Main Fuse Connections: Height of box, in.	Main Fuse Connections: Approx. shipping wt., lb.	Main Brush Switch Fusible with Interlock Door: Panel box and front Cat. No.	Main Brush Switch Fusible with Interlock Door: Height of box, in.	Main Brush Switch Fusible with Interlock Door: Approx. shipping wt., lb.
2	30	NAB302L	17¼	60	NAB302BS	23¼	85	NAB302F	20¼	80	NAB302BSF	29¼	95
4	30	NAB304L	17¼	70	NAB304BS	23¼	95	NAB304F	20¼	85	NAB304BSF	29¼	105
6	60	NAB306L	20¼	80	NAB306BS	26¼	100	NAB306F	23¼	90	NAB306BSF	32¼	115
8	60	NAB308L	20¼	85	NAB308BS	26¼	105	NAB308F	23¼	100	NAB308BSF	32¼	120
10	60	NAB310L	23¼	90	NAB310BS	29¼	110	NAB310F	26¼	105	NAB310BSF	35¼	130
12	60	NAB312L	23¼	100	NAB312BS	29¼	115	NAB312F	26¼	115	NAB312BSF	35¼	135
14	100	NAB314L	26¼	110	NAB314BS	35¼	120	NAB314F	32¼	125	NAB314BSF	41¼	140
16	100	NAB316L	26¼	115	NAB316BS	35¼	125	NAB316F	32¼	130	NAB316BSF	41¼	150
18	100	NAB318L	29¼	125	NAB318BS	38¼	130	NAB318F	35¼	140	NAB318BSF	44¼	160
20	100	NAB320L	29¼	130	NAB320BS	38¼	135	NAB320F	35¼	145	NAB320BSF	44¼	165
22	100	NAB322L	32¼	140	NAB322BS	41¼	145	NAB322F	38¼	160	NAB322BSF	47¼	180
24	100	NAB324L	32¼	145	NAB324BS	41¼	155	NAB324F	38¼	165	NAB324BSF	47¼	190
26	100	NAB326L	35¼	150	NAB326BS	44¼	165	NAB326F	41¼	175	NAB326BSF	50¼	200
28	100	NAB328L	35¼	160	NAB328BS	44¼	175	NAB328F	41¼	190	NAB328BSF	50¼	210
30	100	NAB330L	38¼	170	NAB330BS	47¼	185	NAB330F	44¼	200	NAB330BSF	53¼	220
32	100	NAB332L	38¼	175	NAB332BS	47¼	195	NAB332F	44¼	205	NAB332BSF	53¼	230
34	200	NAB334L	44¼	180	NAB334BS	53¼	205	NAB334F	53¼	210	NAB334BSF	59¼	240
36	200	NAB336L	44¼	185	NAB336BS	53¼	215	NAB336F	53¼	215	NAB336BSF	59¼	250
38	200	NAB338L	47¼	190	NAB338BS	56¼	225	NAB338F	56¼	225	NAB338BSF	62¼	260
40	200	NAB340L	47¼	195	NAB340BS	56¼	235	NAB340F	56¼	235	NAB340BSF	62¼	270
42	200	NAB342L	50¼	200	NAB342BS	59¼	240	NAB342F	59¼	245	NAB342BSF	65¼	280
44	200	NAB344L	50¼	205	NAB344BS	59¼	245	NAB344F	59¼	255	NAB344BSF	65¼	290
46	200	NAB346L	53¼	215	NAB346BS	62¼	255	NAB346F	62¼	265	NAB346BSF	68¼	300
48	200	NAB348L	53¼	225	NAB348BS	62¼	260	NAB348F	62¼	275	NAB348BSF	68¼	310
50	200	NAB350L	56¼	235	NAB350BS	65¼	270	NAB350F	65¼	285	NAB350BSF	71¼	320
52	200	NAB352L	56¼	245	NAB352BS	65¼	280	NAB352F	65¼	295	NAB352BSF	71¼	330
54	200	NAB354L	59¼	255	NAB354BS	68¼	290	NAB354F	68¼	305	NAB354BSF	74¼	340
56	200	NAB356L	59¼	265	NAB356BS	68¼	300	NAB356F	68¼	315	NAB356BSF	74¼	350
58	200	NAB358L	62¼	275	NAB358BS	71¼	310	NAB358F	71¼	325	NAB358BSF	77¼	360
60	200	NAB360L	62¼	285	NAB360BS	71¼	320	NAB360F	71¼	335	NAB360BSF	77¼	370
62	200	NAB362L	65¼	295	NAB362BS	74¼	330	NAB362F	74¼	345	NAB362BSF	80¼	380
64	200	NAB364L	65¼	305	NAB364BS	74¼	340	NAB364F	74¼	355	NAB364BSF	80¼	390

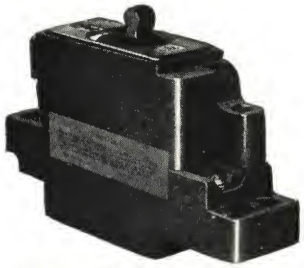
*Catalogue number covers 15-ampere breakers only. 20, 25 or 35-ampere breakers can also be supplied when specifically mentioned on order. Panels with mixed capacity breakers may be arranged if desired.



Open View of Nofuze Breaker

The de-ion principle is simple and inexpensive, consisting of a series of steel plates mounted in a plane at 90° to the path of the arc, insulated from each other and the contacts. The arc is driven between the plates either by magnetic means or by the natural flow of the gases, the latter means being sufficient for low voltages. The gases are de-ionized by their passage over the cool surfaces of the plates, an arc voltage is quickly built up and the arc quietly extinguished.

The thermal release element is so designed as to give desirable inverse-time-limit characteristics. For instance, the circuit-breaker will carry 110% of normal rating indefinitely without tripping but will trip within one minute when the current reaches 150% of normal. At higher overloads, the element becomes very short until instantaneous tripping is secured. This feature prevents tripping on momentary overloads but positively protects the branch circuit wire and its insulation before dangerous values are reached.



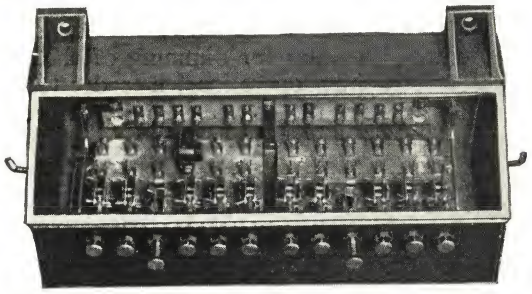
Nofuze Breaker with Cover in Place

Oil Immersed Panelboards

Westinghouse oil immersed panelboards are designed primarily for protection of lighting and power circuits in applications where the action of corrosive and explosive chemicals is unusually severe.

Tankless Oil Immersed Lighting Panelboard

This panelboard consists of a combined cast iron supporting bracket and oil container in which are assembled externally operated 30-ampere, 250-volt, tumbler switches. Access to fuses is obtained by removal of the cover. The fuses and switches are mounted on a slate base and each fuse is equipped with an insulated holder. These panelboards are available with 6 or 12 circuits for single-fuse branches, or 3 and 6 circuits for double-fuse branches.

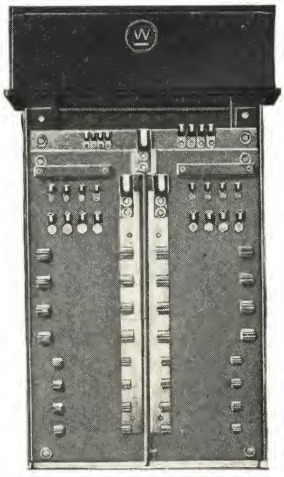


Oil Immersed Tankless Type Panel with Cover Removed

Oil Immersed Distribution Panelboard

This panelboard is provided with a supporting cast iron pothead with a suspended panel, the panel having mounted on it the necessary busbars and fuse gaps. The panel is totally immersed in a removable tank filled with oil. When in position, the tank closes against the lower surface of the cast iron pothead thus forming an oil and acid proof joint. The leads are brought through conduit into the cast iron pothead, and then through the bus bars to the fuses. The leads then go from the fuses to the various circuits.

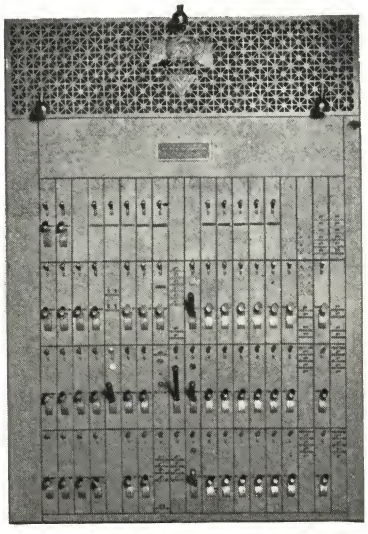
No vapor can attack the leads because the joint between the cast iron pothead and the tank is vapor and acid tight.



Oil Immersed Distribution Panel with Tank Removed

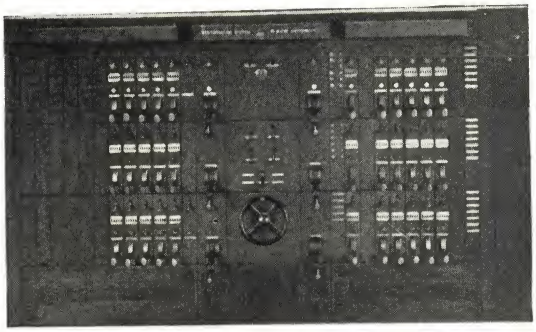
THEATER SWITCHBOARDS

Multi-pre-set Type—The multi-pre-set theater switchboard is of the all-steel dead front composite construction and combines the switching and dimming equipment in a compact unit which permits localizing all the controls of each circuit. A number of lighting scenes may be set up in advance, thereby giving the operator a variety of effects to be used when desired. With the use of this board the most superb lighting effect may be produced by the operation of a single switch.



One-scene Switchboard Installed in Keith's Fordham Theater, New York, N. Y.

One-scene Composite Type — This switchboard is used where it is essential to keep the first cost low, and where it is unnecessary to have more than one scene set up at one time. This type of switchboard is similar in construction to the above boards and differs only in the set-up arrangement. All circuits are manual instead of remote control. Any combination of circuits or colors may be effected by the operation of a single switch.



A Five-scene Multi-pre-set Switchboard Installed in the Regent Theater, Grand Rapids, Mich.

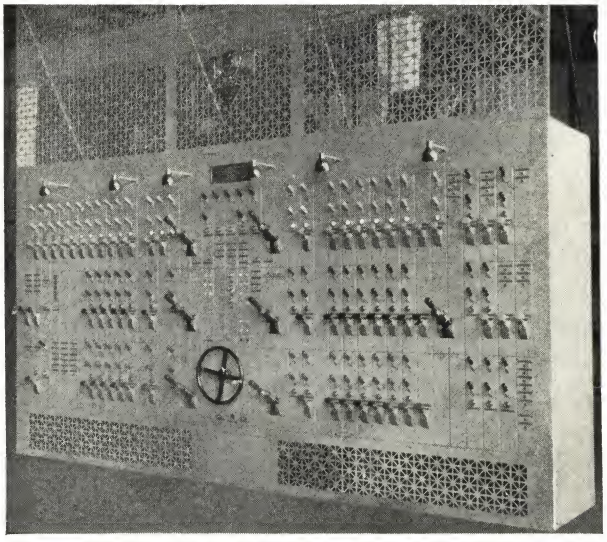
Pre-set Selective Type—The pre-set selective theater switchboards are for use in vaudeville theaters and other places where it is desired to set up only two lighting scenes in advance. Before the performance starts, the lighting for two scenes can be set up and after scene one is thrown "on," scene two is waiting. Then,

when scene two is thrown "on," scene one is still available for emergency. After all possibility for the need of scene one lighting is past, the lighting for scene three can be set up, using scene one switches and circuits.

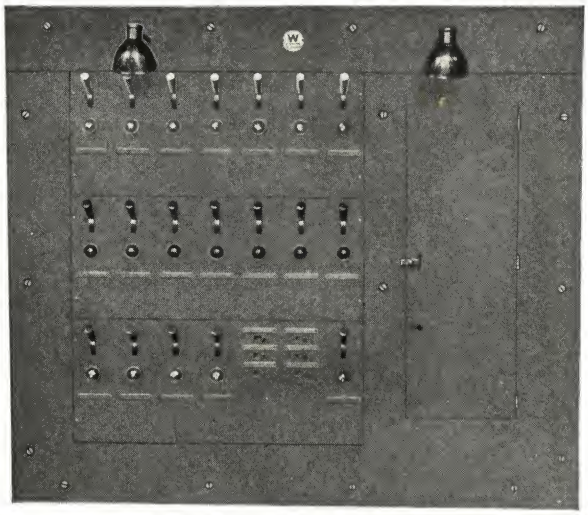
Manually Operated Composite Type—Boards of this type are for use in places where it is satisfactory to use the dimmer handles for dimming of the circuits as well as for switching operations, in order to reduce the cost and still have the composite type of construction. Circuit control is obtained either by the operation of the pilot switch controlling the individual circuits or by the use of the dimmer. Color group control of the circuits is obtained by color group operation of the dimmers through the color master dimmer lever or wheel. Grand master operation may be obtained by either switching or dimming.

Tumbler Type—These direct control boards can be used in school auditoriums, small motion picture theaters, churches, and other places where the cost of equipment must be kept low.

For complete information see Circular 1702.



Pre-set Selective Switchboard Installed in Keith's Theater, Rochester, N. Y.

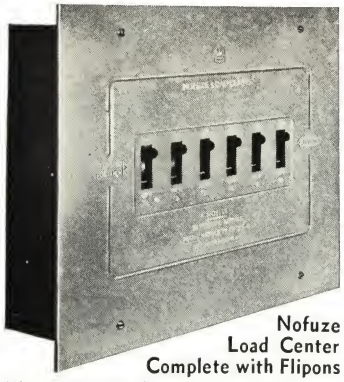


Manual Switchboard with Separate Dimmer Bank Installed in the Flynn Theater, Sawyer, Mich.

WESTINGHOUSE SAFETY SWITCHES

Nofuze Load Center

A branch circuit arrangement has been developed known as the Nofuze Load Center which makes fuseless homes. It consists of a gang of Flipons, the new type of circuit breaker, operating on the principle of de-ionization.

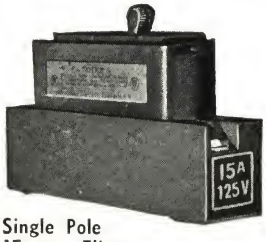


Nofuze Load Center Complete with Flipons

The "De-ion" Circuit Breaker makes possible fuseless homes

The most logical place to locate the Nofuze Load Center is at the actual electrical load center of the home, namely, the kitchen or in a hallway adjacent to the kitchen. This type of installation permits minimum wiring costs because of the short branch circuit runs, especially for the heavier loads.

Convenience and Safety—To restore electric service, all that is necessary is to reset the Flipon controlling the circuit that is out. This is done as easily and as safely as operating a wall switch. Just force the handle to the extreme "off" position then throw "on." No fussing in a dark basement with fuses. No exposed live parts to cause injury.



Single Pole 15-amp. Flipon

Attractive Appearance—In addition to the convenience and safety, the Nofuze Load Center is attractive in appearance. It can be painted to blend with the color of the wall in which it is installed.

The Nofuze Load Center is available for either flush or surface mounting. Flipons range in capacities, either single or double pole, from 15 to 50 amperes.

Box Over-all Dimensions—All boxes $4\frac{1}{16}$ in. deep. 6-pole Flush Cover $12\frac{3}{4}$ in. wide and $15\frac{5}{8}$ in. long. 8-pole Flush Cover $12\frac{3}{4}$ in. wide and $19\frac{3}{8}$ in. long.

Type WK-50 Meter Service Breaker

30 amps., 2 poles, 125 volts

WK-50 Meter Service Breaker

Designed to eliminate main fuses and accompanying troubles. Its calibration cannot be altered or its action blocked so as to prevent its opening.

The breaker has a longer time element than fuses, withstanding temporary overloads but opening the line before any damage can be done. It is as easily reclosed as a toggle switch. Easily wired, compact and front operated.

Box Over-all Dimensions—All boxes—width $6\frac{3}{16}$ in.; depth, $3\frac{3}{8}$ in.; 15, 25, 30, 35 amp. length, $10\frac{3}{16}$ in.; 50 amp. length, $12\frac{9}{16}$ in.

Heavy Duty Industrial Type WK-55—30 to 800 Amperes

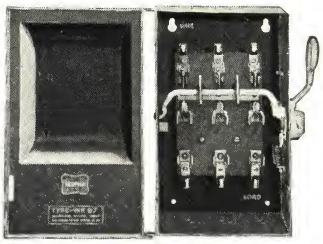
Full-safety switch—fusible only—withstands the most severe service in buildings and industrial plants.

The exclusive double-door design is the principal safeguard to the operator. The inner door through which fuses are changed is interlocked with the operating handle so that it can be opened only when switch is off and all fuse parts are dead. Outer door over

the entire switch is padlocked and can be opened by an authorized inspector without interrupting operation.

Box over-all dimensions: 30 and 60 amperes—length 16⅜ in., width 7¼ in., depth 4¾ in. 800 amperes—length 46 in., width 21¼ in., depth 8 in. Other ratings approximately proportional.

General Purpose, Type WK-97—30 to 200 Amperes



Type WK-97, Open
60 amps., 3 poles, 230 volts

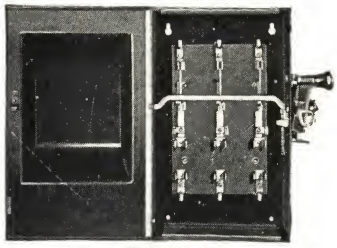
These switches—fusible, solid neutral and non-fusible—are inexpensive, enclosed, externally operated safety switches. They have a reliable quick-make and quick-break, and are also equipped with the diamond pointed jaw and extended blade construction that assures a clean contact. These switches have a lock-off feature for independent locking by two persons. High grade Vermont slate bases, free from metallic veins, are used.

In WK-97, 600-volt switches, up to 200 amperes, each blade is equipped with an individual arc quencher. These devices, while mounted individually, operate on the same principle and perform as efficiently as the arc quencher on WK-55 switches.

Over-all dimensions: 30 amperes—length 9⅛ in., width 6⅝ in., depth 5½ in. 200 amperes—30⅛ in., width 13$\frac{5}{32}$ in., depth 8$\frac{29}{32}$ in. Other ratings approximately proportional.

Enclosed Type WK-66—30 to 1200 Amperes

These are safety switches—fusible, solid neutral and non-fusible—for use in industrial plants where an interlocking type of switch is desired. They have a positive quick-make and quick-break mechanism contained in the external handle, leaving the cabinet entirely clear. The diamond pointed jaw and extended blade construction is used. In the WK-66, 575-volt switches, up to 200 amperes, each blade is equipped with an individual arc quencher.



Type WK-66, Open
60 amps., 3 poles, 230 volts

Box over-all dimensions: 30 amp.—length 12¾ in.; width 8⅞ in.; depth 5$\frac{9}{16}$ in. 1200 amperes—length 55⅛ in.; width 36¼ in.; depth 12$\frac{15}{16}$ in.

Motor Watchman (WK-16)

Motor Watchman

For controlling motors up to 10 hp., is very adaptable for heavy overload applications. The Built-in-Watchman assures positive motor overload protection. There are no thermal elements to renew. Trip mechanism is easily reset by moving the handle to extreme "off" position and then to "on." Switch is front operated and compact. Contacts are of special non-brazing alloy. Toggle type operating mechanism.

Box over-all dimensions: Length 9 in., width 4$\frac{15}{16}$ in., depth 2$\frac{1}{16}$ in.

Other Types of Westinghouse Switches

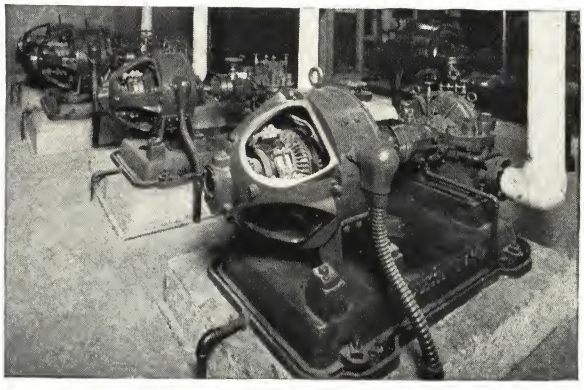
Westinghouse also manufactures a complete line of porcelain base switches, meter service switches, and weather proof switches. Watch for our new line of industrial Flipons to be ready in the late fall 1931.

Safety Switch Catalog

Catalog 226 gives complete information and listing of the various types of Westinghouse safety switches.

MOTORS AND CONTROL

Westinghouse motors for the building industry are fortified by an organization which has designed, manufactured and serviced motors since the dawn of the motorizing idea. The Westinghouse Company co-operates with the building equipment manufacturer to the fullest extent in supplying the motor which is scientifically built for the requirements.



Type SK Motors Driving Circulating Pumps

Motors

Standard Westinghouse general purpose motors are equipped with Sealed Sleeve bearings. These provide a cushioning film of oil which resists shocks and vibrations and contributes to the quiet operation of the motors. The oil is sealed in and dust is sealed out. These factors contribute materially to the service economy of the motors.

A unique method of manufacture is employed to avoid dead air spaces down in the heart of the motor insulation. Hot spots are eliminated, thus adding to the life and to the investment value of a Westinghouse motor.

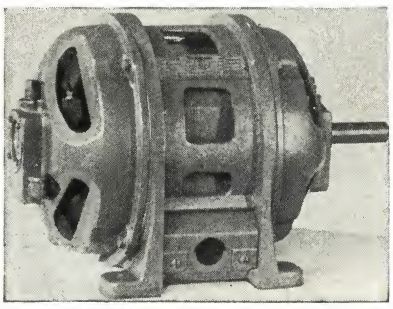
Small Linestarter Class 11-200-H
For push button control and protection of squirrel cage motors

To prevent undue deterioration due to heat, a motor must be carefully ventilated. It is not enough that a large volume of air be drawn into motor; it must be directed to the proper winding slots. Applying this principle, Westinghouse engineers introduced in this country *directed air circulation.*

These factors contribute materially to the service economy of the pump or fan, and to added years of dependable ventilation and pumping facilities.

Control

Whatever the application, there is a Westinghouse control, matched to the motor requirements. The complete line of control equipment includes every type from the simple, manually operated starter to the complicated remote, automatic control.



Type CS Linestart Motor
Designed for starting on full line voltage

BULL DOG ELECTRIC PRODUCTS CO.

Manufacturers of Electrical Controlling Devices

DETROIT, MICH.

IN CANADA: BULL DOG ELECTRIC PRODUCTS OF CANADA, LIMITED, TORONTO

DISTRICT OFFICES

ATLANTA	CINCINNATI	GRAND RAPIDS	MILWAUKEE	PITTSBURGH	TOLEDO
BOSTON	CLEVELAND	INDIANAPOLIS	NEW ORLEANS	PROVIDENCE	TULSA
BUFFALO	DENVER	KANSAS CITY	NEW YORK	ST. LOUIS	WASHINGTON
CHICAGO	FORT WORTH	LOS ANGELES	PHILADELPHIA	SAN FRANCISCO	

Products

SAFETY SWITCHES; FUSENTERS; PRO-DUCT, TROL-E-DUCT, BUS-DUCT; SAFTOSWITCH-BOARDS; SAFTOFUSE POWER and LIGHT FEEDER PANEL-BOARDS; SUPERBA LIGHTING PANELS.

Also "Unit-Versal" Lighting Panelboards; Theatre Switchboards.

TRADE-MARK

Safety Switches

Two lines of Bull Dog Safety Switches are made, viz.:

Type "A"—For heavy duty industrial work in capacities from 30 to 2400 amp., 600 volts and less.

Type "C"—For general duty, 30 to 200 amp., 575 volts and less.

Features of Construction—Type "A" switches are characterized by machine made, built-up switch jaws in which hard drawn tempered clips are driven into foot blocks, accurately milled. They are then soldered and pinned. This type of construction eliminates joints and consequent heating. In contrast, the Type "C" construction, for lighter duty, has switch jaws formed or bent up in punch presses.

Blade and Crossbar Construction—This is unique, no attachments, such as screws, rivets, clamps or other devices being used, which are apt to work loose. With these switches it is not possible for any blade to remain in contact after handle is pulled to "off" position as blades move directly and positively with crossbar.

Quick-make and Quick-break—Both Type "A" and Type "C" Bull Dog Safety Switches (with the exception of a few 30-amp. entrance switches) are quick-make and quick-break.

Springs are of the compression type and switches could still be operated if springs broke or were removed.

Bull Dog Safety Switch

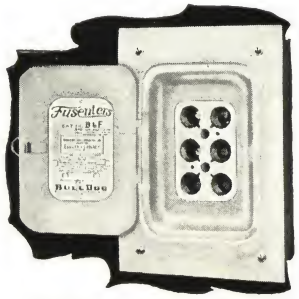
Appearance—The fine symmetrical appearance is enhanced by the unusually deep draw in the covers.

Underwriters' Approval

Bull Dog Electrical Apparatus is listed as standard by Underwriters' Laboratories, Inc., and is also generally approved by Associated Factories Mutual Fire Insurance Companies.

Fusenters

The ornamental product that "took fuses out of the cellar" by rendering obsolete the ugly old-time cut-out whose appearance condemned it to installation in the basement. The attractive appearance of the Fusenter qualifies it for installation in the finest surroundings. The line is complete from 2 to 12 circuits, plug fuse connections, to meet the requirements of ordinary size residences. Flush type have attractive luminized fronts which is also a good base for any other desired tint.



Bull Dog Safety "Fusenter"

Pro-Duct

Pro-Duct is an enclosed metal raceway or trough for conveying electric wires or cables in industrial plants employing mass production methods, necessitating frequent changes in wiring. Eliminates dangers of "temporary wiring."

Bus-Duct

Bus-Duct is a busbar system of electric power distribution direct to motors or machines. In mass production plants this is more efficient than conventional "wires-conduit-panels" method of electric distribution.

Trol-e-Duct

Trol-e-Duct is a flexible system of electric control for portable tools as used on moving assembly lines in automobile and other mass production plants.

Bull Dog SaftoSwitch-Board
Totally steel enclosed. Free standing

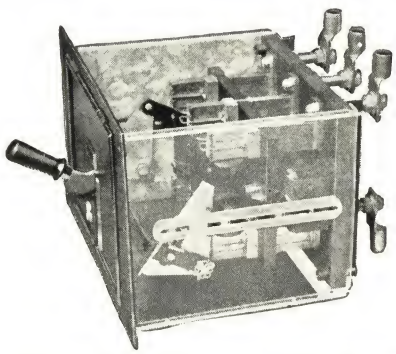
Bull Dog Type DF30 SaftoSwitch-Boards

(Featuring ball bearing switches, 30 to 1200 amp., 600 volts and less.)

The SaftoSwitch-Board is a completely standardized product of sectional unit construction, incorporating ball bearing switches. It is possible to add new panels or individual switches to original board, without making extra drillings or detracting from its fine, integral appearance.

Ball bearing switches provide frictionless switching and are interchangeable for all capacities, all voltages and all polarities. Design embodies separate fuse and switch compartments interlocked for safety in replacing fuses.

The SaftoSwitch-Board is free standing and totally steel enclosed, requiring no special switchboard room for its installation, thus conserving valuable production or rental space.



Phantom View Ball Bearing Switch Saving 25% to 50% Space

Frictionless switching. Lifetime service. Self-centering alignment and full floating contact. Simultaneous double break, completely disconnecting fuses from "line" and "load"

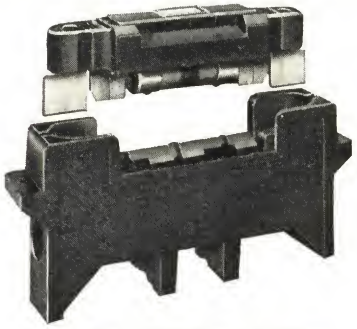
Bull Dog "SaftoFuse" Power and Light Feeder Panelboards

The United States Bureau of Standards Electrical Safety Rules, Handbook No. 7 Rule 324 (b) reads as follows:

"Switch ahead of the Fuse . . . Switches shall be so placed or arranged that opening them will disconnect the Fuses from all sources of electrical energy . . . ."

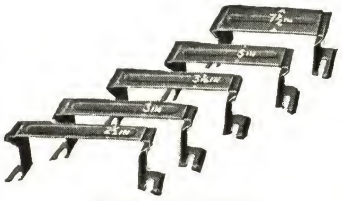
The Bull Dog "SaftoFuse" accomplishes this purpose in the safest, simplest and most complete manner. It is a "combination switch and cut-out"—a fusible safety switch, double break. Fuses cannot be touched while they are alive.

Bull Dog "SaftoFuse" panels are made up of standard units *11 in. wide* installed in cabinet boxes *19 in wide* which provides *4-in. wiring gutters* on both sides. These units are interchangeable. The various types may be connected together on the same busbar.



Standard "SaftoFuse" Fusible Switch Unit

Cabinets should be ordered with space for additional circuits. Units for these additional circuits may later be secured, of the size and type required, and installed in the cabinet without disturbing the other units on the panel. *It is not necessary to order spare circuits with the original panel, only spare space for spare circuits.*



Blank Filler Units

Made in varying widths to cover unused busbar space pending installation of future circuits

Fig. 1

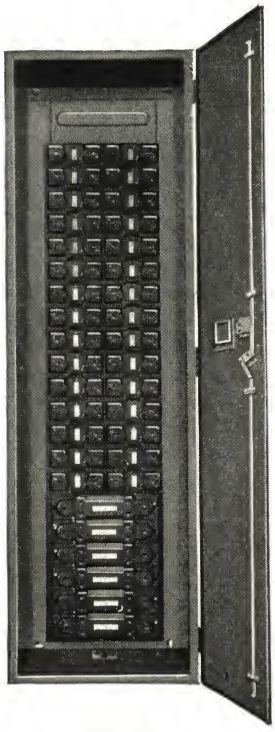


Fig. 2

"SaftoFuse" Power and Light Feeder Panelboard Convertible, Interchangeable Cabinet

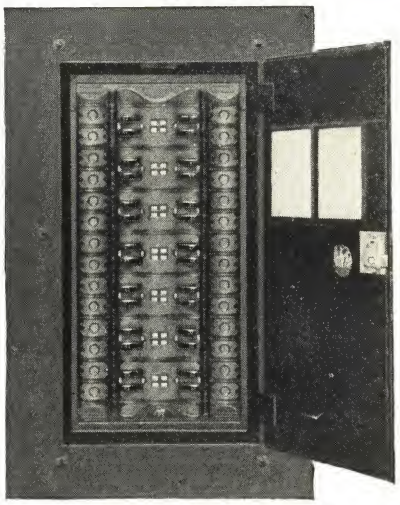
At first merely the cabinet with busbars and main lugs as shown in Fig. 1 need be purchased, and later, when circuit requirements are known, "SaftoFuse" (fusible switch) Units can then be installed on the busbars until the complement of circuits is secured as shown in Fig. 2. Pending the installation of all circuits, blank filler units cover the unused portion of busbars

Bull Dog Superba Lighting Panels

The Superba is the result of a desire to give lines of beauty and symmetry to lighting panelboards, and at the same time incorporate better and more flexible electrical and mechanical features.

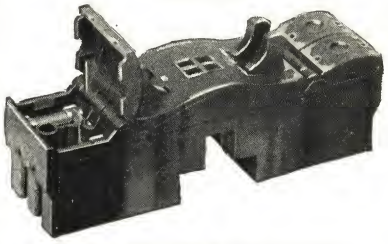
Graceful Bakelite Units—Superba Panels are composed of sectional units of the highest grade bakelite, the surface or face plates having a beautifully curved design with a variegated grain finish, highly polished. The artistic use of curves, producing a lights-and-shadows effect, lends a very harmonious and symmetrical appearance to the panel. The Superba truly represents beauty in panelboards.

Bakelite Doors Over Fuses—The bakelite face plates of the Surperba units terminate in gracefully curved doors over the fuse compartment, thus avoiding the unsightly appearance and obvious danger of exposed fuse shells or fuse connections. No metal parts are visible to constitute a danger from electrical contact or to detract from the artistic, symmetrical appearance. These bakelite doors constitute an improved and ornamental substitute for the necessarily plain steel door of the conventional door-in-door or inner door type.



Superba Lighting Panel
28-circuit

Scientific Design—The Superba is not only a beautiful product but represents the acme of engineering skill. Careful attention has been given to details heretofore generally overlooked in all panelboard designs, such as protecting against electrical creepage, dust collection and moisture; the isolation in separate compartments of busbars, switches and fuses and the interlocking of the latter two, for safety.



Superba Bakelite Sectional Unit
Fuse compartment doors interlock with toggle switches

Switch and Fuse Safety Interlock—The door over fuse compartment is interlocked with the toggle switch so that fuses are inaccessible while the switch is in the "on" position. Opening the door with switch in "on" position automatically throws switch to "off" position. Fuses may be tested in circuit, however.

Changing the Distribution System and Equalizing Phase Loads—The Omni-Bus (variable busbar feature) makes it possible to adapt the panel to any of the various types of distribution systems, either before or after the panel is installed. The Omni-Bus feature permitting ready changes of voltage and phase also offers a very easy way of balancing the load on the phases of the Superba Panel after it is installed without removing the door and trim or disturbing the load wiring connections.

Extent of the Superba Line—Superba Panels represent a complete line from 4 to 64 circuits with branches having either single or double pole toggle switches and plug or cartridge type fuse connections. Panels may be furnished with main lugs, main SaftoFuse or main SaftoFuse switch.

Specifications—Write for illustrated bulletin fully describing Superba Panels and containing a set of suggested specifications covering this type of lighting distribution panelboard. Our Engineers from the district offices listed will also gladly furnish any additional information or data required by architects or consulting engineers.

Bulletins

Bulletins on all Bull Dog Electric Power and Light Controlling and Distributing Apparatus sent upon request.

THE TRUMBULL ELECTRIC MFG. CO.

PLAINVILLE, CONN.

BRANCH SWITCH, SWITCHBOARD AND PANELBOARD FACTORIES

LUDLOW, KY. PACIFIC DIVISION: LOS ANGELES, CAL.; SEATTLE, WASH.

DRENDELL-TRUMBULL ELECTRIC MFG. CO., SAN FRANCISCO, CAL.

SALES OFFICES

NEW YORK, N. Y., 60 E. 42nd Street
PHILADELPHIA, PA., 511-519 No. Broad Street
CHICAGO, ILL., 2001 West Pershing Road
Detroit Branch, 415 Brainard Street
ATLANTA, GA.
SAN FRANCISCO, CAL., 432 Fourth Street
BOSTON, MASS., 1002 Statler Building

THE "CIRCLE T" LINE

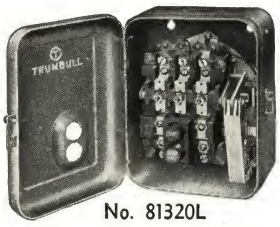
INDUSTRIAL SWITCHES; MOTOR CIRCUIT SWITCHES; ENTRANCE SWITCHES; MAGNETIC and MANUALLY OPERATED MOTOR STARTING SWITCHES; METER SERVICE SWITCHES; TUMBLER SWITCHES; OPEN KNIFE SWITCHES; SPECIAL SWITCHES.

PANELBOARDS; SWITCHBOARDS; BUSS-WA (the copper bar distribution system); FLEX-A-POWER (the convenient outlet for power in industry); CONTROLITE (the theatre control board); CONVERTI-FUSE (the convertible power panel); "F.O.I." (front operated interlocking) dead front distribution board.

Catalogues and bulletins listing "Circle T" products gladly sent on request.

Magnetic Motor Starting Switches

Compact magnetic switches for local or remote control with time limit overload and undervoltage protection. Furnished either self-resetting or hand reset after trip on overload.



No. 81320L

Equipped with local control push button stations as a part of the switch or separate push button stations for remote control switches.

Relays ranging from 1 to 40 amps. provide overload protection on the "M-25" type. On the "M-7½" switches, heater units ranging from ½ to 20 amps. provide overload protection.

Thermostatic trip is reset by the start button after an interval of two minutes for heater units or relays to cool when the switch has opened on an overload.

Heater units or relays easily interchanged.

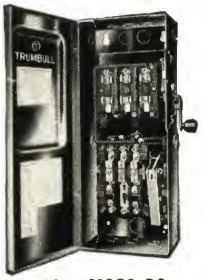
Moving contacts bridge the gap between the line and load side of the switch through stationary contacts in each leg. A moulded composition barrier between contacts shields each from the other so that maximum loads can be broken without the possibility of a flashover.

H.P. RATINGS FOR MAGNETIC MOTOR STARTING SWITCHES

	Type "M-7½" (20 amp.)				Type "M-25" (40 amp.)			
Volts, a-c...	115	230	460	575	115	230	460	575
Polyphase ..	3	5	7½	7½	5	10	15	25
Single phase.	1½	3	5	5	3	5	7½	7½

Magnetic Combination Switches—Types "M-7½" and "M-25"

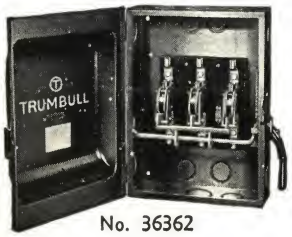
A combination of a magnetic switch for either local, remote, or automatic control, combined with a manually operated fusible or no fuse motor circuit switch in one box. Listed as standard by the Underwriters' Laboratories, Inc., for a manually operated disconnect switch ahead of a magnetic switch with thermal overload protection. Both switches are capable of breaking the stalled rotor current of motors for which rated and may be readily removed from the box for wiring by loosening the mounting screws. Ratings for 20 and 40 amp. are same as above.



No. 81320-R3

Type "A" Safety Switches

Supplied either single or double throw, in fusible or no fuse types and will break full load at listed ratings.



No. 36362

These quick positive make and quick break switches have an interlocking safety cover. Switches are made of milled foot block construction with built-up contact jaws sweated and pinned into the foot blocks on the larger sizes and swedged into the foot blocks on the smaller sizes. Rated 2, 3 and 4 poles, 30 to 2400 amps. at 230 and 575 v. a-c. and 250 and 600 v. d-c.

Type "R.B." Safety Switches

Revolutionary in switch construction, these new quick make and quick break, *receding blade* switches will break full rated load under frequent operation with long life. Path of current does not pass through any hinged, soldered or riveted connections which makes a stronger and more compact switch unit and reduces voltage drop.

A new method of breaking current from extended arc breaking tips prevents pitting and scarring on contact surfaces which burnish themselves and retain a perfect contact area.

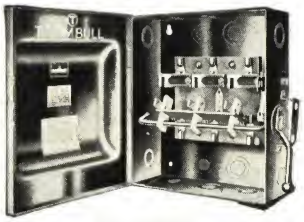
A fuse clamping device is regularly supplied on all switches 100 amp. capacity and above. Switches provided with interlocking cover.

Available either side or front operated, in fusible and no-fuse types.

Type "C" Switches

Externally operated, single throw, quick positive make and quick break switches in no fuse and fusible types.

High class punched clip construction is used, giving maximum electrical and mechanical strength for this type of design.



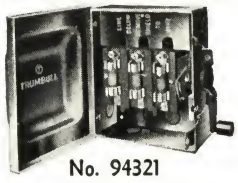
No. 20362

The box cover, however, does not have the safety interlocking feature of the Type "A" line.

These switches are available 2 to 5 poles, inclusive, in 230 v. a-c. and 250 v. d-c. ratings, and 3 and 4 poles at 575 v. a-c.

Rotor Movement (Type "R.M.") Switches

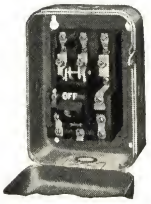
A revolutionary design in safety switch construction in both fusible and no fuse types. Has double break blade construction with rotor movement. This design results in a very compact switch for breaking full rated loads. When switch is opened, blades are thrown into deep, narrow slots in the base, cooling and snuffing out the arc. In 2, 3 or 4-pole switches for 30 and 60 amp. and 250 or 600 v. in either drawn steel or cast iron boxes. Also available in 2-position motor starting types with the fuses shunted in the starting position.



No. 94321

Thermostatic Manual (Type "T.M.") Motor Starting Switches—Double Brake Construction

These switches provide thermal protection against overload or damage due to phase failure. Externally operated by simple "on" and "off" movement of the handle. Overload in any phase trips the entire switch. To reset, just throw the switch "on" after the thermal element has cooled. Handle returns to "off" when switch trips from an overload.



No. 91367

Switches will break stalled rotor current at listed ratings. Ampere capacity regulated by interchangeable heater units, ½ to 20 amp.

Type "T.M.-2" front operated, max. rating 2 hp. at 110-550 v. a-c. polyphase. Type "T.M.-7½," side operated, max. rating 7½ hp. at 575 v. a-c. polyphase.

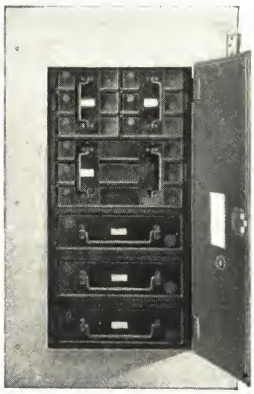
NTP 320L
Safety type

Unit Panelboards

Trumbull "Circle T" Panelboards can be furnished in a number of various types suitable for all recognized service; and with either tumbler switches and fuses in the branches, or fuses only, or of the no-fuse, automatic circuit breaker.

Three types of mains are provided:
(1) Lugs only.
(2) ConverTi-Fuse switch mains.
(3) Type "R.B." switch mains.

See Catalogue 15 for detailed description and listing.



ConverTi-Fuse Panels

As its name implies, ConverTi-Fuse Panels have been developed to provide a safe and economical dead front panel with the added feature that the panel is convertible for either larger or smaller size fuse gaps.

This dead front distribution panel not only facilitates fuse replacements but also repairs or extension to the line.

Completely described in Bulletin No. 87.

"F. O. I." (Front Operated Interlocking)

Switchboard of dead front steel construction developed to provide an economical switchboard which will provide full safety to the operator. The individual switches are of "Circle T" design being of the parallel break, double break and quick break construction. An interlocking door is provided over the fuse compartment so that access to the fuses cannot be had until the switch is in the "off" position. If desired, this board may be arranged so that all wiring is accessible from the front. This feature is valuable for installations where space is limited.

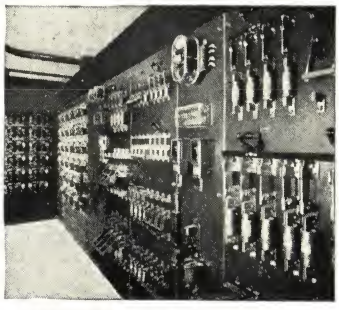
"F.O.I." Switchboard in a Large Department Store

Switchboards

Switchboards of varying types for almost any purpose are built by Trumbull. Special switchboard requirements or specifications receive immediate attention.

Trumbull Engineers and the Trumbull Sales Force have co-operated in designing and recommending types of equipment for the most efficient power and lighting distribution in many industrial plants and large buildings.

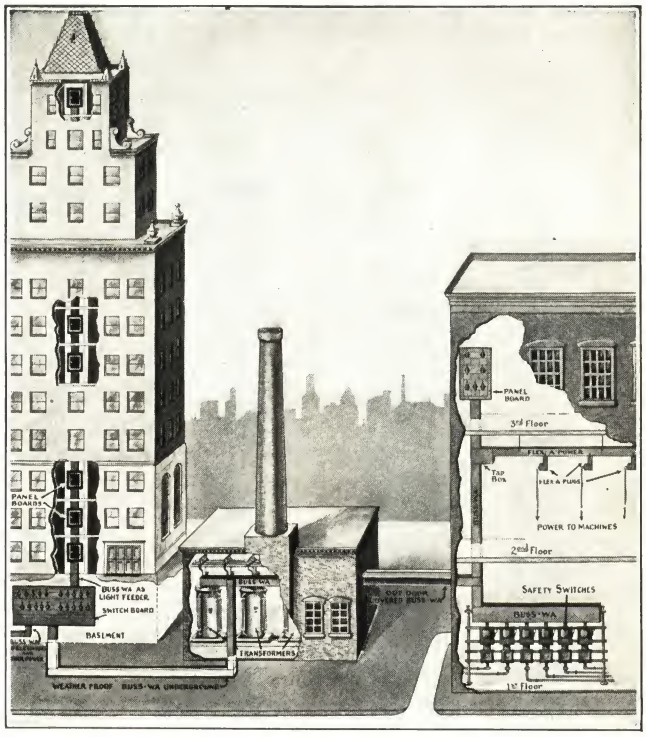
We omit no service which might be of help to the architect, engineer or contractor.



Main Line Front Distribution Switchboard

Buss-Wa—The Copper Bar Distribution System

The Buss-Wa Distribution System has been developed to provide a safe and economical means of running power or light feeders without the use of conduit and wire.



This feature is worthy of note, particularly in the large sizes of feeders when multiple wires per pole would be necessary.

Briefly, this material consists of a heavy gauge U-shaped steel housing lined with transite into which is inserted the necessary copper buss bars held in place by means of ebony asbestos supports. An insulating cover is provided along its entire length and smaller covers, readily removable, are located at the joints. This provides a means for inspection.

Because of the steel construction, taps or fitting can be readily attached, providing a neat method for tapping off to transformers or other equipment.

Adaptable for both indoor and outdoor service.

The illustration shows how the enclosed and insulated copper bars may be run from a power plant or transformer bank, either underground or overhead (weather-proof) to a main switchboard or a sectional Buss-Wa for any required distribution of power and light feeders.

Flex-A-Power

Flex-A-Power is similar in construction to Buss-Wa except that contacts are provided at predetermined intervals into which plugs may be inserted providing taps for motors or other equipment. Particularly adaptable for branch runs, and because of its flexibility is known as "The Convenience Outlet for Power in Industry."

"Controlite"

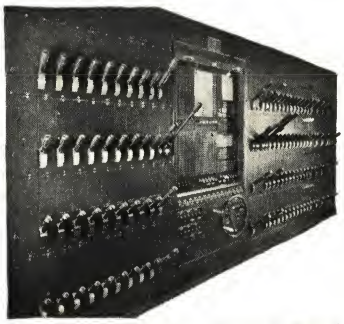
"Controlite" is a combined switchboard and interlocking dimmer bank designed to give ideal theatre lighting control at reasonable cost.

Long study of theatre lighting problems has shown that good lighting effects can only be obtained by providing ease of dimmer and switchboard operation.

"Controlite" may be provided with control refinements commonly required—such as slow motion cross control, advance setup and multi-preset remote control.

"Controlite" is a complete switchboard and a complete dimmer bank combined, making a very compact installation.

It is built and shipped as a complete self-contained unit. Upon arrival on the job it is only necessary to connect line and load wires.



"Controlite" Theatre Control Board
With multi-preset system

THE CARL BAJOHR LIGHTNING CONDUCTOR COMPANY

Manufacturers and Erectors of Lightning Conductors

4055 Keokuk Street, ST. LOUIS, MO.

Product

LIGHTNING CONDUCTORS for chimneys, churches, institutions, structural steel buildings, etc.

Experience and Underwriters' Approval

Over forty years' experience in protecting hundreds of power plant chimneys, churches, institutions and other buildings of every description. All materials are listed by the Underwriters' Laboratories, Inc.

Important Feature

Be sure to specify *lead* covering to insure permanent protection for powerhouse chimneys.

(Note specifications.)

Catalogue

Send for our new 16-page catalogue—"Chimney Protection"—which fully illustrates all our materials, manner of installations, etc.

SPECIFICATIONS FOR BRICK OR CONCRETE CHIMNEY PROTECTION

Chimney Protection

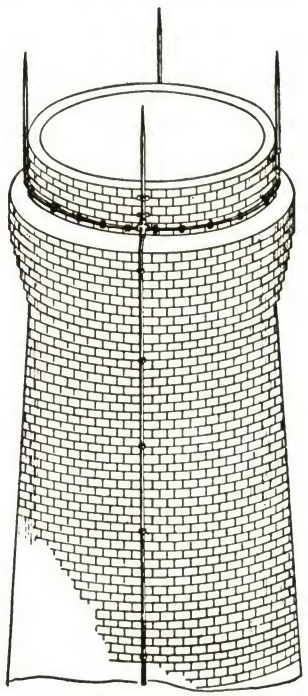
General—The chimney shall be provided with a complete Lightning Conductor System, consisting of: One circuit cable placed about 18 ins. below top of chimney. If chimney is more than 160 ft. in height, same shall be provided with another circuit midway between top and bottom. Two ground terminals placed on opposite sides of the chimney. Four air terminals, equally spaced. If chimney is more than 11 ft. in diameter, same shall be provided with six air terminals.

Downrod and Ground Terminals—The conductor to consist of a pure copper cable ½ in. in diameter, composed of 28 wires twisted together into seven strands of a solid cable, having a capacity of 137,200 circular mills.

All splices between circuit and down-cables shall be made with heavy bronze connections.

To protect the conductor cable from damage, same shall be incased in a brass or copper pipe 8 ft. long, extending about 7 ft. above and 1 ft. below grade level. Conductor cable shall be well soldered to pipe for electrical contact.

Each down-cable shall terminate into a 4-wing ground plate made of No. 20 B&S gauge sheet copper. These plates shall have a net surface of 252 sq. ins. and shall be placed 10 ft. below grade level.



Bajohr System of Chimney Protection

Air Terminals—The point rods shall consist of solid copper bars ⅝ in. in diameter and 4 ft. long. The upper ends of these bars shall be drawn to a point. The lower end shall be provided with proper bronze connections.

Fasteners—Bronze anchor or support fasteners shall be inserted during masonry progress every 5 ft. for the vertical conductors and, about 18 ins. below top of chimney, bronze lead covered fasteners shall be inserted every 2 ft. for the circuit cable.

Two bronze lead covered fasteners shall be inserted for each air terminal.

To Prevent Corrosion—The upper 25 ft. of the lightning conductor—including all fasteners, connections, air terminals and cables—shall be covered with pure lead $\frac{1}{16}$ in. thick.

The entire work shall be done in a neat, workmanlike manner.

Building Protection

Specifications for Building protection should be compiled only after careful study of the plans of the structure. If plans can be sent to our office, we will be pleased to prepare specifications for a proper lightning protection system free of charge. Blue prints will be returned immediately.

A FEW RECENT MAJOR POWER PLANT PROJECTS WHERE CHIMNEYS ARE PROTECTED BY "BAJOHR LEAD COVERED SYSTEMS"

American Smelting & Refining Co., Chihuahua, Mexico; Rosita Coahuila, Mexico
Ford Motor Co., Dearborn, Mich.
Naval Ammunition Dept., Hawthorne, Nev.
U. S. Veterans' Hospital, Little Rock, Ark.; Atlanta, Ga.; Lincoln, Neb.; Newington, Conn.; South Chicago, Ill.
Nichols Copper Co., El Paso, Tex.
Shell Petroleum Corp., Deer Park, Tex.
Gulf Refining Co., Port Arthur, Tex.; Girard Point, Pa.
International Shoe Co., Philadelphia, Pa.; Wood River, Ill.; Hannibal, Mo.
Weyerhouser Lumber Co., Klamath Falls, Wash.; Longview, Wash.
Puget Sound Navy Yard, Bremerton, Wash.
Universal Atlas Cement Co., Buffington, Ind.
Pennsylvania Railroad Co., Philadelphia, Pa.
Inland Steel Co., Indiana Harbor, Ind.
Western Electric Co., Kearney, N. J.

A FEW LARGE "BAJOHR" BUILDING INSTALLATIONS

Southwestern Bell Telephone Co., St. Louis, Mo.; Oklahoma City, Okla.; Dallas, Tex.; San Antonio, Tex.
University of Chicago (New Chapel), Chicago, Ill.
University of Illinois, Urbana, Ill.
Sears & Roebuck, Atlanta, Ga.; Memphis, Tenn.; Boston, Mass.; Los Angeles, Calif.; Minneapolis, Minn.
Park Plaza Hotel, St. Louis. Mo.
Lindbergh Beacon Atop Palmolive Bldg., Chicago, Ill.

ESTABLISHED 1873 INCORPORATED 1911

BOSTON LIGHTNING ROD COMPANY

755 Boylston Street, BOSTON, MASS.

TELEPHONE, Kenmore 4034

NEW YORK OFFICE
Grand Central Terminal Building
Telephone, VAnderbilt 3-8824

PHILADELPHIA OFFICE
1211 Chestnut Street
Telephone, Rittenhouse 8329

WASHINGTON, D. C., OFFICE
3602 Ordway Street, N. W.
Telephone, Cleveland 3227

Product

Manufacturers and contractors for installation of APPROVED LIGHTNING CONDUCTORS on all classes of structures.

Description

The principle upon which the lightning conductor is based is universally accepted by engineers as being strictly scientific. Boston Conductors are made of pure copper, in two types as illustrated: (1) solid, 3/8-in. diameter and (2) of 7-strand, 3/8-in. diameter cable. Both types are of ample weight, surface and conductivity to afford complete protection under all conditions. They are exceptionally durable.

The cable conductor conforms to the U. S. Bureau of Yards and Docks Specifications. Both types are listed by the Underwriters' Laboratories, Inc.

Connections and Installations

On the solid rod, threaded joints are employed throughout. All points are of copper, plated with either nickel or platinum. Conductors are attached with copper clips; they are fastened to wood with screws and to existing metal work with solder. Metal finials, ridges, skylights, gutters, leaders, etc., are connected to the conductors. All ground leads terminate with heavy copper plates, sunk to an electrically tested level and embedded in charcoal; approved grounding rods; water service pipe or running water.

Every installation made by the BOSTON LIGHTNING ROD COMPANY is applied by thoroughly trained mechanics. Each finished job is as inconspicuous as is consistent with complete dependability and is fully guaranteed.

Recent Developments

We now manufacture and install a concealed equipment, which type of equipment is erected prior to the roof covering.

In modern skyscrapers we utilize the steel frame for grounding. This method of installation makes absolute protection available at a remarkably low cost.

Service

Upon receipt of complete information we will submit plans and estimates. We are equipped to make installations in any part of the United States.

Solid Copper Conductor **Copper Cable** **Copper Terminal**

References

Architects and Contractors

John Russell Pope, New York, N. Y.
Dwight James Baum, New York, N. Y.
McKim, Mead & White, New York, N. Y.
Whitney Company, New York, N. Y.
Geo. A. Fuller Co., New York, N. Y.
Consolidated Engineering Co., Baltimore, Md.
Cross & Cross, New York, N. Y.
Carrere & Hastings, New York, N. Y.
Delano & Aldrich, New York, N. Y.
Jos. H. Freedlander, New York, N. Y.
Marc Eidlitz & Son, Inc., New York, N. Y.
A. L. Harris, Washington, D. C.
Walter Mellor, Philadelphia, Pa.
Andrews, Jacques & Rantoul, Boston, Mass.
Derby, Robinson & Shepard, Boston, Mass.
J. William Beal Sons, Boston, Mass.
Norcross Brothers Co., Worcester, Mass.
Bigelow & Wadsworth, Boston, Mass.
Arthur F. Gray, M. E., Boston, Mass.
Charles K. Cummings, Boston, Mass.
Hewitt & Brown, Minneapolis, Minn.
Roberts & Hoare, Manchester, Mass.
Geo. Hunt Ingraham, Boston, Mass.
Casper Ranger Co., Holyoke, Mass.
French & Hubbard, Boston, Mass.

Architects and Contractors (Continued)

F. Joseph Untersee, Boston, Mass.
Maginnis & Walsh, Boston, Mass.
Cram & Ferguson, Boston, Mass.
Matthew Sullivan, Boston, Mass.
Charles E. Patch, Boston, Mass.
Fox & Gale, Boston, Mass.
Ira G. Hersey, Boston, Mass.
J. T. Wilson, Nahant, Mass.
J. Henry Miller, Baltimore, Md.
Irwin & Leighton, Philadelphia, Pa.

Private Owners

Geo. L. Ohrstrom, Greenwich, Conn.
J. DuPratt White, Nyack, N. Y.
G. W. Perkins, Riverdale, N. Y.
Henry P. Erwin, Washington, D. C.
Paul B. Belin, Scranton, Pa.
Harvard University, Cambridge, Mass.
R. F. Haffenreffer, Fall River, Mass.
Hynicka Bros., Lebanon, Pa.
Rt. Rev. Mgr. James E. Cassidy, Fall River, Mass.
Fordham University, New York, N. Y.
Herbert Dumaresque, Center Harbor, N. H.
James E. Whitin, North Uxbridge, Mass.
R. Livingston Beeckman, Newport, R. I.

Private Owners (Continued)

Geoffrey G. Whitney, Woods Hole, Mass.
Mrs. G. R. Dodge, Madison, N. J.
Charles A. Kidder, Southboro, Mass.
John M. Woolsey, New York, N. Y.
Samuel E. Winslow, Worcester, Mass.
Henry L. Higginson, Boston, Mass.
Franklin MacVeagh, Dublin, N. H.
Prof. A. V. Phelps, Westerly, R. I.
R. T. Crane, Jr., Chicago, Ill.
Russell Robb, Boston, Mass.
Edmund Hayes, Buffalo, N. Y.
Perry Memorial, Put in Bay, Ohio
Edmund S. Burke, Jr., Chagrin Falls, Ohio
All Souls Church, Washington, D. C.
Emmanuel Baptist Church, Washington, D. C.
Yale University, New Haven, Conn.
Charles M. Schwab, New York, N. Y.
Langwater Farms, North Easton, Mass.
Eugene Endicott, Norwood, Mass.
Russell Grinnell, Providence, R. I.
R. H. Agassiz, Hamilton, Mass.
Burton K. White, Brewster, N. Y.
F. H. Metcalf, Holyoke, Mass.
Albert Clayburgh, Mt. Kisco, N. Y.
F. A. Kennedy, Windsor, Vt.
Independence Hall, Philadelphia, Pa.

ESTABLISHED 1870 INCORPORATED 1911

THE BURKETT LIGHTNING ROD CO.

Designers, Engineers, Manufacturers, Installers

FREMONT, OHIO

Burkett System of Lighting Protection

A *modern, scientific, all-copper, invisible (inconspicuous) system* for protecting structures of all kinds against the hazards of lightning.

Where Installed

The Burkett System provides adequate protection against lightning to churches, public buildings, schools, clubhouses, structural steel office buildings, etc., as well as to smokestacks, chimneys and industrial structures of all kinds. We specialize in the protection of fine homes.

Endorsements

The Burkett System of Lightning Protection conforms to the requirements of the National Bureau of Standards, Washington, D. C.; the National Fire Protection Association, Boston, Mass.; and the Underwriters' Laboratories, Inc., Chicago, Ill.

Our Guarantee

High grade materials are used throughout and *installed by our own workmen* who are thoroughly competent to make proper application of the Burkett equipment to any type of structure in a neat, permanent manner, anywhere in the United States.

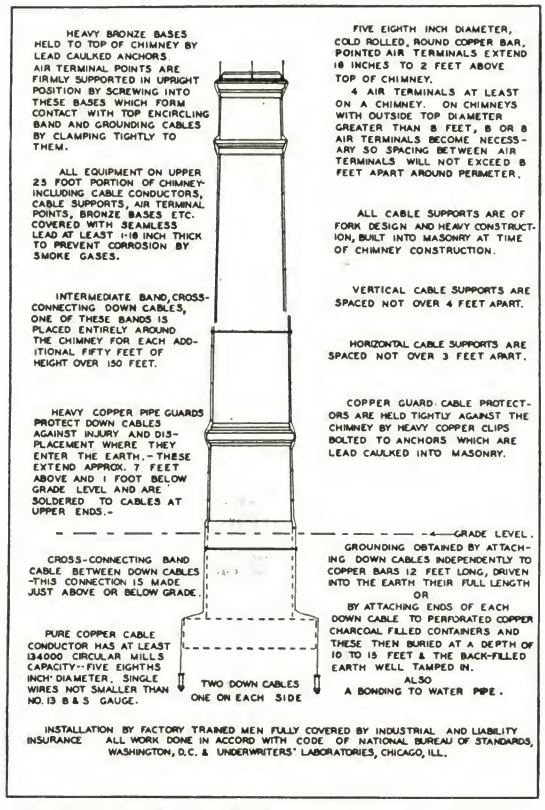
Service

We suggest the sending of blue prints of all elevations, and roof detail showing locations of soil pipes, metal ventilators, chimneys, and down-spouts, when asking for estimated cost of protection. This will save time and assure you of accurate figure. If possible when submitting blue prints, forward one which shows plot plan or grade elevation, and indicate points of entry for water service, gas service, and electric service.

Should you desire personal interview with one of our representatives feel free to make such request. *Write or telephone.*

To Architects, Specification Writers and Engineers

You can write specifications for *Boiler Room Chimney Lightning Protection* from copy contained in the illustration below,



Installation of Burkett Smokestack Lightning Protection

(Use the above copy for writing specifications)

Lead covered equipment furnished for all types of stacks and chimneys
Platinum tip points furnished if desired

or we will furnish complete written specification upon request.

References

Thousands of structures of various types in many sections of the United States are equipped with materials manufactured by us and installed by expert erectors from factory or by our authorized representatives. We list a few of the more recent installations below:

Public Buildings

Indiana World War Memorial and Obelisk, Indianapolis, Ind.
Walker & Weeks, Architects
Washington Monument, Baltimore, Md.
Bay View Hospital, Baltimore, Md.
Governor's Mansion, Baltimore, Md.
Farmer's-Mechanic's National Bank, Washington, D. C.
Beaumont Memorial Tower, Michigan Agricultural College, Lansing, Mich.
Ohio Sesqui-Centennial Building, State Fair Grounds, Columbus, Ohio
U. S. Powder Magazines, Proving Grounds, Camp Perry, Ohio
Municipal Filtration and Water Softening Plant, Fremont, Ohio

Churches

Grace Evangelical Lutheran Church, Fremont, Ohio
Cram & Ferguson, Architects
Holy Rosary Church, Pittsburgh, Pa.
Epiphany Church, Washington, D. C.
The Cathedral, Baltimore, Md.
St. Stephen's Catholic Church, Cleveland, Ohio
Plymouth Church—Shaker Heights, Cleveland, Ohio
Swazey Chapel, Dennison University, Granville, Ohio
St. Peter's Protestant Episcopal Church, Albany, N. Y.

Schools

Georgetown University, Washington, D. C.
The Notre Dame, Baltimore, Md.
McCoy Hall, Johns Hopkins University, Baltimore, Md.
St. Mary's Industrial School, Baltimore, Md.
Wm. S. Pierson School, Flint, Mich.
Malcomson & Higginbotham, Architects
J. R. Lowell Junior High School, Flint, Mich.
Wm. McKinley School and Power House Building, Flint, Mich.
Washington Junior High School, Pontiac, Mich.
University High and Elementary School, Ann Arbor, Mich.
Lochmoor School, Detroit, Mich., Geo. J. Haas, Architect

Homes, Estates, Ranches

MICHIGAN

L. D. Buhl, Country Estate, Detroit
James E. Vernor, Jr., Detroit
E. C. Hirschfield, White Lake
A. H. Buhl, Arbu Farms, Detroit
R. R. Motschall, Detroit
C. H. Hodges, Mt. Vernon

OHIO

O. P. and M. J. Van Sweringen, Shaker Heights, Cleveland
L. C. Hanna, Jr., Kirtland Hills
Pratt E. Tracy, Toledo
Eugene Rheinfrank, Toledo
W. W. Farnsworth, Waterville
G. C. Kalbfleisch, Tiffin
Earle L. Johnson, Painesville
M. D. Ludwig, Painesville
Chas. Pratt, Old Brick Farm, Orwell
W. C. Huber, Fostoria
B. I. Tuttle, Springfield
A. R. Christy, Fremont
D. LaMar Christy, Fremont
F. H. Anderson, Fremont

MISCELLANEOUS

Martin Lux, Washington, D. C.
J. C. Craft, Buffalo, N. Y.
D. S. Sommers, Indianapolis, Ind.
Prof. W. A. Henry, Sarasota, Fla.
Dr. H. L. Foss, Danville, Pa.
Geo. W. Hewlett, Cheyenne, Wyo.

Cathedral of Our Lady Queen of the Most Holy Rosary, Toledo, Ohio

COMES, PERRY & MCMILLAN, Architects

The Burkett equipment furnished to protect this two million dollar structure included, approximately, one-half mile of copper cable conductors, connected to groundings at ten places distributed about the building. Eighty-five points were supplied and so placed that the entire system is practically invisible. The method of protection is similar to that specified for St. Paul's Cathedral in London, as well as the Vatican and the larger and more imposing edifice of St. Peter's in Rome

ELECTRA MANUFACTURING COMPANY

INCORPORATED

Manufacturers and Erectors of "Electra" Lightning Protection

13 North Pearl Street
ALBANY, N. Y.
TELEPHONE: 3-5851

610 North Oakley Boulevard
CHICAGO, ILL.
TELEPHONE: Brunswick 1633

Grand Central Terminal
NEW YORK, N. Y.
TELEPHONE: VAnderbilt 3-5058

CONTROLLING LIGHTNING FOR OVER A QUARTER CENTURY

For Country Homes, Schools, Churches, Grain Elevators, Hospitals, Powder Magazines, Power Chimneys, and Other Valuable Property

The "Electra" System of Complete Lightning Protection

Our equipment consists of pure copper conductors. These form a continuous circuit along all ridges, parapets, and other exposed points, to the various ground terminals. The copper air terminals are low and plain of design. Air terminals are placed on gables, chimneys, high projections, and along ridges. They are electrically connected to the main circuit. All extensive metal structural equipment is connected to the system and grounded. This insures maximum safety.

Invisible System for New Buildings

The equipment is entirely concealed within the structure, except for the air terminals. These are very inconspicuously located at all important points.

Where this system is desired the contract should be placed with us when the plans for the structure are being drawn, rather than during the early stages of construction. We are then able to employ the best methods of concealment.

Outside Inconspicuous System for Existing Buildings

Through methods of our own we install a complete "Electra" protective system in a practically invisible form. Advantage is taken of the general architecture of the building, as well as avoiding all unnecessary and unsightly fittings.

"Electra" Equipment

Air Terminals—The copper air terminals have a patented clamp on one end. This reduces the resistance to a negligible amount, at the same time providing a rigid mechanical and electrical connection. Air terminals are 10 in. high for non-inflammable roofs, and 15 in. high for inflammable roofs, unless otherwise specified.

Conductor—The conductor is a ½-in. cable made of the purest copper. It is manufactured in continuous lengths to insure an uninterrupted electrical circuit.

Ground Terminals—The type of ground terminal varies, depending on the individual grounding conditions presented.

Specifications (Abbreviated)

Lightning protection for this building is to be the "Electra" system, furnished by the ELECTRA MANUFACTURING COMPANY, or its equal.

Installation

"Electra" equipment is installed by our trained men. All attachments to masonry are secured by heavy expansion shields embedded in the brick or stone itself. Attachments to metal roofs are made by soldering.

Engineering Service

Our engineers have been very successful in co-operating with architects and owners. We gladly submit plans and estimates for approved lightning protection. Our technical force is always at your disposal.

Unusual Conditions of Color

All situations which require special attention are adequately managed. For example: air terminals and conductors can be colored to match roof, or any part of structure. By so doing equipment is not noticeable.

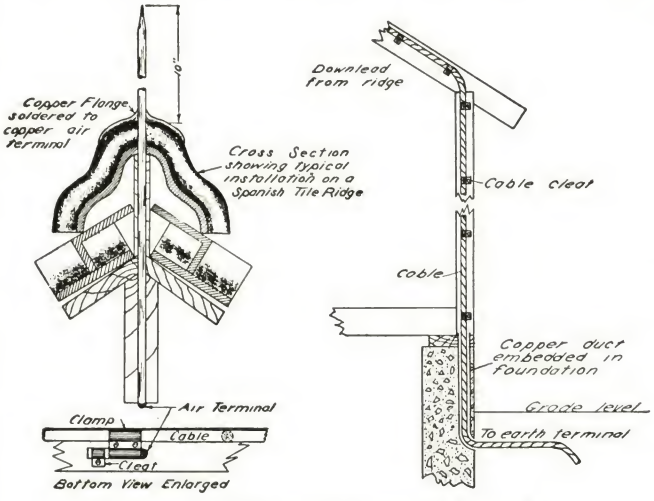


Diagram of "Electra" Concealed Method

Prompt Estimates

When located at considerable distance time will be saved if following information is sent with first inquiry:

(1) Plans showing side elevations of the building.

(2) A complete roof plan showing all ridges, ventilators, chimneys and vents.

(3) Location of all structural steel and extensive metal equipment.

(4) Location of supply water pipe in or near building.

(5) Nature of soil and depth of rock ledges if possible.

References

Names of prominent Architects and Engineers who endorse our system will be furnished on request.

A Few "Electra" Installations

United States Government, Savanna, Ill.
78 Powder and Ammunition Magazines
Illinois Bell Telephone Co., Warrenville, Ill.
E. F. Swift, of Swift & Co., Chicago, Ill.
American Can Co., Maywood, Ill.
Chicago & North Western R. R. Co., Chicago, Ill.
M. S. Florsheim, Chicago, Ill.
Utica State Hospital, Farm Building, Utica, N. Y.
First Presbyterian Church, Glens Falls, N. Y.
Troy Orphanage, Troy, N. Y.
St. Vincent's Orphan Asylum, Troy, N. Y.
La Sallette Seminary, Altamont, N. Y.
Hudson River State Hospital, Poughkeepsie, N. Y.
Harlem Valley State Hospital, Wingdale, N. Y.
Waldorf Stock Farms. North Chatham, N. Y.
H. H. Westinghouse, Goshen, N. Y.
Vincent Astor, Rhinebeck, N. Y.
St. Joseph's Church, Cohoes, N. Y.
Robert Goelet, Chester, N. Y.
Dr. E. G. Stillman, Cornwall-on-Hudson, N. Y.
Ann Lee Home, Albany, N. Y.
Frances C. Huyck, Albany, N. Y.
Isaac Wheaton, Amenia, N. Y.
Charles Danforth, Ridge Avenue, Norwalk, Conn.
Christian Brothers Novitiate, West Park, N. Y.
Oliver Gould Jennings, Fairfield, Conn.
R. D. & H. S. Benson, Lake Placid, N. Y.
Dr. H. N. McCracken, North Cornwall, Conn.
Wm. T. Hunter, Henryville, Pa.
John L. Wilkie, New Windsor-on-Hudson, N. Y.

ESTABLISHED 1862

HAROLD K. JONES COMPANY

Lightning Conductor Systems and Art Metal Work

TELEPHONE
JOhn 4-1668

153 Maiden Lane
NEW YORK, N. Y.

Products

Registered manufacturers and installers of approved LIGHTNING CONDUCTOR SYSTEMS.

WEATHER VANES, SILHOUETTE VANES, ART METAL WORK and GATE POST SIGNS.

Lightning Protection

Modern lightning protective systems are recognized as a necessary safeguard for exposed buildings of the country estate, tall and isolated structures, valuable trees, etc., and are endorsed by insurance authorities when properly installed.

Installation Methods—

Copper cable is the best form of conductor, with solid copper air terminals, cast bronze fittings and fasteners. Conductors are applied to tile and slate roofs by specially fitted copper clamp fasteners, avoiding the use of nails and screws. Exterior metal work is bonded and made a part of the conductor system. Grounds are made in a permanent manner by the copper plate-charcoal method, supplemented by driven copper ground rods at the proper distance from building and sufficient depth to insure good electrical contact with large capacity.

Conductors are carefully harmonized with roof surfaces, making concealment practically complete without impairing efficiency, this being a special feature of our work.

Approved Material—

All material and installation methods subject to inspection service of the Underwriters' Laboratories, Inc.

References—

Our clientele includes prominent architects, builders and owners, for local reference.

Inspections and Estimates—

We will gladly co-operate with architects and builders in offering suggestions for lightning protection. Estimates furnished from plans or by inspection of property. Inspections and reports on old installations.

Installations Made Anywhere in the United States—

We are prepared to render our clients efficient service anywhere in the United States.

Weather Vanes and Art Metal Work

Manufacturers of a complete line of artistic weather vanes in various designs.

Ornamental metal work. Special designs executed from sketches.

Artistic Designs of Silhouette Weather Vanes Are Most Pleasing and Furnish the Finishing Touches for the Buildings of Country Estates

Construction: Bronze, copper, brass with weather-proof bronze ball bearings

SMYSER-ROYER COMPANY

Exterior Lighting Fixtures of Cast Iron and Bronze

MAIN OFFICE AND WORKS
YORK, PA.

PHILADELPHIA, PA., Sales Office, 1700 Walnut Street
BALTIMORE, MD., Jas. P. Lynch, Representative, 811 Park Avenue

Products

LAMP STANDARDS, LAMP BRACKETS and LANTERNS of cast iron and bronze for all exterior lighting purposes.

For our pages on Ornamental Metal Work, see Manufacturers' Index.

TRADE-MARK

Workmanship

Since 1840 the works at York, Pennsylvania, have specialized in artistry in iron, and since that time the high character of workmanship has been steadily maintained. The brief list of typical installations given on this page indicates the type of structure and wide range of projects for which our fixtures have been specified.

Facilities

Complete drafting and designing departments, large pattern and model studio, cast iron and bronze foundry and extensive fitting and assembling shops provide the utmost in facilities to our clients.

Purpose of This Catalogue

While we gladly co-operate with architects in the development of original designs we believe that the array of fixtures shown herein will enable the architect to find one or more suitable to almost every building.

These patterns have been acquired over a period of many years and represent the selection from more than 350 different designs.

In studying the illustrations of standards, brackets and lanterns herein it should be noted that two scales have been used. A height of 6 ft. 6 in. was selected as the dividing point between the scales—fixtures 6 ft. 6 in. or less in height shown to scale ⅜ in. equals 1 ft., and fixtures measuring over 6 ft. 6 in. shown to scale ¼ in. equals 1 ft. A brief description is given below each design.

If larger illustrations of any particular designs are desired by the architect they may be obtained by addressing the company at any of its offices.

Some Typical Installations.

A few of the projects for which we have furnished the exterior lighting fixtures are:

Delaware River Bridge, Philadelphia, Pa.
Roosevelt Dam, Phoenix, Ariz.
Grand Central Station Approach, New York, N. Y.
Fairmount Park, Philadelphia, Pa.
Estate of John Wanamaker, Elkins Park, Pa.
Estate of Charles M. Schwab, Bethlehem, Pa.
Estate of Mrs. R. T. Reynolds, Winston Salem, N. C.
Roland Park, Baltimore, Md.
Forest Hills and Garden City, L. I., N. Y.
Federal Reserve Bank, Houston, Tex.
D Street Bridge, Washington, D. C.
Tacony-Palmyra Bridge
Albany Courthouse, Albany, N. Y.
City Hall, Omaha, Neb.
Strand Hotel, Atlantic City, N. J.
City Hall, Philadelphia, Pa.

Philadelphia, Pa. Subway
DEPARTMENT OF CITY TRANSIT, Architects

Delaware River Bridge, Philadelphia, Pa.
RALPH MODJESKI, Chief Engineer

No. 423
Height, 7′ 1½″ to bottom of globe
Base 2′ 5″ square

No. 322
7′ 9″ high to bottom of upper globe
Base, 2′ 8″ square

No. 396
6′ 11½″ high to bottom of central globe
Base, 2′ 3″ square

No. 176
9′ high to bottom of upper globe
5 globes
Base, 1′ 6″ square

No. 127
9′ 4″ high to bottom of upper globe
Base, 2′ 8½″ square

No. 222
9′ high to bottom of upper globe
Width across arms, 2′ 3″
Base, 2′ 9″ on square

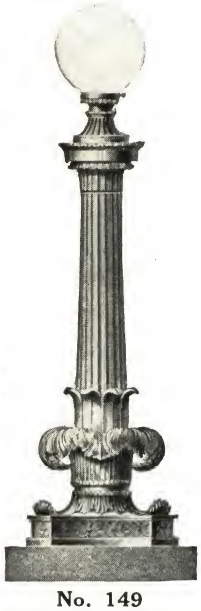
No. 325
9′ 5⅜″ high to bottom of upper globe
Base, 2′ 0″ square

No. 298
8′ 5″ high to bottom of globe
Base, 2′ 3½″ long, 12″ wide

No. 185
7′ high up to 10′ high to bottom of upper globe
5 globes
Base, octagonal
2′ 2″ diameter

No. 381
7′ 5″ high to bottom of globe
Body triangular
Base, 18″ square

No. 313
7′ 9⅝″ high to bottom of globe
Base, 2′ 5″ x 2′ 5″



No. 149
6′ 5″ high to bottom of globe
Base, 2′ 1″ square

No. 353
5′ 7⅜″ high to bottom of globe
Base, 1′x2′ 3½″ long

No. 32
6′ high to bottom of globe
Base, round, 2′ 6″ diameter

No. 107
2′ high to bottom of globe
May also be made 1′ 3½″ high to bottom of globe
Extreme projection, 1′ 5″
Wall plates, 7½″x9⅜″; 9″x11″

No. 311
3′ ¼″ high to bottom of globe
Extreme projection, 1′ 7⅛″
Wall plate, 10⅛″ square

No. 114
3′ 6″ high to bottom of globe
Extreme projection, 1′ 4″
Top wall plate, 6⅜″x1′ 3″
Lower wall plate, 8¼″x4¾″

No. 384
Extreme projection, 25½″
Wall plate, 21¼″x8″

No. 166
Extreme projection, 1′ 3″
Wall plate same as for No. 109
May be used with globe upright or pendent, as desired

No. 300-A
Extreme projection, 1′ 7″
Wall plate, 1′ 11″x7⅝″

No. 300—Similar
Extreme projection, 2′9½″
Wall plate, 3′ 5″x1′ 1½″

No. 254
1′ 6¼″ high to bottom of globe
Extreme projection, 9¼″
Wall plate, 8″x15″

No. 111
Extreme projection, 1′ 11″
Wall plate, 11½″x1′5″

SMYSER-ROYER COMPANY

EXTERIOR LIGHTING FIXTURES

SCALE
⅜″ and ¼″ = 1′ 0″

No. 239
8′ 1″ high to bottom of globe
Base, round, 1′ 6″ diameter

No. 30
8′ 3″ high to bottom of upper globe
Spread of arms, 2′ 0″ c.-c. of globes
Can be made with either 3 or 4 cross-arms
Base, round, 2′ 0″ diameter

No. 189
7′ 1″ high up to 10′ 0″ high to bottom of globe
Base, octagonal, 1′ 6½″ diameter

No. 205
7′ 1″ high up to 10′ 0″ high to bottom of globe
Number of arms, 2 or 4, to suit requirements
Base, octagonal, 1′6⅜″ diameter

No. 309
7′ 5″ high, over all
Body of lantern octagonal, 1′ 3″ diameter
Base plate square, 1′ 8″x 1′ 8″

No. 433
Standard with octagonal lantern
Overall height, 7′ 6″ (can be made any height up to 9′ 7″)
Round base 11″ diameter

No. 355
7′ 9″ high to bottom of globe
Base, round, 18″ diameter

No. 105
8′ 9″ high to bottom of globe
Base, triangular, 2′ 9″ diameter
Base may also be made 2′ 0″ diameter

No. 401
5′ 6½″ high to bottom of globe
Figure on top of globe 6″ high
Base, 5 sided, 17¼″ greatest width

No. 352
5′ 10″ high to bottom of globe
Base, round, 1′ 4½″ diameter

No. 118
5′ 2″ high to bottom of globe
Base can also be made 1′ 3″ diameter
Base, 1′ 3″ square

No. 249
5′ 6″ high to bottom of globe
Base, 1′ 8″ diameter

No. 215
6′ 6″ high to bottom of lower globes
Base, 1′ 6″ square with cut corners and curved sides

No. 54
2′ 7½″ high to bottom of globe
Extreme projection, 1′ 5″
Wall plate, 1′ 4″x1′ 11″
Wall plate same as No. 199

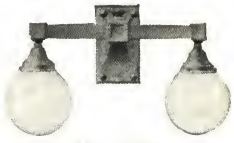
No. 180
1′ 6½″ high to bottom of globe
Extreme projection, 2′ 7″
Wall plate, round, 1′ 2″ diameter

No. 143
3′ 9″ high to bottom of globe
Extreme projection, 1′ 4″
Top wall plate, 1′1″x9¼″
Lower wall plate, 10½″x7½″

No. 408
2′ 1½″ high to bottom of globe
Extreme projection, 9⅝″
Wall plate, octagonal 10″ extreme diameter
Bracket octagonal

No. 113
Extreme projection, 1′ 1″
Wall plate, 1′ 0″x1′ 1½″

No. 280
1′ 4¾″ high over all
Extreme projection, 1′ 2″
Wall plate, 1′ 4″x9″; 1′ 3″x8″



No. 361
Extreme spread of arms, 2′ 9½″
Extreme projection from wall, 10½″
Wall plate, 8″x14″

SMYSER-ROYER COMPANY

EXTERIOR LIGHTING FIXTURES

SCALE
⅜″ and ¼″ = 1′ 0″

No. 211
7′ 1½″ high to bottom of globe
Base, round, 1′ 4″ diameter

No. 24
7′ 0″ high to bottom of globe
Base, 2′ 0″ square

No. 273
7′ 0″ high to bottom of upper globe
4 arms, 22″ center to center of opposite lights
Base, 1′ 4″ square

No. 265
7′ 1½″ high to bottom of upper globe
2, 3 or 4 arms
Base, triangular, 1′ 8″ diameter

No. 160
6′ 7″ high to bottom of upper globe
3 or 4 pendent globes
Base, 1′ 4″ square

No. 270
8′ 6¼″ high to bottom of upper globe
Five globes
Base measures, 2′ 0″ across

No. 29
6′ 8″ high to bottom of globe
Base, 1′ 4½″ diameter

No. 170
7′ 7″ high to bottom of globe
Base, 2′ 2½″ square

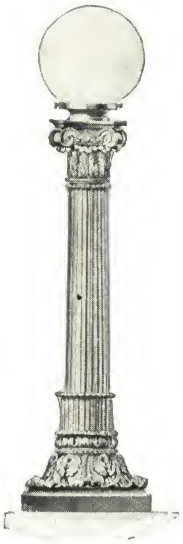
No. 307
5′ 4¼″ high to bottom of globe
Base, 18½″ square

No. 354
6′ 0″ high over all
Base, octagonal, 13″ longest diameter

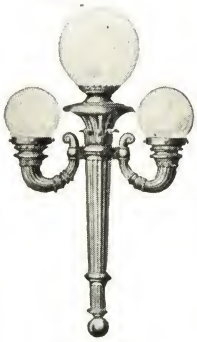
No. 328
5′ 2½″ high to bottom of globe
Base, round, 1′ 8″ diameter

No. 50
5′ 6″ high to bottom of globe
Base, 1′ 9″ square

No. 400
5′ 3½″ high to bottom of globe
Base, 21¼″ square



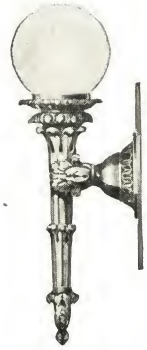
No. 326
5′ 8½″ high to bottom of globe
Base, 1′ 10″ square



No. 206
3′ 6″ high to bottom of upper globe
Design, size and projection of wall plates and brackets same as per design No. 114

No. 198
3′ 8½″ high to bottom of globe
Wall plate, 11″ diameter

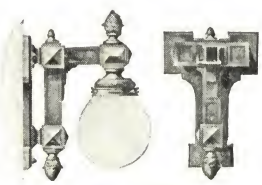
No. 198-A
2′ 8″ high to bottom of globe
Wall plate, 8″ diameter with projecting lugs for bolts with 9″ over all diameter



No. 52
3′ 7″ high to bottom of globe
Wall plate, octagonal 1′ 2″ diameter
Extreme projection, 1′ 7½″

No. 183
1′ 11″ high to bottom of globe
Extreme projection 1′ 1½″
Wall plate, rectangular, 10″x11″

No. 213
1′ 4½″ high to bottom of globe
Extreme projection, 11¾″
Wall plate, 9⅜″x7½″
(same as per design No. 214)



No. 199
2′ 4½″ high over all
Extreme projection, 1′7½″
Wall plate, rectangular, 1′ 4″x1′ 10″

No. 109
1′ 7¾″ high to bottom of globe
Extreme projection, 1′ 7″
Wall plate, 1′ 5″x11¼″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

No. 120
6′ 0″ high to bottom of globe
No. 120-A
7′ 0″ high to bottom of globe
No. 120-B
4′ 0″ high to bottom of globe
Base, 1′ 4″ square

No. 27
5′ 4½″ high to bottom of globe
Base, octagonal, 1′ 3″ diameter

No. 259
5′ 6″ high up to 6′ 0″ high to bottom of globe
Base can be made 10″ or 11½″ square

No. 53
5′ 6″ high to bottom of globe
Base, 1′ 8″ square

No. 369
6′ 0″ high to bottom of globe
Base, round, 1′ 3″ diameter

No. 318
6′ 0″ high to bottom of globe
Base, round, 1′ 8″ diameter

No. 334
5′ 0″ high to bottom of globe
Base, octagonal, 1′ 10″ diameter

No. 334-A
Scale, 1″ = 1′ 0″
3′ 8″ high to bottom of globe
Base, octagonal, 1′ 4″ diameter

No. 397
5′ 6″ high to bottom of globe
Base, octagonal, 12¼″ across square, 13½″ across corners

No. 191
5′ 0″ high up to 8′ 1″ high to bottom of globe
Base, 1′ 0″ square

No. 316
7′ 6″ high to bottom of globe
Base, triangular, 2′ 4¾″

No. 110
7′ 7″ high to bottom of globe
Base, 2′ 0″ square

No. 262
8′ 11″ high to bottom of globe
Base, 1′ 5″ square

No. 252
8′ 0″ high to bottom of globe
Base, 11″, round or square

No. 182
6′ 7½″ high to bottom of globe
Base, 1′ 8″ square

No. 124
8′ 9″ high to bottom of center globe
Base, rectangular, 3′ 3″x1′ 4″

No. 357
1′ 6⅝″ high to bottom of globe
Extreme projection, 12¼″

No. 358
2′ 6¾″ high to bottom of globe
Extreme projection, 15″
Wall plate, round, 11½″ diameter

No. 231
2′ 8″ high to bottom of globe
Extreme projection, 1′ 1⅛″
Wall plate, 9″x16″

No. 234
Extreme projection, 1′ 3¾″
Wall plate, round, 11″ diameter

No. 405
Extreme projection, 7″
Wall plate, 5″x9½″

No. 246
3′ 3″ high to bottom of upper globe
Distance from center of shaft to wall, 12″
Size of wall plate, 9″x16″

No. 212
Extreme projection, 1′ 3½″
Wall plate, round, 6″ diameter

No. 181
Extreme projection, 1′ 1½″
Wall plate, rectangular, 10½″x1′ 7″

SMYSER-ROYER COMPANY

EXTERIOR LIGHTING FIXTURES

SCALE
⅜″ and ¼″ = 1′ 0″

No. 312
Scale, 1″ = 1′ 0″
5′ 10″ high to bottom of globe
Steel pipe shaft
Base and cap of cast iron
Can be made any height
Base, round, 11″ diameter

No. 337
Scale, 1″ = 1′ 0″
4′ 11⅛″ high over all
Base, octagonal, 10″ diameter

No. 23
Scale, 1″ = 1′ 0″
4′ 2¾″ high to bottom of globe
Base, 1′ 3½″ square

No. 413
Scale, 1″ = 1′ 0″
4′ 2″ high to bottom of globe
Base, 4½″ square
This standard is especially adapted for stair newel lighting and can be made from 3′ 0″ to 5′ 0″ high to bottom of globe

No. 260
Scale, 1″ = 1′ 0″
4′ 9½″ high to bottom of globe
Base, 1′ 3″ square

No. 190
Scale, 1″ = 1′ 0″
4′ 5″ high to bottom of globe
Base, 1′ 2″ square

No. 244
Scale, 1″ = 1′ 0″
4′ 1½″ high to bottom of globe
Base, round, 9″ diameter

No. 244-A
4′ 1½″ high to bottom of globe
Base, 7″ square

No. 200
Scale, ¾″ = 1′ 0″
6′ 7½″ high over all
Lantern, octagonal
Base, square, 1′ 9½″ diameter (cut corners, concave sides)

No. 173
Scale, 1″ = 1′ 0″
3′ 8″ high to bottom of globe
Base, 12″ square

No. 237
Scale, 1½″ = 1′ 10″
4′ 10″ high up to 6′ 3″ high to bottom of globe
Base, 11″ square

No. 319
Scale, 1″ = 1′ 0″
4′ 1″ high to bottom of globe
Base, 1′ 3″ square

No. 421
4′ 10″ high over all
Base, 11″ square

No. 232
Scale, 1″ = 1′ 0″
3′ 4″ high to bottom of globe
Base, octagonal, 10″ diameter

No. 305
Scale, 1″ = 1′ 0″
5′ 8⅞″ high over all
Body, round, 1′ 3″ diameter
Base, 1′ 5″ square

No. 410
5′ 2½″ high over all
Body, round; outside diameter of glass, 1′ 6″
Base, round, 1′ 7½″ over all diameter

No. 441
5′ 10¼″ high over all
Base 2′ 1″ square

No. 375
Scale, 1″ = 1′ 0″
3′ 7⅜″ high over all
Lantern, octagonal
Base, 2′ 10¾″ on diagonal

No. 364
Scale, 1½″ = 1′ 0″
2′ 11¼″ high over all
Over-all spread of base, 1′ 9½″

No. 350
Scale, 1′ = 1′ 0″
4′ 8½″ high over all
Body, octagonal, 2′ 9¾″ longest diameter
Base, round, 1′ 8″ diameter

No. 360
Scale, 1″ = 1′
Octagonal pier lantern
Over-all height, 4′ 0″
Base, 12″ square

No. 432
2′ 4½″ high over all
Base, 8½″ square

No. 391
Scale, 1½″ = 1′ 0″
2′ 11″ high over all
Lantern, hexagonal, widest diameter 17″
Base, round, 12″ diameter

No. 333
Scale, 1½″ = 1′ 0″
3′ 3¾″ high over all
Body, octagonal
Longest diameter 1′ 6¼″
Bottom member of base, 1′ 2½″ diameter

No. 362
Scale, 1½″ = 1′ 0″
2′ 7⅝″ high over all
Body, octagonal
Base, 12″ square

SMYSER-ROYER COMPANY

EXTERIOR LIGHTING FIXTURES

SCALE
⅜″ and ¼″ = 1′ 0″

No. 278
12′ 6″ high over all
9′ 8″ high to bottom of lantern
Can be made with 1 to 3 sign arms
Can be made with 1 to 4 lamp arms
Base, 13″ diameter, octagonal

No. 230
11′ 11⅝″ high over all
Base, round, 16¼″ diameter

No. 323
11′ 7½″ high over all
Lantern, round, 10½″ diameter
Base, round, 10″ diameter

No. 399
12′ 6″ high over all
Base, 12″ square

No. 419
12′ 0″ high over all
Base, 1′ 5″ diameter

No. 255
14′ 1″ high over all
Lantern, octagonal, 18″ diameter
Base, 1′ 4¼″ square

No. 202
1′ 0″ high to bottom of globe
Base, round, 1′ 4″ diameter

No. 187
4′ 3½″ high over all
Base, octagonal, 1′ 5″ diameter

No. 418
Over-all height, 5′ 0″
Base round, 15½″ diameter
Lantern is irregular octagon

No. 393
2′ 6″ high over all
Base, octagonal, 14″ over octagon
Base, octagonal, 13″ over square

No. 393-A
Same design as 393 but 2′ 11½″ high over all
Base, octagonal, 17″ over octagon
Base, octagonal, 16″ over square

No. 383
3′ 4½″ high over all
Base, 14″ square

No. 275
"The New Path-finder"
2′ 6½″ high over all
Specially designed for walks and driveways of country estates
Base, round, 7⅞″ diameter

No. 335
2′ 2¼″ high over all
Base, round, 7¾″ diameter

No. 233
2′ 0¾″ high to bottom of globe
Shaft, 2″ square
Base, 8″ square

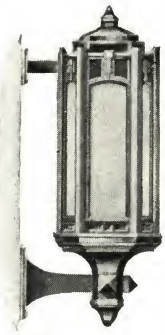
No. 203
Over all height of body, 1′ 5½″
Extreme diameter of base, 1′ 4″

No. 203-A
Similar
Height, 1′ 1″
Base, 1′ 0″

No. 177
1′ 7″ high to bottom of globe
Base, 2′ 0″ square

No. 409
2′ 10¼″ high over all
Base, 7¼″ square

No. 377
5′ 8″ high over all
Extreme projection, 2′ 0⅝″
Lantern, octagonal
Wall plate, 8¾″ wide x 9¼″ high



No. 412
4′ 6″ high over all
Extreme projection, 2′ 0″
Upper wall plate, 6″ square
Lower wall plate, 12″ square

No. 379
10⅞″ high
Base, 16″ octagonal

No. 134
2′ 4″ high to bottom of globe
May also be made 3′ 10½″ high to bottom of globe with 1′ 0½″ square base
Base, 11″ square

No. 340
3′ 6″ high over all
Base, 16″ round

No. 108
12″ high to top of globe holder
Base, 9¾″ square

No. 374
10¼″ over-all height of body
Base, round, 10″ diameter

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

No. 386
9′ 0″ high over all
Lantern, octagonal, mean diameter, 10⅛″
Base, round, 1′ 6″ diameter

No. 321
9′ 8½″ high over all
Lantern, hexagonal, 13½″ diameter
Base, round 1′ 8″ diameter

No. 430
Over-all height 9′ 6″
Standard octagonal with base to set on 9″ square

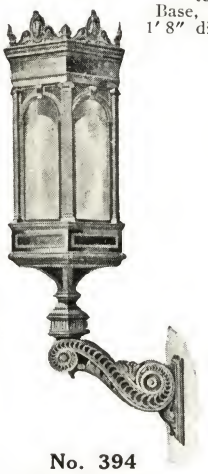
No. 435
9′ 8½″ high over all
Base, octagonal, 1′ 6½″ diameter

No. 303
9′ 7″ high up to 12′ 8″ high over all
Lantern, octagonal, 10″ diameter
Base, octagonal, 1′ 6⅜″ diameter

No. 363
10′ 8¼″ high over all
Base, round, 12″ diameter

No. 294
8′ 6″ high over all
Base, 10″ square

No. 446
11′ 2¾″ high to bottom of globe.
Base, octagonal, 1′ 6⅜″ short diameter



No. 394
6′ 1½″ high over all
Lantern, hexagonal
Diameter across corners at top, 31¾″
Wall plate, 12½″x20¾″

No. 137
4′ 6½″ high over all
Extreme projection, 1′ 10″
Wall plate, 1′ 10″ diameter

No. 306
5′ 3″ high over all
Lantern, octagonal, 12½″ diameter
Extreme projection, 1′ 8½″
Wall plate, 11″ square

No. 276
4′ 4″ high over all
Extreme projection, 2′ 4¾″
Body, octagonal, mean diameter, 14″
Wall plate, 9⅞″x14⅝″

No. 258
6′ 9¾″ high over all
Extreme projection, 2′ 10½″
Top wall plate, 7¾″ wide x 17¾″ high
Bottom wall plate, 7¾″ wide x 13″ high

No. 437
Octagonal lantern, Over-all height, 3′ 10″
Extreme projection, 1′ 11″
Octagonal wall plate, 10⅜″ across the square

No. 402
4′ 3¼″ high over all
Extreme projection, 21⅛″
Lantern, octagonal
Wall plate, 17¼″ long, 9″ wide at top, 6¾″ wide below

No. 320
5′ 9″ high over all
Body, hexagonal, 1′ 2¼″ diameter
Projection from wall to center line, 12¼″
Wall plate, 9¼″x15¾″

No. 395
3′ 10½″ high over all
Extreme projection, 23″
Wall plate, 6½″ diameter

No. 136
3′ 8½″ high over all
Extreme projection, 1′ 11½″
Wall plate, 10½″ diameter

No. 346
Extreme projection, 3′ 0″

No. 277
4′ 0½″ high over all
Extreme projection, 2′ 1″
Body octagonal, 10″ diameter
Wall plate, 2′0¼″x7½″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

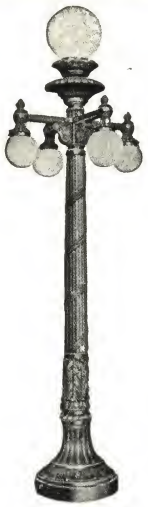
No. 192
10′ 0″ high to bottom of globe
Base, round, 1′ 7″ diameter

No. 373
8′ 0″ high to bottom of sign
Sign box, 2′ 4″ long, 1′ 6″ high, 5″ deep
Base, 1′ 4″ square

No. 290
7′ 0″ high to bottom of lower sign
Pipe shaft, base and signs of cast iron

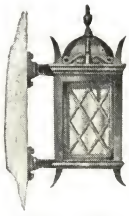
No. 291
6′ 6″ high to bottom of globe
Base, round, 11½″ diameter

No. 240
11′ 6″ high to bottom of globe
Base, 1′ 6″ square



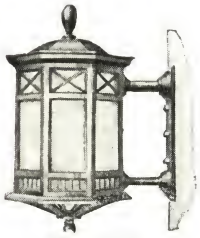
No. 317
9′ 0″ high to bottom of upper globe
Base, round, 1′ 8″ diameter

No. 248
10′ 0″ high to bottom of globe
Base, round, 1′ 4″ diameter



No. 445
2′ 6″ high over all
Lantern, 11″ square

No. 444
2′ 10⅜″ high over all



No. 417
Over-all height, 3′ 3½″
Extreme projection, 2′ 3⅜″
Body of lantern octagonal and is 1′ 5½″ across the square
Wall plate, 1′ 10¼″x 6¼″

No. 425
Octagonal lantern
Over-all height, 3′ 6⅝″
Extreme projection, 1′ 7½″
Back plate, 10¾″x5″
Top bracket plate, 4½″ diameter

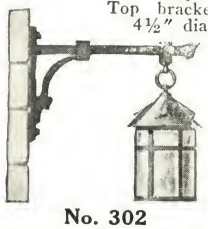
No. 327
5′ 0¾″ high over all
Body, octagonal, 1′ 4″ mean diameter
Extreme projection, 2′ 2″
Wall plate, round, 15″ diameter

No. 429
Over-all height, 4′ 0″
Extreme projection, 2′ 6″
Back plate, 7″ diameter

No. 286
1′ 7¾″ high over all
Projection to center of lantern, 1′ 1¾″

No. 282
2′ 1½″ high over all
Projection to center of lantern, 11¾″
Wall plate, 2″x14″

No. 284
1′ 9¾″ high over all
Projection to center of lantern, 1′ 0″



No. 302
2′ 4¾″ high over all
Projection to center of lantern, 1′ 10½″
Wall plate, 3½″x19″

No. 287
1′ 1¼″ high over all
Projection to center of lantern, 1′ 1″

No. 285
1′ 4¾″ high over all
Projection to center of lantern, 1′ 0″

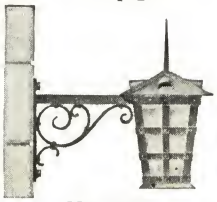
No. 288
1′ 8½″ high over all
Projection to center of lantern, 1′ 0″

No. 299
3′ 7½″ high over all
Projection to center line of lantern, 1′ 4″
Body, octagonal, 12¼″ diameter
Wall plate, 7⅝″ square

No. 407
2′ 1⅜″ high over all
Lantern, octagonal
Wall plate, round, 5″ diameter

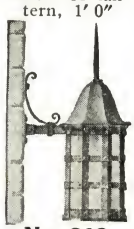
No. 376
2′ 1½″ high over all
Extreme projection, 19½″
Lantern, hexagonal
Wall plate, 5¼″ square

No. 367
Lantern, 1′ 6″ high over all
Body at largest point, 12″ square



No. 281
2′ 4½″ high over all
Projection to center of lantern, 1′ 10½″
Wall plate, 2½″x17½″

No. 63
1′ 6″ high.
Body, 7″ square
Extreme projection, 1′ 9″



No. 283
2′ 9½″ high over all
Projection to center of lantern, 1′ 0″
Wall plate, 3″x5″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

No. 296
2′ 8″ high over all
Body, octagonal, mean diameter, 10⅛″
Wall plate, round, 10½″ diameter

No. 438
Octagonal lantern, over-all height, 2′ 11″
Extreme projection, 1′ 7″
Wall plate, 4″x1′ 9″

No. 343
Projection to center of lantern, 12″

No. 439
Square lantern of wrought iron, Over-all height, 3′ 4″
Extreme projection, 2′ 4½″
Body of lamp, 12″

No. 426
Body of lantern octagonal 10″ across the flats
Over-all height, 3′ 4″
Extreme projection 1′ 7″
Wall plate, 1′ 9¾″x3⅝″

No. 301
3′ 10¼″ high over all
Projection to center of lantern, 1′ 6½″
Wall plate, 4½″ wide x 3′ 3″ long

No. 371
Lantern, 2′ 0¼″ high over all
Extreme projection, 3′ 1″
Wall plate, 24″ high, 4″ wide

No. 424
Octagonal lantern
Over-all height, 3′ 0″
Extreme projection, 1′ 1″
Wall plate, 3½″ diameter

No. 440
Octagonal lantern
Over-all height, 1′ 1″
Extreme projection, 8″
Octagonal wall plate, 4″

No. 324
11¼″ high over all
Extreme projection, 7″
Body octagonal, 6″ maximum diameter
Wall plate octagonal, 4⅛″ diameter

No. 438-A
Same design as No. 438, but of the following dimensions:
Over-all height, 2′ 1½″
Extreme projection, 1′ 1¾″
Body of lantern, 10″
Wall plate, 3″x15⅜″

No. 324-A
1′ 10¾″ high over all
Extreme projection, 1′ 2½″
Body, octagonal, 11¾″ maximum diameter
Wall plate, octagonal, 9″ maximum diameter

No. 345
2′ 10″ high over all
Projection to center of lantern 1′ 1¾″

No. 380
2′ 8″ high over all
Extreme projection, 17″
Lantern, octagonal
Wall plate, round, 10½″ diameter

No. 168
2′ 4″ high over all
Extreme projection, 1′ 4½″
Wall plate, 4½″ diameter
Body, 1′ 0″ square

No. 336
2′ 10⅜″ high over all
Extreme projection, 13″
Wall plate, same as design No. 214

No. 329
Octagonal lantern
Diameter of body 10″
Wall plate, round, 8″ diameter

No. 447
6′ 2¼″ high over all

No. 55
5′ 8½″ high over all
Body, octagonal
Extreme projection, 2′ 0″
Upper wall plate, 8¼″x4¾″
Lower wall plate, 1′ 3″x6⅜″

No. 365
3′ 7⅞″ high over all
Body, round, 1′ 3″ diameter

No. 329-A
Ceiling plate, round, 8″ diameter
Octagonal lantern
Diameter of body, 10″

Lantern No. 146
Height of body over all, 4′ 0″
Ceiling plate, 8″ diameter
Body, square, 2′ 0″ over all

No. 194
Height of body over all, 3′ 6″
Body, octagonal, 1′ 6″ diameter
Ceiling plate, round, 10″ diameter

No. 151
4′ 3½″ high over all
Body, round, 2′ 1″ diameter
Rosette at ceiling, 1′ 2″ diameter
Suspension pipe, 1⅛″ outside diameter
Length to suit specifications

No. 161
2′ 4″ high over all
Extreme projection, 1′ 5″
Wall plate same as for No. 54

No. 226
Extreme projection, 1′ 6″
Wall plate, octagonal, 14″ short diameter

No. 169
Extreme projection, 1′ 4″
Wall plate, 9″ diameter

No. 197
Over-all height of body, 2′ 1½″
Body, octagonal
Extreme diameter, 1′ 1¾″
Canopy at ceiling included

No. 112
Extreme projection, 1′ 4½″
Wall plate, 1′ 0″x1′ 1½″
(Same as per design No. 113)

No. 372
Extreme projection, 10⅝″
Wall plate, round, 8″ diameter

No. 135
Extreme projection, 1′ 2″
Wall plate, 11¾″x5½″

No. 214
Extreme projection, 9¾″
Wall plate, 9⅜″x7½″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

No. 390
12′ 5½″ high over all
Base, 17″ square

No. 261
10′ 0½″ high over all
Base, 14″ square

No. 385
9′ 10″ high over all
Lantern, octagonal, 12″ across corners
Base, octagonal, 22″ across corners
Base, without feet, 21½″ octagonal

No. 216
7′ 5″ high to bottom of globe
Base, 3′ 7″ square

No. 165
8′ 9″ high to top of acorn
Base, 2′ 8″ square

No. 332
8′ 0⅛″ high over all
Lower portion, 12″ square
Outside diameter, at base, 13¼″

No. 308
6′ 6¼″ high to bottom of globe
Base, 2′ 4″x2′ 4″

No. 51
6′ 0″ high to bottom of upper globe
Base, triangular, 2′ 0″ diameter
Base also can be made 1′ 9″ diameter

No. 142
4′ 2″ high to bottom of globe
Base, 1′ 3½″ square

No. 150
5′ 2″ high to bottom of globe
Base, 11″ square

No. 179
4′ 7″ high over all
Base, 1′ 10″ square

No. 420
7′ 6¾″ high over all
Base, 1′ 11″ square

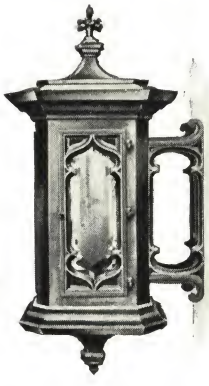
No. 129
5′ 10″ high to bottom of globe
Base, 1′ 4″ square

No. 292
6′ 6″ high to bottom of globe
Steel pipe shaft
Base and cap of cast iron
Can be made any height
Base, round, 11½″ diameter

No. 389
Lantern, 18½″ high over all
Lantern, hexagonal
Extreme diameter, 12½″
Sides flattened out to attach to scroll braces

No. 277-A
3′ 11½″ high over all
Extreme projection, 1′ 6⅜″
Body, octagonal, 10″ diameter
Wall plate, 1′ 6¾″x7½″

No. 338
5′ 1″ high over all
Base, 14½″ over all



No. 242
5′ 2″ high over all
Distance from wall to center of lantern, 1′ 6″

SMYSER-ROYER COMPANY

EXTERIOR LIGHTING FIXTURES

SCALE
⅜″ and ¼″ = 1′ 0″

THE UNION METAL MANUFACTURING CO.

GENERAL OFFICES AND FACTORY
CANTON, OHIO

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Products

BRACKETS, NEWELS, LANTERNS, ENTRANCE STANDARDS, STREET LIGHTING STANDARDS, FLOODLIGHT PROJECTOR BRACKETS and STANDARDS.

For Union Metal Columns, see Manufacturers' Index.

UNION METAL
FLUTED STEEL PRODUCTS

Materials

Newels and brackets are cast from highest grade gray iron or bronze as desired.

Entrance standards are made with the base shaft and capital as separate units.

Shafts are built up of 2-ply 22-gauge, copper-bearing steel. They are lock-seamed, die-fluted and pressed firmly together; no solder or rivets are used.

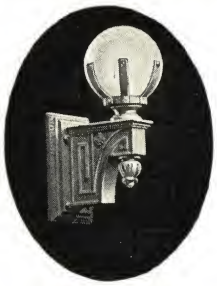
Bases and caps are cast. Copper-jacketed shafts can be furnished.

Workmanship

For more than a quarter century Union Metal has specialized in the production of ornamental exterior lighting fixtures. This experience enables Union Metal to produce lighting equipment which is efficient, beautiful and durable.

Today, Union Metal is one of the world's largest manufacturers of street lighting equipment.

Design No. 2067
Wall plate 12 in. diam. Wall to center of lantern 17 in. G-E Form 18-B Novalux lantern



Design No. 764
Wall plate 10x17 in. Wall to center globe 12 in. Globes 12x6 in.

Finishes

All fixtures are given a shop coat of high quality paint before leaving the factory and should be given a finishing coat after erection.

The following special finishes may be obtained at an extra charge: natural copper, verde antique, oxidized copper or statuary bronze.

Special Fixtures

Union Metal has complete facilities for the production of fixtures from the architect's drawing.

You are assured of a faithful reproduction of your plans.

Design No. 1846
Wall plate 5¼x13 in. Wall to center globe 13½ in. G-E Form 8 Novalux Luminaire

Design No. K-785
Wall plate 9x18 in. Wall to center lantern 14½ in. Octagonal lantern

Design No. 1668
Base 18 in. square. Globe 12x6 in. Over-all height, 24½ in.

Design No. 864
Base 11 in. square. Octagonal lantern. Over-all height 3 ft.

Design No. 960
Wall plate 5x12 in. Wall to center globe 16 in. Octagonal lantern

Design No. 7025
Base 9½x20⅛. Bottom shaft 7 in. diam. Top shaft 5 in. diam. G-E Form 18-A Novalux Standard height to top of lantern 9 ft. 2 in.

Design No. 735
7 globes. Base 18 in. square. Bottom shaft 9½ in. diam; top 6½ in. diam. Center globe 18x10 in. Side globe 6x3¼ in. Height to top of center globe 9 ft.

Design No. 1649
Base 16 in. diam. Bottom shaft 6½ in. diam.; top 4 in. diam. Octagonal Gothic lantern. Height to top of lantern 8 ft. 2½ in.

Design No. 1156
Base 18 in. square. Bottom shaft 8 in. diam.; top 5 in. diam. G-E Form 12 Novalux No. 103 globe. Height to top of globe 7 ft. 9½ in.

Design No. 1218
Base 13 in. square. Bottom shaft 5½ in. diam.; top 4 in. diam. G-E Form 8 Novalux No. 109 globe. Height to top of globe 6 ft. 9⅝ in.

BEARDSLEE CHANDELIER MANUFACTURING CO.

Manufacturers of Chandeliers and Ornamental Bronze

216 South Jefferson Street
CHICAGO, ILL.

Background

Our business is designing and manufacturing Lighting Equipment.

The Beardslee Organization has a background of over fifty years. Thirty-one years ago the BEARDSLEE CHANDELIER MANUFACTURING CO. was formed. Sixteen years ago Beardslee absorbed David J. Braun Co. The Braun organization would have been in business 57 years had they continued until now. The pick of the Braun personnel still functions in the Beardslee Organization.

Two years ago Beardslee absorbed R. Williamson & Company. Their key-men became part of our organization. So our background is rich in experience. Every member of the Beardslee staff is trained, competent and keen to serve your needs.

Beardslee Products

These consist of everything in HIGH QUALITY LIGHTING FIXTURES:

Brackets, Chandeliers, Lanterns, Built-in and all forms of Specially Designed Pieces, Period and Moderne.

Expert craftsmen have the finest equipment their special needs require. We operate two, wholly owned, foundries. Because of the volume of varied ornamental bronze and brass work flowing through week after week, its personnel handles difficult jobs as readily and easily as they put through the very simple kinds.

We can produce for you anything in high grade Church, Residential, Public and Semipublic, Commercial, Interior and Exterior Lighting Fixtures.

Effective Co-operation

At your instant service is Beardslee's very extensive library of drawings and photographs. The extensive collections of patterns that were consolidated when Beardslee absorbed the Braun and Williamson Companies give us unusual ability to serve at modest prices. Our effectiveness is ready for immediate action. You are assured of speedy, high quality execution of designs, at lowest possible costs.

Perhaps you need the services of our Designers. We have a competent staff. Our designers can take your sketches, outlines and under your direction bring forth exactly what you visualize for your needs. Or, we will gladly begin with your verbal instructions, suggestions, views, etc., and submit for your approval designs, sketches and drawings of appropriate lighting equipment.

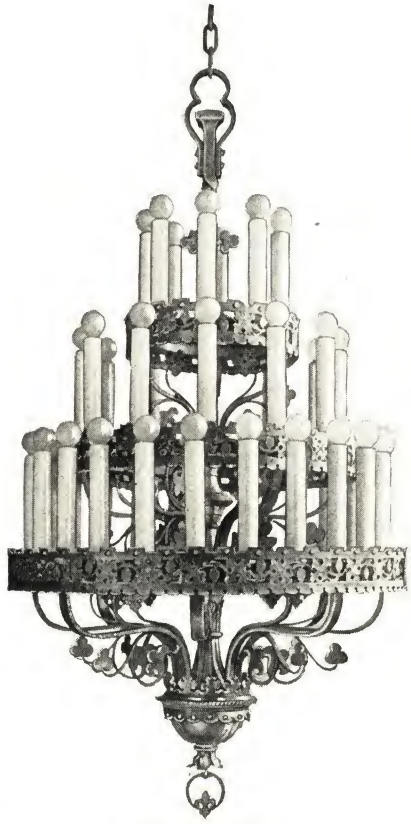
There is a Beardslee District Manager near you. Even closer, in a geographic sense, is a Beardslee Local Distributer. Both can, and will gladly, contact you. When selecting Beardslee to execute your designs, you can rely upon them furnishing exactly what you expected, just where needed and on time.

Our new Catalog 30—Section 1, covering outdoor lighting fixtures is being mailed to all architects. If it is not in your files, let us send you your copy.

Let Beardslee provide you with effective Lighting Fixture co-operation.

No. H30—142

No. K30—297



No. C28-373

FRANKLIN POTTERY, INC.

Manufacturers of Vitrified Pottery Lighting Fixtures and Switch Plates

LANSDALE, PA.

Products

Vitrified Pottery Lighting Fixtures and Switch Plates.

Faience and other Hand Made Plastic Tiles.

White and Colored Dry Pressed Wall Tiles.

Glazed and Unglazed Floor Tiles.

Bathroom Accessories and Electric Heaters.

Uses

Franklin Vitrified Pottery Lighting Fixtures are especially adapted to use wherever beauty and durability are considered paramount.

They make excellent fitments in bathrooms, kitchens, porches, halls, laundries, beauty parlors, garages, bedrooms. They are especially desirable in hospitals, hotels, apartment houses and places where fixtures are subjected to severe wear and places where ease of cleaning and sanitary qualities are of importance.

Properties

Vitrified pottery is made the same as the finest china. It combines beauty with utility. Being itself an insulating material adds to the safety of the product. All Franklin fixtures are approved by the National Board of Fire Underwriters.

They retain their newness for all time. Not easily soiled, but if dirt accumulates, it can be readily removed with a damp cloth. "As Easily Washed as a China Plate." Will not rust or corrode; are not injured by soap, lye or acid; never lose their beautiful glaze. All screws used are heavily nickelplated.

Fixtures come wired ready to hang. Wire used is No. 18 standard fixture wire, insulated $\frac{1}{32}$ in.

Designs and Colors

Fixtures are made in many designs, suitable for practically every purpose. A few are shown here, but complete catalogue shows many others.

Franklin fixtures are also furnished in a variety of colors to fit into almost any decorative scheme. They may be had in striped effects and many banded designs. Complete color chart sent on request.

Any of our sidewall brackets can be furnished either with or without convenience outlet. They may be had with levolier socket, with pull chain or without switchir mechanism for use with wall switch. Ceili units may be either keyless or with pull chai

Special Emergency Circuit for Hospitals

We manufacture a ceiling unit fitted wi special emergency light to switch on aut matically from house supply if regular ele tric supply is interrupted. Write us for furth information regarding this useful item.

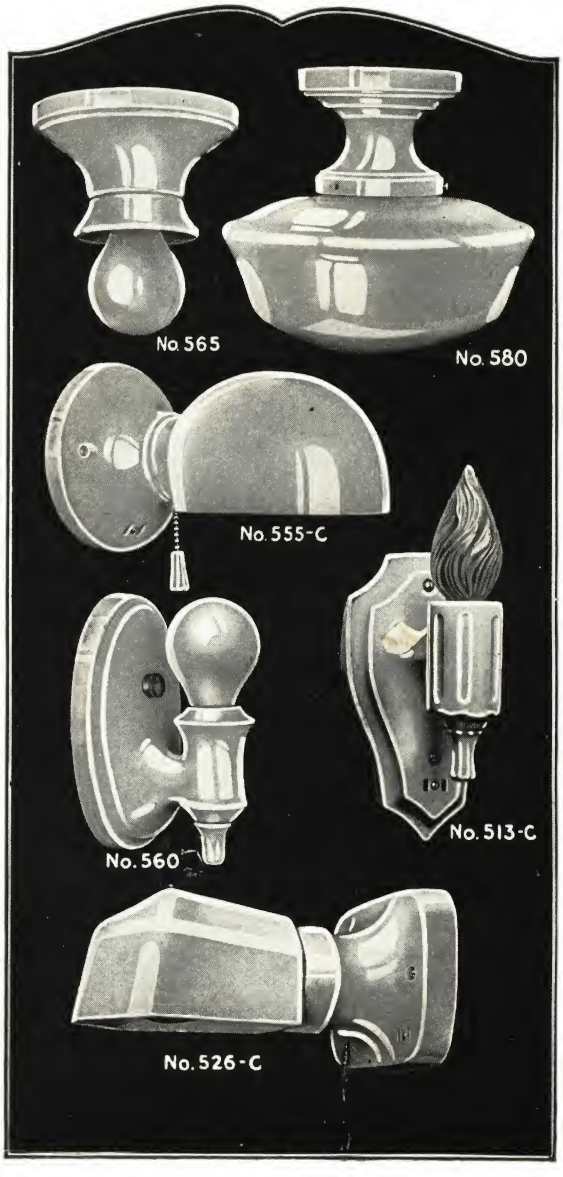
We also furnish our No. 525, sidewa bracket with Dim-a-lite socket. This is e tensively used in hospitals, as it furnishes night light when dimmed, but is made a bright light b a touch of the chain.

Vitrified Pottery Switch Plates

We manufacture swit plates to match tile, fixtures an bathroom accessories.

But not alone in the batl room are these switch plat desirable. They add a finishir touch of beauty to any roon As they come in many colo they fit any decorative schem while the lustre finishes are a ways suitable for any part of th building. They are easy to clea with a damp cloth and neve lose their beautiful glaze or colo

Although made of vitrifie pottery, these switch plates a not easily broken and will stan a lifetime of wear. They d not chip or craze, cannot b dented or discolored, hence a always new.



Get Complete Catalogue

Catalogue, showing all d signs in lighting fixtures an switch plates, together wit sheet showing various color should be in your files. A pos tal card request from any arch tect will bring it.

A Complete Service

Franklin Service eliminate the uncertainty that is inevitabl if a harmonious color ensembl must be provided from sample and products furnished by vari ous manufacturers.

All our materials are fur nished with the same glazes a made under identical condi tions as to production selection, therefore offers tru color harmony.

CURTIS LIGHTING

CHICAGO
NEW YORK
TORONTO
ANTWERP

X-Ray Reflectors

PLANNED LIGHTING

Curtis Lighting, Inc.

Manufacturers of
X-Ray Reflectors
Golden Armored

Illuminating Engineers—Artists—Designers

1125 West Jackson Boulevard
CHICAGO

Originators of
Eye Comfort
TRADE MARK REG
Indirect Lighting

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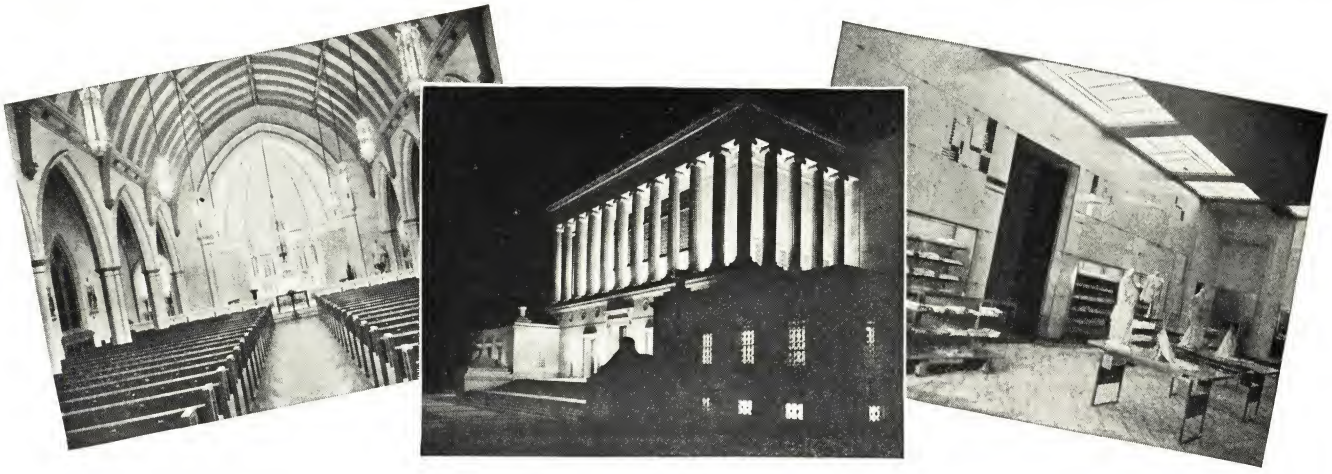


Curtis Lighting

THE success of "Planned Lighting" is due largely to the close co-ordination of effort between the architect, lighting specialist and those concerned in the construction and equipment of buildings.

CURTIS LIGHTING is "Planned Lighting,"—each job engineered to provide the correct amount of illumination for proper architectural and lighting effect. The pages which follow illustrate completed jobs and give suggestions for planning similar installations.

The basic principle of CURTIS LIGHTING is the X-Ray Reflector, introduced in 1897, and known the world over for efficiency, light control and durability.

X-Ray Reflectors are made of the clearest crystal glass, plated with pure silver, and Golden Armored to protect and keep the silver bright at all times!

Insist on GOLDEN ARMORED X-RAY REFLECTORS; guaranteed to give perfect service and complete satisfaction, regardless of the date of purchase.

Representatives of CURTIS LIGHTING are located in the world's principal cities,—with factories in United States, Canada and Europe. The organization is one of the largest devoted to the design and manufacture of Engineered Lighting Equipment and Luminaires.

CURTIS co-operation is extended to Architects, Engineers and others interested in developing or applying advanced lighting methods.

"PLANNED LIGHTING"

Is worked out in detail in the architect's office when the structure is being planned, to provide the ideal system of illumination.

It produces harmony between structural arrangement and architectural detail, obviating later costly alterations and compromises in both architectural plans and lighting effect.

"Planned Lighting" insures the right atmosphere or effect with proper interpretation of architectural values by providing the correct amount of illumination where it is needed.

And provides flexibility for easily and economically increasing intensities of illumination for future needs.

THE Lighting BOOK

"THE LIGHTING BOOK"

Presents reproductions of outstanding "Planned Lighting," together with ideas and suggestions similar to those covered in the following pages.

The author, J. L. Stair, Chief Engineer, CURTIS LIGHTING, INC., has been highly complimented on the presentation and thoroughness.

Architects who have copies of "The Lighting Book" and use it constantly, find it very valuable.

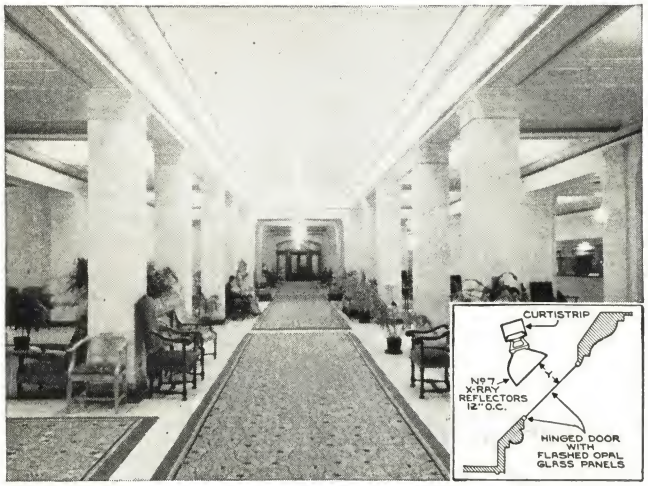
Schools and colleges use it as a combined reference and text book in the study of illuminating engineering. Copies for general reference are available in public libraries, as well as libraries of universities and technical schools.

PANEL AND RECESSED LIGHTING

Moderne interiors lend themselves especially to panel or recessed lighting, although this application is not limited only to rooms in Moderne.

Glass used for this type of lighting is generally flashed opal. Sections of each panel are generally hinged for maintenance and relamping, unless there is access to equipment from back of the glass panels.

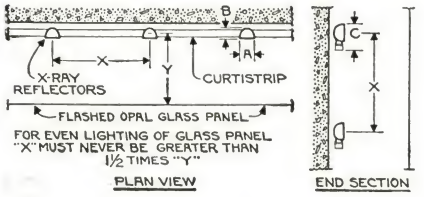
As an alternate, panel lighting might be provided from what would seem to be rosettes, or multiple skylight units. Or it might take the form of large panels resembling a skylight. Still another type has individual recessed units located at or near the ceiling, or placed individually, or in series in the side walls.



Exchange Floor, Haddon Hall, Atlantic City, N. J.
RANKIN & KELLOGG, Architects

For this type of installation No. 7 X-Ray Reflectors, using 60-watt lamps, mounted 12 in. o.c. on CurtiStrip, produce the splendid results shown. Flashed opal glass offers complete concealment of lighting equipment, and spacing on 12-in. centers gives uniform distribution.

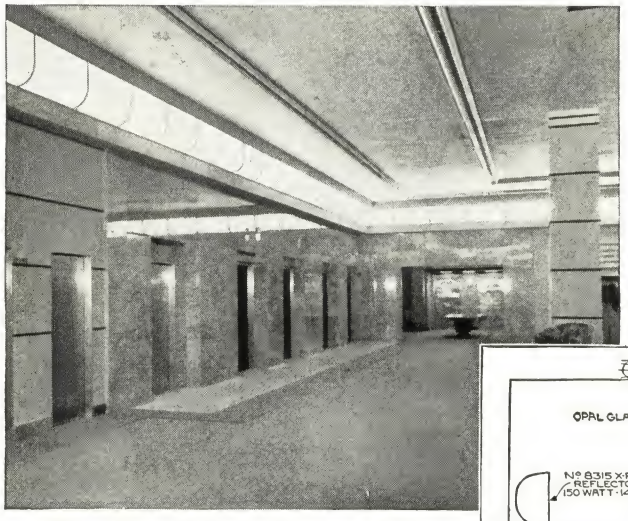
Bullock's-Wilshire Building, Los Angeles, Cal.
JOHN AND DONALD PARKINSON, Building Architects
FEIL AND PARADISE, Designers of Store Interiors.
An outstanding example of engineered lighting.



Wattage

Using flashed opal glass, 4 watts per sq. ft. of floor area will give approximately 6 to 8 foot-candles.

Wattage	Unit No. (including holder)	X-Ray Reflector No.	Dimensions A	Dimensions B	Dimensions C
60	8305	EC-50	4 ″	$3\frac{1}{16}$″	$7\frac{1}{16}$″
100	8310	EC-100	$4\frac{5}{8}$″	$3\frac{5}{16}$″	$8\frac{1}{2}$″
150	8315	EC-150	$5\frac{1}{8}$″	$3\frac{1}{2}$″	$9\frac{1}{2}$″
200	8320	EC-200	$5\frac{3}{4}$″	4 ″	$10\frac{5}{8}$″



Store Foyer, T. Eaton Company, Ltd., Toronto, Can.
ROSS & MCDONALD, Architects
SPROAT & ROLPH, Associates

Restaurant, T. Eaton Company, Ltd., Montreal, Can.
Two rows of No. 8310 X-Ray Reflectors 16 in. o.c. on CurtiStrip are used in this installation.

Main Banking Room, Union Trust Co., Detroit, Mich.

SMITH, HINCHMAN & GRYLLS, Architects

Dual illumination. X-Ray direct-indirect Bank-Ray, with 150-watt lamps on 18-in. centers, provides indirect lighting for the room and direct lighting on bank counters. Ceiling panel lighting brightly illuminates public space.

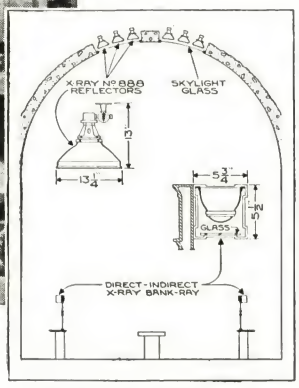
Light Transmission Through Glass

The amount of light transmitted through glass panels used in skylights, wall panels, etc. varies with the type of glass, as indicated in this table.

Type of glass	Transmission factors	Type of glass	Transmission factors
Clear hammered	90–95%	Clear antique	85–90%
Clear sanded hammered	70–85%	Amber antique	75–80%
Clear pebbled	65–80%	Sanded amber antique	55–70%
Amber hammered	70–75%	White opal	35–50%
Sanded amber hammered	50–60%	Flashed opal	55–60%

Directional Panel or Unit Lighting

Lighting, as shown in the photograph below, may be planned for utility or effect, or a combination of both. Determining factors are color of side walls, location and angle at which reflectors are mounted, distance at which light must be projected, and size of units that may be employed. For additional suggestions see Page 8.



Additional details on No. 888 are on page 23. "Bank-Ray" has 150-watt X-Ray Reflectors on 12-in. centers.

Side Walls Used as Reflecting Surfaces, M. E. Church, Knoxville, Tenn.

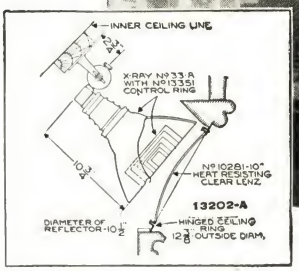
BARBER and MCMURRY, Architects

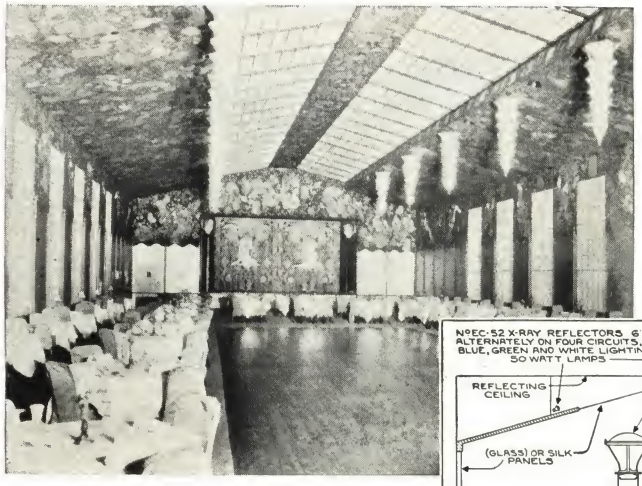
For details of hinged rims, see Pages 23 and 25.

Planning Lighting With Ceiling Panel Units

Arrangement of ceiling panel units depends on general structural conditions and architectural motif. The diagrams and tables governing skylight lighting on Page 8 govern lighting from ceiling panels. Where space above ceiling is limited, or where "box type" of panel unit must be shallow, lamps without reflectors may have to be used.

Curtis Engineers will gladly assist in planning panel, directional, or unusual lighting effects.

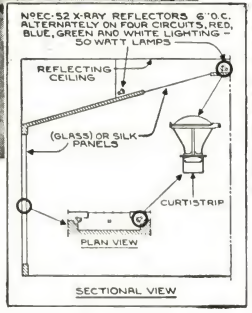


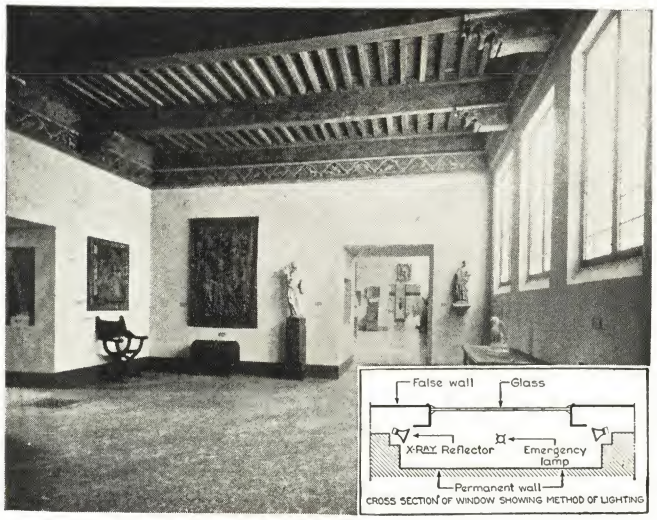


Indirect Panel Lighting for Roof Garden, Gibson Hotel, Cincinnati, Ohio

GUSTAVE W. DRACH and ASSOCIATES, Architects

Diagram explains unusual lighting in this unusual interior. Luminaires of silk are purely decorative.





Metropolitan Museum of Art, New York, N. Y.

Except for the diagram, one might believe that this room received natural daylight through the panel windows. This is indirect lighting through glass panels. Use principle of Panel Lighting, Page 3, for direct lighting.

COVE LIGHTING

Cove Lighting is one of the most effective, yet most difficult methods of illumination to properly apply. It has been widely adopted because of the fact that reflector equipment can be easily hidden in the architectural elements of the structure.

The idea of compactness is of great importance, so that no architectural feature be over-emphasized. At the same time coves or cornices must be constructed to offer complete concealment of lighting equipment.

Atmospheric moods or effects are created or emphasized by planned cove lighting. It is especially desirable in churches, auditoriums, theatres, display rooms, conference rooms, lobbies, etc.

Rooms in Moderne design admirably lend themselves to cove lighting either in the usual complete cove, or with abbreviated ceiling—or in a system of reverse cove lighting as in the lower left photograph.

Color lighting is particularly interesting and adaptable to cove or cornice lighting.

Photographs and diagrams cover general details for planning the size of cove, wattage, etc. It is advisable to consult Curtis Engineers to make certain that all conditions are conducive to satisfactory cove lighting.

Beautiful Lighting in a Beautiful Church

An interesting departure uses an abbreviated ceiling of proportions wide enough to serve as a reflecting surface to light the entire room.

Contrast between the light colored walls, the illuminated cove section and the Moderne ceiling produces a fascinating effect.

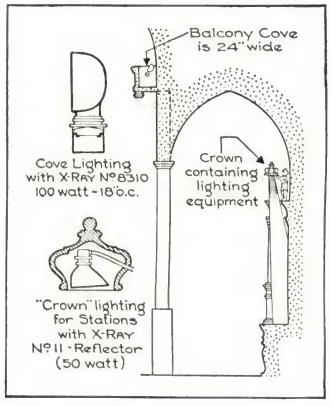
Applicable as a complete scheme of lighting—or to supplement lighting from a dome or skylight.

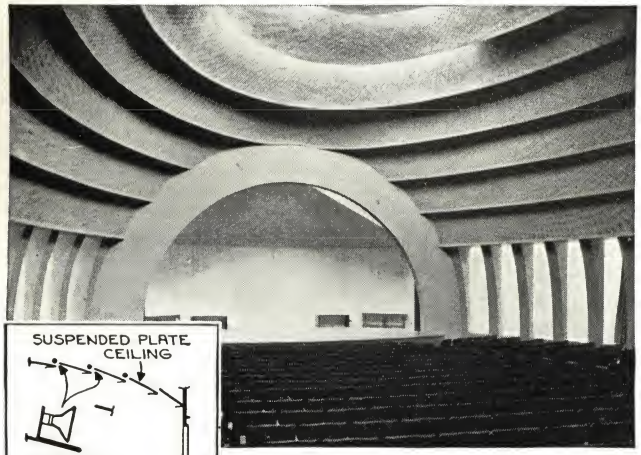
Bullock's-Wilshire Building,
Los Angeles, Cal.
JOHN and DONALD PARKINSON,
Architects

Sacred Heart Church, shown above, was provided with outlets for both fixture and cove lighting.

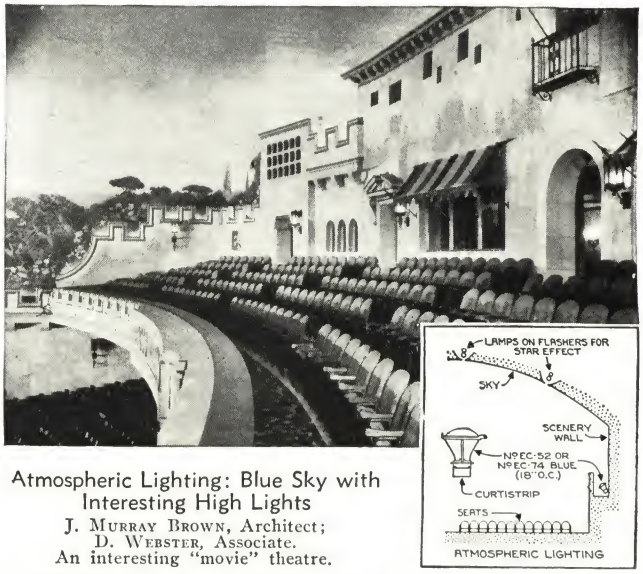
Cove lighting as shown in the diagram was decided upon. It brings out the detail and beauty of the interior and seems to "raise" the height of the ceiling.

Lighting Stations of the Cross—Use No. 11 Reflector with 60-watt lamp, installed as far forward as pleasing architectural arrangement will permit. See Diagram at right.





Auditorium, New School for Social Research, New York, N. Y.
JOSEPH URBAN, Architect
Unique reverse cove lighting places dramatic emphasis on stage.

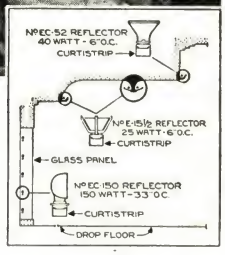


Atmospheric Lighting: Blue Sky with Interesting High Lights
J. MURRAY BROWN, Architect;
D. WEBSTER, Associate.
An interesting "movie" theatre.

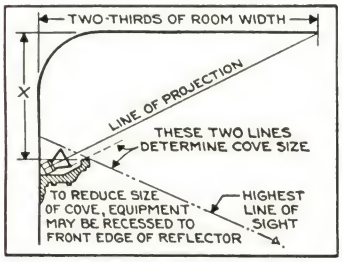
Above:
Niagara Electric Service Building, Niagara Falls, N. Y.
KIRKPATRICK & CANNON, Architects
WM. A. MALONEY, Electrical Engineer
EC-74 Reflectors on CurtiStrip

At Right:
A. B. Leach Conference Room, Chicago, Ill.
Designed by BRUNER & SIMMONS, Office Layout Specialists

Above:
A Combination of Cove and Moderne Panel Lighting
Designed by JACQUES CARLU of Boston and Paris.
Ross & MCDONALD, Architects
The panel lighting was planned as outlined on Pages 3 and 4.



E-15½ X-Ray Reflector is used in small coves. Consult Curtis Engineers.



The distance "X" from top of cove to ceiling should never be less than $\frac{1}{10}$ of the room width.

Note: To insure even lighting on back wall, this line of reflector should be vertical or forward of vertical

Planning Cove Lighting

The three important factors in planning cove lighting are size of cove, complete concealment of equipment and uniform distribution of light on ceiling.

Line of Sight Governs Size of Cove—Location of reflector and equipment in the cove and line of sight determine the size of the cove, as explained by diagram at left. The distance the cove will project can be reduced as much as the distance equipment can be recessed into the wall up to the front edge of the reflector.

Reflectors—There are two types of reflectors used for average cove lighting. *Concentrating Types*—For shallower ceilings where cornice is relatively close to ceiling. EC-52—60-watt size is for small coves. EC-74—100-watt size is for larger coves or in wide rooms. *Distributing Types*—For average conditions. There are four sizes—60, 100, 150 or 200-watts. This type can be mounted horizontally or vertically.

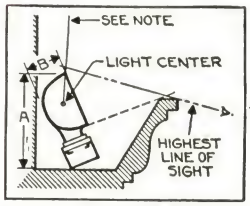
Wattage—Should be approximately twice the wattage for indirect lighting from fixtures; see Pages 15 and 16.

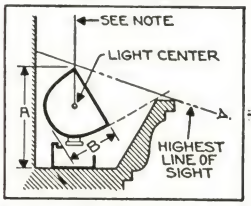
Above:
Distributing Type EC-50, EC-100, EC-150, EC-200.

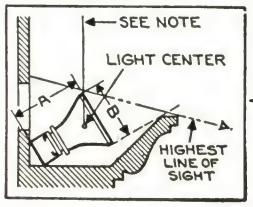
Concentrating Types EC-52, EC-74

At Right:
Colrlenz Frames Mounted in New, Simple "Clip Hinge" Frame.
Especially appreciated by maintenance man.

COLOR LIGHTING—Produced by fitting the same reflectors used for white lighting with "Colrlenz" units, consisting of frame with red, blue, green or amber colored glass. Wattage for each color is the same as for white lighting.







COVE LIGHTING REFLECTORS AND DIMENSIONS

X-Ray Refl. Number	Unit No. including holder	Wattage	For White Lighting: Dimensions A	Dimensions B	Spacing: Min. white	Spacing: Min. with color	Spacing: Max.	For Color Effects Using Heat Resisting Glass Colrlenz Add Catalog Numbers: Red	Amber	Blue	Green
EC- 50	8305	60	7 1/16"	3 1/16"	4½"	5½"	17"	10613	10614	10615	10616
EC-100	8310	100	8½"	3 5/16"	5 "	6 "	18"	10609	10610	10611	10612
EC-150	8315	150	9½"	3½"	5½"	6½"	20"	10605	10606	10607	10608
EC-200	8320	200	10 5/8"	4 "	6¼"	7¼"	22"	10601	10602	10603	10604
EC- 50	8305	60	6½"	3 1/16"	7 "	7 "	17"	10613	10614	10615	10616
EC-100	8310	100	7 "	3 5/16"	8¼"	8¼"	18"	10609	10610	10611	10612
EC-150	8315	150	7¼"	3½"	9 "	9 "	20"	10605	10606	10607	10608
EC-200	8320	200	8 "	4 "	10½"	10½"	22"	10601	10602	10603	10604
EC- 52	8255	60	5 7/16"	5 "	5 "	6 "	18"	10678	10679	10680	10681
EC- 74	8277	100	6½"	7¼"	7¼"	8⅛"	25"	10682	10683	10684	10685

SEE PAGE 1 FOR LIST OF CURTIS [6] ENGINEERS IN PRINCIPAL CITIES

ARTIFICIAL SKYLIGHT LIGHTING

Skylights may be real skylights to also transmit daylight, or they may be "false skylights" for only artificial lighting. The selection of proper reflectors is necessary for correct lighting in both.

X-Ray Reflectors for mounting above skylights are of three types—distributing, semi-concentrating and concentrating. The distributing type is used generally, unless the lighting requirements call for concentration on the floor area or working plane, or where directional lighting is used as in art galleries.

The particular problem in skylight lighting is to provide uniform distribution of light on the glass and to conceal individual light sources from the observer below.

Fourth Church of Christ, Scientist, Detroit, Mich.
Weston and Ellington, Architects
Combination cove and skylight lighting. Decorative skylight relieves the flatness of the ceiling.

Types of Skylights

Photographs on these two pages show that skylights can be built structurally plain with either flat or curved ceiling. Increasing the width of ribs between glass panels ofttimes makes considerable improvement in the general appearance. Ornamental or moderne designs offer many possibilities.

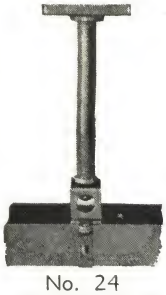
Upper Lobby, Midland Club, Chicago, Ill.
Vitzthum & Burns, Architects
The effect of sunshine from X-Ray Distributing Reflectors above skylight of tone emphasizes the hospitality and character of interior.

General Installation Problems

Arrangement of supports, or construction of both skylight and space above it sometimes makes installation of equipment a problem.

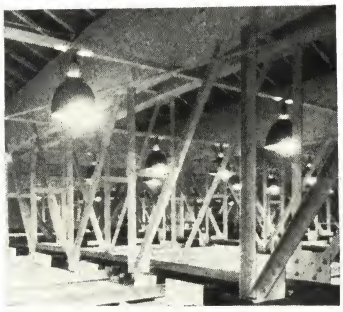
Equipment should be almost completely wired and assembled on the bench and installed quickly and easily, using standard fittings. CurtiStrip (see page 17) wiring channel fits this very purpose.

The large wire carrying capacity of CurtiStrip and flexibility of fittings makes it particularly adaptable and economical for skylight lighting. This means fewer distribution panels, *lower wiring costs.*



No. 24
One of the standard CurtiStrip bracket assemblies for skylight lighting equipment

Moderne "False Skylight" in Store Auditorium, T. Eaton Company, Ltd., Toronto, Can.
Ross & McDonald, Architects
Sproat and Rolph, Associates
X-Ray Distributing Reflectors used.



View above typical skylight shows X-Ray Reflectors installed on CurtiStrip wire channel. Rigid construction of CurtiStrip saves time in installation. "Cat walk" is just behind structural steel cross braces.

Feed wires are brought up to fewest number of distribution panels making considerable saving in cost of wiring.

Metropolitan Museum of Art, New York, N. Y.
Distributing X-Ray Reflectors above rippled glass skylight.

Planning Skylight Lighting

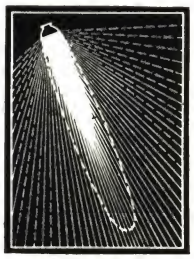
Diagram and tables below give data and dimensions to assist in planning skylight lighting.

Distributing

Distributing type X-Ray Reflectors produce wide spread of light, uniformly distributed within angle of approximately 90°.

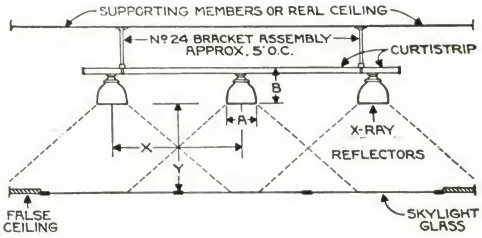
Semi-Concentrating

Semi-concentrating X-Ray Reflectors have greatest concentration within approximately 40°.



Concentrating

Concentrating types of X-Ray Reflectors provide maximum concentration in center beam at approximately 15°.



No. 570 Reflector

General Lighting

For an intensity of approximately 15 foot-candles on the working plane, provide 4 watts per square foot of floor area, when glass with a transmission of 75% is used in the skylight. See Pages 4 or 16 for factors of light transmission through glass.

DISTRIBUTING X-RAY REFLECTORS

The distance "X," shown in the diagram above must never be greater than 1½ times "Y." Distributing table follows:

Reflector No.	Wattage	Dimensions A	Dimensions B
3	60	4½"	6½"
535	100	5⅞"	8⅛"
570	150	8"	10¼"
575	200	9⅜"	11⅛"
585	500–300	11⅞"	20"
54	1500–750	16½"	28"

No. 710 Reflector

SEMI-CONCENTRATING X-RAY REFLECTORS

Distance "X" shown in the diagram above must never be greater than ¾ of "Y." Semi-concentrating table follows:

Reflector No.	Wattage	Dimensions A	Dimensions B
696	100–60	8⅜"	8"
700	150	10"	9"
710	200	11½"	10"
848	500–300	13¼"	18"
590	1500–750	20"	26"

No. 33-A Reflector

Directional Lighting

The two art galleries shown at the right, with their diagrams, illustrate general method of planning Directional Lighting. Suggestions under each cut give general data.

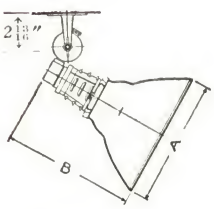
Wattage Required for Directional Lighting—50 to 100 watts per running foot of side wall are recommended. For average ceiling height 100 watts provide approximately 30 to 40 foot-candles on the wall.

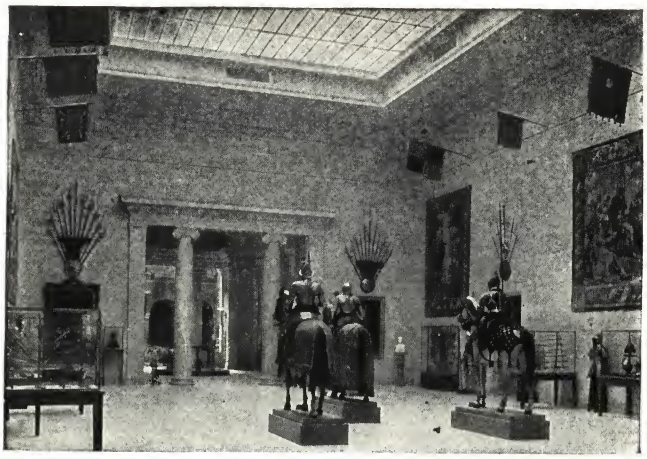
X-RAY INTERIOR FLOODLIGHTS

(Additional details on Page 23)

Cat. No.	Lamp size	Dimensions A	Dimensions B
Semi-concentrating Type			
338	200-watt	10½"	9¾"
Concentrating Center Beam with Flood			
44	100-watt	8⅝"	8"
33-A	200-watt	10½"	10¾"

These units are all mounted on swivel base to make adjustment easy.

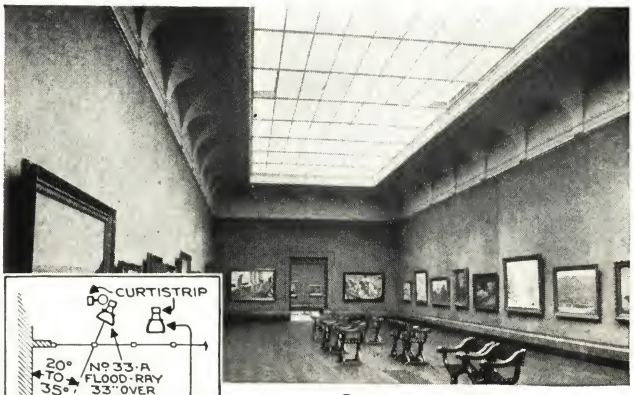


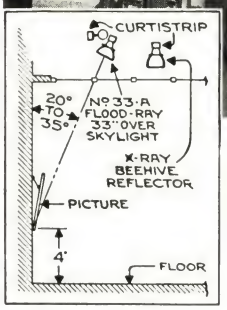


Court of Tapestries and Armory, Cleveland Museum of Art

HUBBELL and BENES, Architects

Lighted with distributing type X-Ray "Beehive" Reflectors.

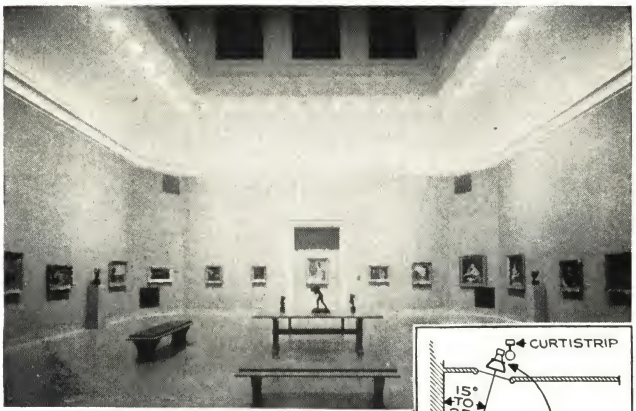




Directional Lighting

For art galleries this general type X-Ray No. 33-A is mounted on CurtiStrip 33 in. above glass as shown in diagram. The center portion of the skylight is planned on the same principle as skylight requiring general distributing types of reflectors—(see diagram in left column).

For general lighting of center portion of skylight, so as to have entire glass illuminated, provide ½ watt per square foot.



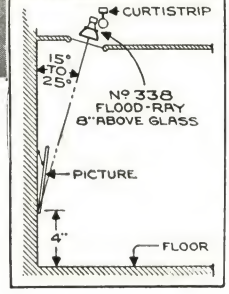
Baltimore Museum of Art

JOHN R. POPE, Architect

HENRY ADAMS, Consulting Engineer

Where art galleries have a skylight or "light-well" for day-light lighting as used above, X-Ray No. 338 "Floodray" (as shown in diagram), is mounted individually. These may be recessed using hinged ceiling rim shown on Page 25.

For ceilings up to 14 ft. high, X-Ray No. 44, using 100-watt lamps, may also be used.



LIGHTING FROM PEDESTALS, REFLECTOR LAMPS, WALL URNS

One of the interesting departures from the conventional type of lighting for completely illuminating the room with pleasing indirect lighting is the use of X-Ray Reflector equipment concealed in Pedestals, Reflector Lamps, Wall Urns, "Built-into-Furniture," or on the tops of wall cases.

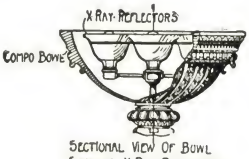
Parkside Candy Company, Buffalo, N. Y.
G. Morton Wolfe, Architect
The pedestals (Design No. 6650-X) supplement cove units for lighting this high class shop.

Promenade, South Shore Country Club, Chicago, Ill.
Marshall and Fox, Architects
Ornamental floor pedestals, containing X-Ray EC-344 Reflector units, using 500-watt lamps light this space.

Pedestal Lighting

Various designs and sizes of standard pedestals are available.

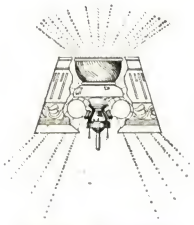
Planning Wattage and Proper Spacing—Spacing between pedestals should not exceed five times the distance from top of pedestal to the ceiling. To produce 6 foot-candles requires approximately 2 watts per sq. ft. of floor area.



Sectional View of Bowl Showing X-Ray Reflector Equipment

EC-344 X-Ray Reflectors are concealed in pedestals for "Eye Comfort" Indirect Lighting.

Reflector Lamps Equipped with Curtis Adapters



Curtis Adapters Concealed Within the Shade

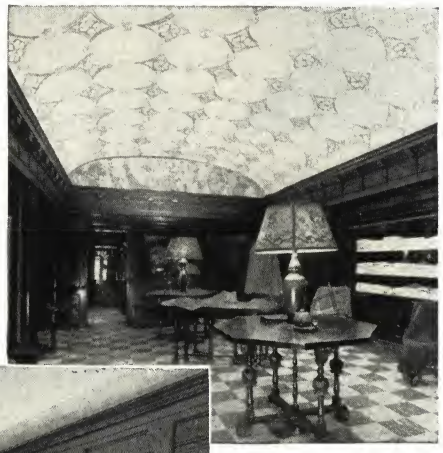
These make possible direct or indirect lighting, or a combination of both.

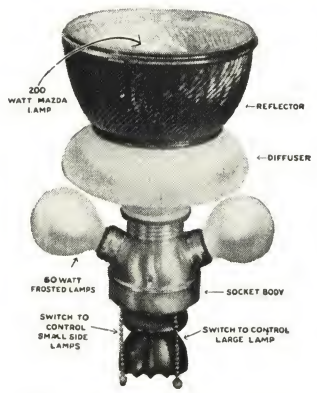
Four types of Curtis Adapters provide indirect lighting with portable lamps wherever the less formal atmosphere seems desirable.

Planning Wattage and Proper Spacing—

For Home Lighting—For indirect illumination, ½ to 1 watt per sq. ft. of floor area. Interiors with dark furnishings may need a higher intensity to obtain the desired effect.

For Commercial Lighting—The wattage is figured on the same basis as lighting from ceiling fixtures, using as an average from 2 to 4 watts per sq. ft.





Curtis Adapters Nos. 3000 and 2852
Have two pull chain switches.

Nos. 3000 and 2852 produce two effects: Local lighting and general indirect illumination—or a combination of both

Catalog No.	No. and size of lamp for indirect lighting
2852	One 500 or 300 watt
3000	One 200, 150 or 100 watt

Nos. 2700 and 2848 are suited to "candle type" portables, and where permanent Indirect Reflector Lamps with luminous shades are used as in shops, etc.

Catalog No.	No. and size of lamp for indirect lighting
2700	One 200, 150 or 100 watt
2848	One 500 or 300 watt

Portable lamps equipped with Curtis Adapters are ideal for clubs. Two types of lighting may be had: local or complete indirect lighting throughout the room.

Above:

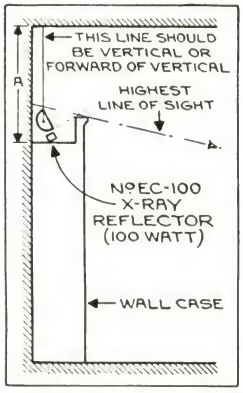
Finchley's Men's Store, New York, N. Y.
Beverly King, Architect

The entire store is lighted by lamps equipped with the Curtis Indirect Adapter mounted on pottery bases with parchment shades.

A distinctive method for a merchandising establishment.

Shop Designed by McLanahan & Benckner of Philadelphia, Pa.
Display cases afford opportunity for concealing lighting equipment and provide illumination in harmony with the treatment of the interior.

Column Lighting, Main Electrical Display Room of the Union Electric Light & Power Company, St. Louis, Mo.
Albert Groves, Architect
A splendid example planned by the cove lighting method. See Pages 5 and 6.



Lighting from tops of wall cases generally accomplished by using EC-100 X-Ray Reflector units. See Pages 5 and 6

"Built-into-Furniture" Lighting

Building lighting into furniture produces a unique and pleasing atmosphere.

Suitable for shops and stores; museums, hotel lobbies, railroad waiting rooms, school science rooms, laboratories, etc.

Planning Wattage and Proper Spacing—In general EC-100 Reflector mounted on CurtiStrip is recommended for this type of lighting. Approximately 5 watts per sq. ft. will produce 15 foot-candles. The number of reflectors and location in which reflectors are mounted determines the spacing.

Moderne Urn No. 5721-G fits into this atmosphere at F. Schumacher & Co., New York, N. Y.

5721-G Urn
5792-G Wall Box

EC-68 Reflector

5461-G Urn

Indirect Wall Urns

X-Ray EC-68 Reflector was developed to efficiently meet the requirements of short coves, where rooms are lighted by reflectors in wall urns or wall boxes. Its special design provides the exact light control for this particular type of lighting problem.

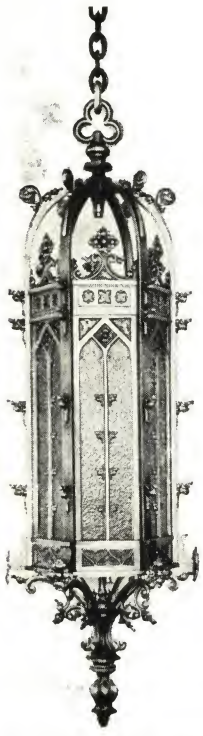
Planning Wattage and Proper Spacing—Lighting from wall urns and wall boxes is worked out in much the same way as cove lighting; (see pages 5 and 6). Spacing between units should not be greater than five times the distance from the ceiling to the top of the urn or box.

Wattage for lighting from wall boxes or urns should be approximately one and one-half times the wattage for indirect lighting from fixtures; (see pages 15 and 16).

Catalog No.	No. and size of lamps	Extends	Width at wall	Height at wall
8237-EC68 Reflector Unit only	One, 200-watt	10⅞″	10⅞″	8⅜″
5461-G Urn	One, 200-watt	12¼″	9¾″	17¾″
5721-G Urn	One, 200-watt	11½″	13¼″	14½″
5792-G Wall Box	Two, 200-watt	11¾″	30″	14½″

Other standard urns and wall boxes, having capacity of one to three 200-watt lamps are also available in Gothic, Adam, Greek, Italian and Classic Design.

Niagara Electric Service Corporation, Niagara Falls, N. Y.
Kirkpatrick & Cannon, Architects
Wm. A. Maloney, Electrical Engineer
Wall boxes each contain two EC-68 X-Ray Reflectors.



LUMINAIRES

Combining Utility and Design

Luminaire Studios of CURTIS LIGHTING specialize in designing equipment harmonizing with the architectural design and insuring the right atmosphere or effect to properly interpret the spirit or design of the interior.

Curtis Designers and Engineers rank among the foremost. In addition to their experience of combining utility and design, they have the famous Curtis-Winslow Library. This is one of the finest design collections. It contains many original etchings and details on all types of architecture, including recent additions in the Moderne.

Photographs of interiors with luminaires designed to harmonize and provide proper lighting are shown on these two pages. It is impossible to make here an elaborate presentation of the complete services of Curtis Luminaire Studios or "Planned Lighting" that is available, but it is hoped that these examples will be of sufficient interest to stimulate the urge for the Architect to make use of the service of Curtis Designers and Engineers placed at his disposal.

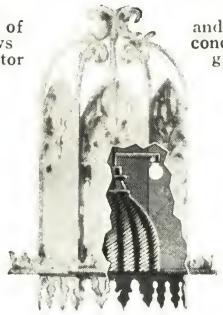
Bankers Trust Company, Atlantic City, N. J.
H. A. STOUT, Architect
Special Curtis Luminaires designed to conform with the architectural treatment of the long narrow interior, supplement the skylight lighting.

Lanterns

Pendant Lanterns have a broad application. The group shown at the right are four types of Gothic. These are hexagonal in shape and are wrought and cast of iron. As regularly supplied they are equipped with an X-Ray Reflector for providing controlled-direct lighting, as shown in the photograph of the church below. They may also be used without reflector for lobbies, etc.

Curtis Lantern in Methodist Episcopal Church, Greensburg, Ind.
FOLTZ, OSLER & THOMPSON, Architects
The Curtis Lantern provides adequate lighting for church services and an interesting effect to the interior.

Cutaway view of lantern shows X-Ray Reflector and small lamps concealed behind glass panels.



No. 40002XH

No. 40203XA

Curtis Gothic Lanterns are hexagonal shape—18½ in. from side to side, 41 in. high with chain hanger of such length as is required. Cathedral diffusing glass, panels regularly supplied.

Lanterns are regularly supplied with X-Ray Reflector for 500 or 300-watt lamp, placed above the hinged panel of heat-resisting diffusing glass.

Planning Lighting with Lanterns—Spacing between outlets should not exceed one and one-half times the distance from floor to bottom of lantern. For churches, wire each outlet on two circuits (1—reflector, 2—small lamps). One watt per square foot will provide approximately 5 foot-candles; two watts, approximately 10 foot-candles.

No. 40037XH

No. 40013XC

Continental Illinois Bank & Trust Co., Chicago, Ill.
GRAHAM, ANDERSON, PROBST & WHITE, Architects
Design No. 70249-A Curtis Indirect Luminaire used in this banking room.

(Above) Design No. 70249-A
Luminous bowl indirect bronze Luminaire, 25 by 9¾ in. with opal amber cased glass bowl. Capacity: four 200-watt lamps.

(At Right) Design No. 9224-XSS
Bronze with panels of sanded plate glass, bright beveled edges, 18 by 39 in. Four-rod hanger. Capacity: thirteen 25-watt lamps; four 60-watt lamps.

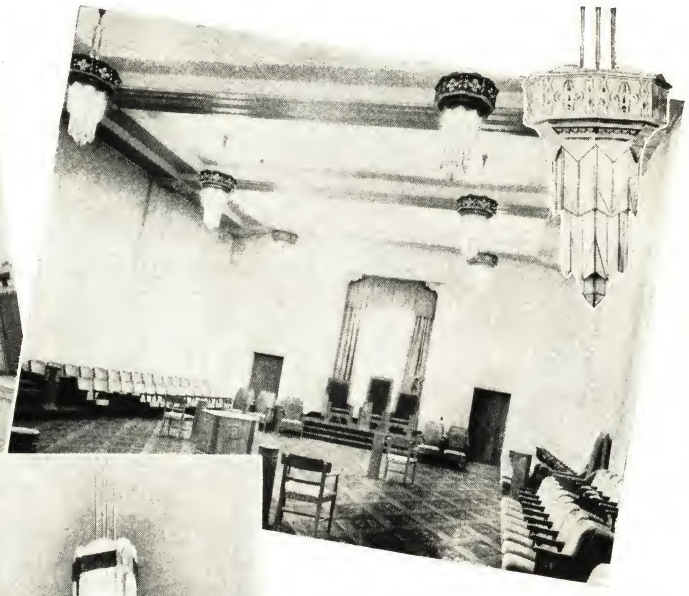
(Below) Design No. 5721-G—Wall Urn
For one 200-watt lamp. See details on page 10.

Design No. 5762—Fixture
INDIRECT PENDANT FIXTURES

Opaque panels	Dimensions, in.		Luminous panels
	Diam.	Depth	
No. 5732	23¼	11½	No. 5762
No. 5744	32	13½	No. 5774
No. 5753	42	17½	No. 5783

Capacities: *Nos. 5732 and 5762*—Two 150 or two, three or four 200-watt lamps.
Nos. 5744 and *5774*—Four to eight 200-watt lamps.
Nos 5753 and 5783—Three to six 500-watt or 300-watt lamps.

Decatur Masonic Temple, Decatur, Ill.
HOLABIRD & ROOT, Architects
Lobby lighted with Design No. 9224-XSS.



Masonic Temple, Rochester, N. Y.
OSGOOD & OSGOOD, Architects
Harmony in lighting and design with Direct-Indirect Lantern No. 9765.

(Above) Design No. 9765-X
Direct-Indirect reinforced composition and glass Lantern with open work rim, finished green bronze. *Diameter,* side to side, 31 in.; *height,* 37½ in. Four-rod pilot hanger. Four 200-watt lamps with X-ray Reflectors for indirect lighting; one 300-watt lamp for controlled-direct lighting.

(Below) Design No. 90041-XA—Wall Urn
Luminous type. 200-watts for indirect, two 25-watt lamps to light glass panels. *Width,* 14¾ in.; *height,* 20 in.; extends 9½ in. from wall.

Design No. 70227-XA
Luminous bowl indirect bronze Luminaire. 26 by 14 in. Single-rod suspension. Opal glass bowl containing X-ray Reflector with diffuser. Capacity: one 750, 1000 or 1500-watt lamp.
Many other Luminous Bowl Indirect Luminaires are available in shallow or deep types. Designs for simple or elaborate interior.

Library, Western State Teachers' College, Macomb, Ill.
A combination of indirect pendant fixtures.
Design No. 5762 and indirect wall urns Design No. 5721-G.

Milwaukee Gas & Light Company, Milwaukee, Wis.
ESCHWEILER & ESCHWEILER, Architects
Luminous bowl indirect Luminaire Design No. 70227-XA
Wall urn Design No. 90041-XA.

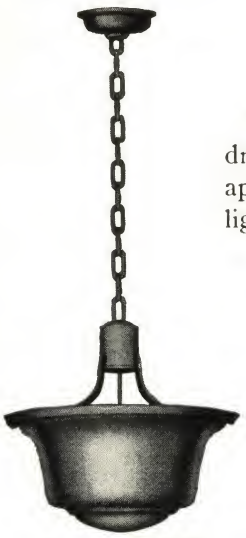
CURTIS "EYE COMFORT" LUMINAIRES

For Indirect Lighting

The indirect lighting fixtures on this page are standard commercial units, popular for offices, drafting rooms, stores, schools, libraries, hospitals and wherever lighting that is the nearest approach to daylight is needed. These are a marked contrast to the types of "inverted" lighting fixtures introduced in 1908 when Mr. A. D. Curtis and Kenneth Curtis made the first demonstration of practical indirect lighting before architects and members of the Illuminating Engineering Society.

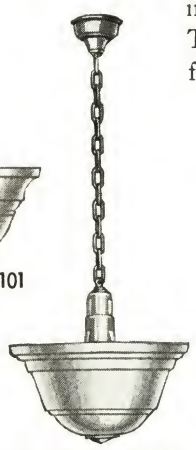
The bowl of each of these several sizes and shapes of modern indirect lighting fixtures contains one or more silver-mirrored X-Ray Reflectors, as shown in in the cutaway views below at the right. This is the secret of the pleasing, comfortable indirect lighting.

Luminous bowl types Nos. 5701 and 4001 are truly indirect lighting fixtures. A small opal diffuser in the bottom of the reflector softly illuminates the glass bowl.

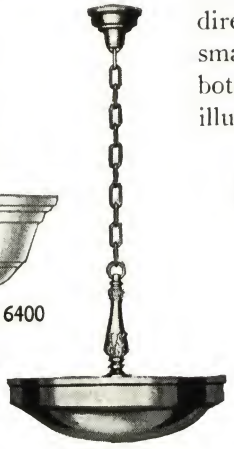


Design No. 5050

Design No. 6101

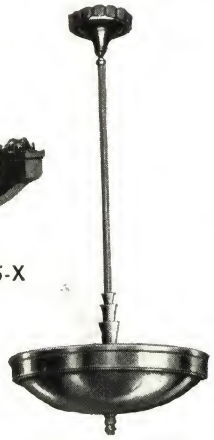


Design No. 6400



Design No. 5000

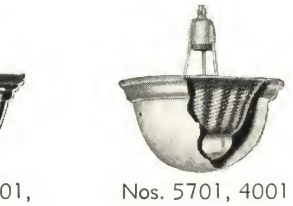
Design No. 9015-X



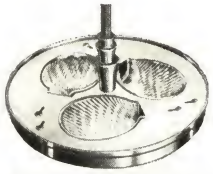
Design No. 7000

Design No. 5701

Design No. 4001



Nos. 5050, 6101, 6040 — Nos. 5701, 4001



Nos. 5000, 9015-X, 7000

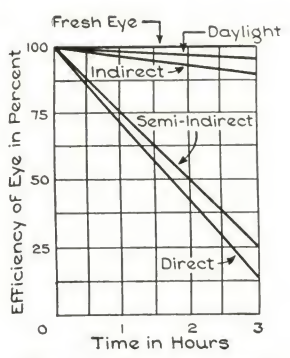


Chart of three-hour test by two eminent scientists shows how indirect lighting compares most favorably with daylight.

Curtis Lighting is *"Daylight Continued"*

General Data

Quality of material, construction and finish are standard in all Curtis Luminaires. Metal is heavy gauge; the entire fixture is substantially but simply made with features that reduce installation cost and assure approval under the most rigid inspection.

Suspension

Standard designs shown are regularly supplied with hanger illustrated.

If desired, Luminaires can be equipped with rod hanger. All rod hangers have swivel top-link.

Finishes

Curtis Luminaires are known for quality and durability of finish.

Silver Grey—Used on No. 5050 is a sprayed lacquer-enamel in keeping with the modern lines of this design.

Washable Ivorytone—Used on Nos. 6101 and 6400 is also sprayed lacquer-enamel and blends with the color of ceilings and walls.

Satin Silvertone—Used on Nos. 7000, 5701 and 4001 is plated cadmium, brushed to a silver lustre.

Antique Silvertone—On Nos. 5000 and 9015 is a brush nickel, shaded to emphasize the character of this design.

Cat. No.	Code Name	Lamp, watts	Bowl dimen. Diam.	Bowl dimen. Depth	Suspension	Finish	Metal
5050	Gem	500 or 300	13½″	6¾″	36″	Silver Grey	Steel
6040	Jewel	1500, 1000 or 750	18 ″	9 ″	48″		Steel
6101-W	Garnet	200	14 ″	6⅝″	36″	Washable Ivorytone	Steel
6101-M	Topaz	500 or 300	14 ″	6⅝″	36″		Steel
6400	Ruby	500 or 300	16¼″	8 ″	36″	Washable Ivorytone	Steel
6800	Emerald	1500, 1000 or 750	20½″	10 ″	48″		Steel
5000	Sapphire	(2) 150 or 100	15½″	4 1/16″	36″	Antique Silvertone	Brass
5003	Pearl	(3) 150 or 100	15½″	4 1/16″	36″		Brass
6000	Coral	(3) 200	19 ″	5⅜″	40″		Brass
9015-X	Amarine	(2) 150 or 100	15½″	4 1/16″	36″	Antique Silvertone	Brass
9015-XS	Yuklas	(3) 150 or 100	15½″	4 1/16″	36″		Brass
70039-P	Sardonyx	(3) 200	19 ″	5⅜″	40″		Brass
7000	Agate	(3) 150 or 100	15½″	4 1/16″	36″	Satin Silvertone	Brass
5701-W	Turquoise	200	14 ″	7⅝″	36″	Satin Silvertone	Steel
5711-M	Onyx	500 or 300	16 ″	8¾″	36″		Steel
4001	Winall	200	12 ″	13½″	36″	Satin Silvertone	Steel
4011	Allwin	500 or 300	16 ″	17 ″	36″		Steel

All Curtis Luminaires are packed in cartons with No. 14 wire for quick delivery from local stocks.

FOR QUICK DELIVERY FROM LOCAL STOCKS!

Capacity at Outlets

It is advisable to provide wiring that will carry sufficient capacity for possible future increases in the lighting. The cost is small compared to cost of alterations later. (See pages 15 and 16.)

Ward in James Whitcomb Riley Hospital, Indianapolis, Ind.

ROBERT FROST DAGGETT, Architect

"Eye Comfort" indirect lighting has no glare and therefore obviates nervous restlessness and aids in convalescence.

Warner & Company Chemical Laboratories, New York, N. Y.

In rooms and work of this character good lighting is most vital. Well diffused indirect lighting reduces the chance of mistakes to a minimum.

Above:

Sewing Room, Trott School, Niagara Falls, N. Y.

KIRKPATRICK & CANNON, Architects

Good lighting is essential in all school rooms. Improper and inadequate lighting causes "optiphosis" (defects in vision caused by poor lighting), that may be permanent.

Above:

Cassett & Co. Office, Philadelphia

Indirect Lighting creates an impression of stability, speeds up work, reduces fatigue.

At Left:

Office
The Electric Association, Chicago

GRAHAM, ANDERSON, PROBST & WHITE, Architects.

Dominion Bridge Company, Montreal, Canada

JOHN S. ARCHIBALD, Architect

In the drafting room both the eye and the lighting system are given the most crucial test. "Eye Comfort" conserves vision and speeds up work. A typical example of good lighting practice.

General Office, Union Central Life Insurance Co., Cincinnati, Ohio

GARBER & WOODWARD, Architects

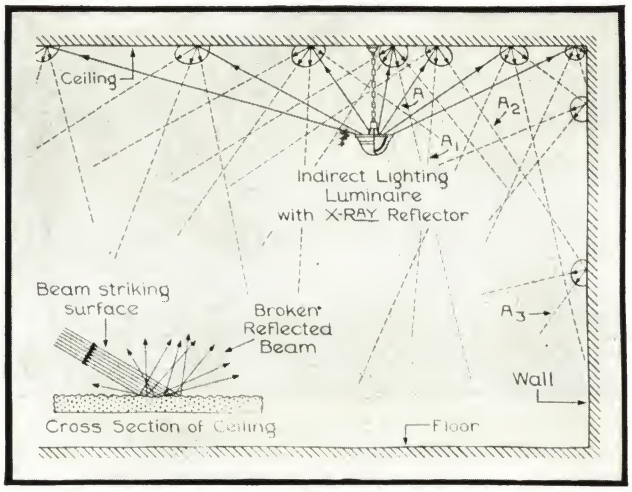
No. 4001 "Winall," designed especially for use throughout this building. Good lighting reduces fatigue and helps keep employees accurate.

PLANNING THE LIGHTING SYSTEM

Brief suggestions for planning lighting from Panels, Coves, Skylights, Pedestals, Urns or Brackets have been made on the pages devoted to these methods. The suggestions on Page 16 are primarily for lighting with pendant ceiling luminaires. The table below gives suggestions of present standards of illumination for various interiors lighted by any one of these methods.

Curtis "Eye Comfort" Indirect Lighting Luminaires are equipped with one or more X-Ray Silver Mirrored Reflectors. These reflectors, the most efficient made, are scientifically designed to direct the light uniformly to the ceiling. From there it is redistributed throughout the room, assuring smooth, even illumination, free from glare.

Good practice in lighting today calls for higher intensities than have been used in recent years. This makes it particularly desirable to provide not only sufficient capacity in the wiring at the time the building is being constructed, but to make allowance for further increases of from 20 to 50%. The initial cost for providing extra capacity is not great.



This Diagram Shows the Principle of Indirect Lighting

The ceiling acts as a diffusing medium and breaks up each light beam into a series of rays, giving an illumination free from glare and strong shadows.

PRESENT STANDARDS OF ILLUMINATION FOR COMMERCIAL INTERIORS

	Foot-Candles Recommended
Armories:	
Drill sheds	10
Exhibition Halls	12
Art Galleries:	
General	5
On Paintings	25–100
Auditoriums	5
Automobile Show Rooms	15
Bank Cages and Offices	15
Barber Shop	15
Base Ball—Indoor Game	15
Basket Ball	15
Billiard Tables	25
Bowling:	
On Alley, Runway and Seats	8
On Pins	25
Churches:	
Auditorium	3
Sunday School Room	8
Pulpit or Rostrum	12
Art Glass Windows	25–50
Club Rooms:	
Lounge	5
Reading Room	12
Court Rooms	10
Dance Halls	6
Dental Offices:	
Operating Office	12
Dental Chair	50
Drafting Room	25
Gymnasiums:	
Main Exercising Floor	12
Swimming Pool	8
Handball	25
Hospitals:	
Lobby and Reception Room	6
Wards (with local illumination)	5
Private Rooms	8
Operating Table	100–200
Operating Room	15
Laboratories	15
Hotels:	
Lobby	8

	Foot-Candles Recommended
Hotels (Cont'd):	
Dining Room	6
Bed Rooms	8
Writing Room	12
Library Reading Rooms	12
Lodge Rooms	6
Moving Picture Theatre:	
During Intermission	5
Museum:	
General	8
Special Exhibits	25–100
Office Buildings:	
Close Work	15
General Space—No Close Work	10
File Room	6
Post Office:	
Lobby	10
Sorting, Mailing, etc.	15
Racquet	25
Railway:	
Depot—Waiting Room	8
Ticket Offices	12
Restaurants	8
Schools:	
Auditorium	8
Class Rooms, Library and Office	12
Drawing	25
Laboratories	12
Manual Training	12
Sewing Rooms	25
Skating Rink (Indoor)	8
Squash	25
Stores—Department and Large Specialty:	
Main Floors	15
Other Floors	12
Basement Store	15
Stores—Medium Size	12–15
Telephone Exchanges:	
Operating Rooms	8
Terminal Rooms	12
Tennis (Indoor)	25–50
Theatres:	
Auditorium	3
Lobby	12

Method of Planning

The foundation of every lighting system is the wiring plan. Outlets should be placed to provide for future as well as immediate needs. Capacities should be ample for flexibility. While structural features often determine location and spacing of outlets, the following suggests a simple method of planning lighting with "Eye Comfort" Indirect Lighting Luminaires:

Determine from table on Page 15 the foot-candle intensity suggested for your type of interior.

The first column of the table below shows average area per outlet in square feet adequately illuminated under various ceiling heights. These areas are average.

Follow *your* area (or that which comes nearest to it) to the column at the right, corresponding with the foot-candle intensity you require. Here you have the wattage capacity for each outlet.

Example: Typical office below. In the table on Page 15, 10-foot candles are recommended. Spacing between outlets in each bay is 15 ft.; giving approximate area, 225 sq. ft. Ceiling height, 12 ft. In the table below "column 10 to 15-foot candles" indicates that 500 watts per outlet should be used. Try this yourself!

Several types of indirect luminaires are suggested on Pages 11 to 14, inclusive.

TABLE TO QUICKLY DETERMINE WATTAGE PER OUTLET

Average area per outlet	Ceiling height	Watts per outlet to produce		
		6-10 ft. Candles	10-15 ft. Candles	15-25 ft. Candles
81	9.0′		200	300
100	9.5 to 11.0′	200	300	500
121		200	300	500
144		200	300	500
169	11.5 to 15.0′	300	500	750
196		300	500	750
225		300	500	750
256	16.0′	500	750	1000

Light Transmission Through Glass

The amount of light transmitted through glass panels used in skylights, wall panels, etc., varies with the type of glass, as indicated in the table at top of next column.

LIGHT TRANSMISSION THROUGH GLASS

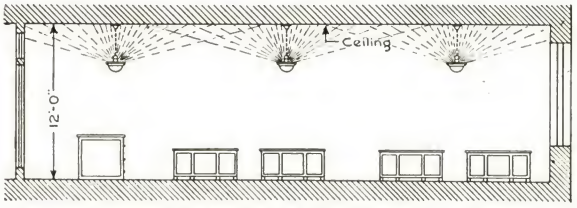
Glass	Transmission Factors	Glass	Transmission Factors
Clear Hammered	90-95%	Clear Antique	85-90%
Clear Sanded Hammered	70-85%	Amber Antique	75-80%
Clear Pebbled	65-80%	Sanded Amber Antique	55-70%
Amber Hammered	70-75%	White Opal	35-50%
Sanded Amber Hammered	50-60%	Flashed Opal	55-60%

Reflection Factor of Paint Finishes

The colors of walls and ceilings have a direct bearing upon the efficiency of the lighting system, as is shown in the following table: (Ivory, White or Cream are recommended for ceilings).

Color	Reflection Factors	Color	Reflection Factors
Flat White	82%	Light Gray	60%
Ivory-White	78%	Light Green	55%
Cream	74%	Buff	55%
Caen Stone	70%	Tan	40%
Ivory Tan	65%	French Gray	35%

Acoustical Materials must be studied individually to determine reflection factor. Results of many tests available on request.



Uniform Lighting Is Assured by Uniform Spacing of Fixtures

Installing Fixtures at Various Ceiling Heights

The architect or engineer need not necessarily concern himself with suspension data unless ceiling heights are very low.

Where suggested, suspension of luminaires might be valuable, table at the right is available for reference.

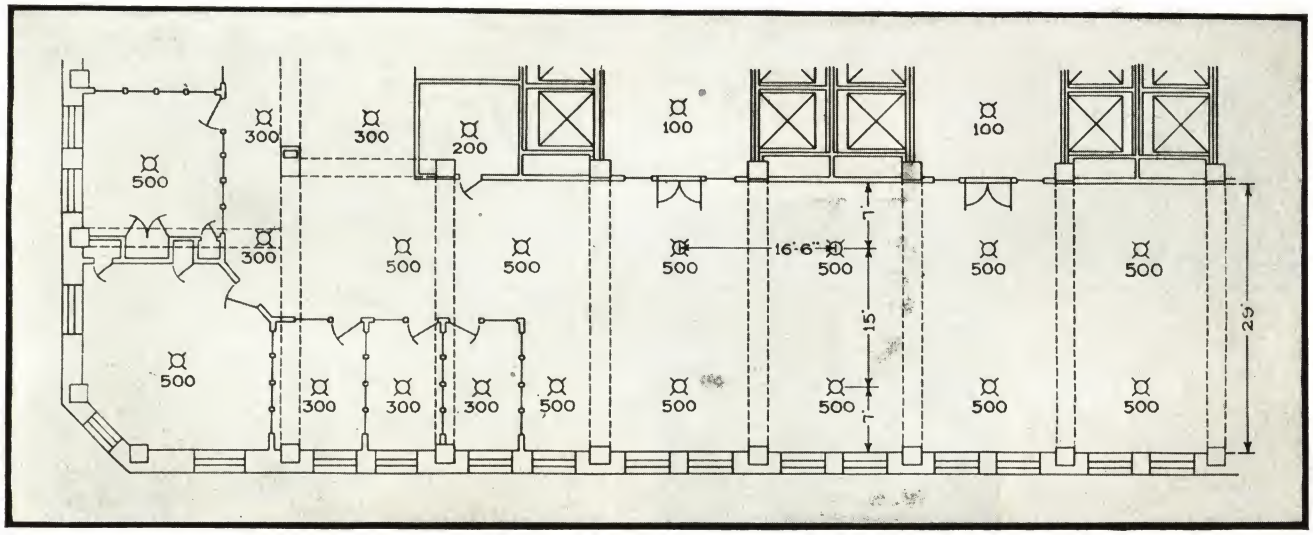
Luminaires with chain hanger suspension can be adjusted while luminaires are being hung.

Luminaires with rod hangers, however, should have suspension figured accurately to secure effect of proper proportion and satisfactory lighting.

SUSPENSION DATA

Ceiling height	Average spacing between outlets	Suspension top of bowl to ceiling
9.0′	9′	24″
9.5′	10′	26″
10.0′	11′	28″
10.5′	12′	30″
11.0′	12′	32″
11.5′	13′	34″
12.0′	13′	36″
13.0′	13′	36″
14.0′	14′	36″
15.0′	15′	42″
16.0′	16′	42″

Color of Ceiling Should Be Similar to or Lighter Than the Color of a Government Postal Card



Plan of a Typical General Office, Showing Location and Wattage of Outlets, also Arrangement for Lighting Where Smaller Private Offices Are Provided

CurtiStrip

A Simplified Wiring Device

Listed as Standard by Underwriters' Laboratories

CurtiStrip is an approved wiring device channel made of No. 20 U. S. gauge cold rolled steel, Zinc Plated. Standardized fittings offer unusual flexibility. It is compact, measuring 1⅝ in. high by 2½ in. wide. *Wired and assembled on the bench* and installed in sections like a fixture. This saves time!

Large wire carrying capacity (30 No. 14 rubber covered wires, local inspection permitting) makes it especially suitable for Cove, Panel and Skylight Lighting. Fewer risers or distribution panels.

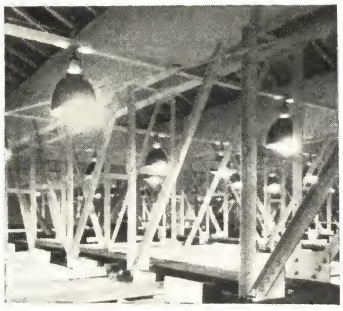
The economy and efficiency of CurtiStrip is due to the special construction, providing sturdiness and perfect alignment without effort. The "snap-in" cover saves time in wiring and makes it possible to add new outlets without tearing up.

Leading contractors everywhere use and recommend CurtiStrip.

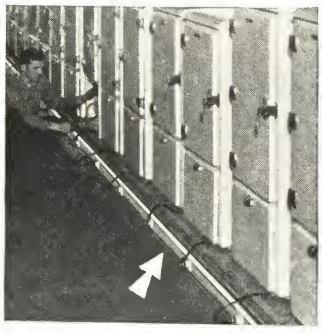
CurtiStrip Channel No. 1

Made in one size only, 1⅝ in. by 2½ in., and is available with all standard parts from local electrical stocks everywhere.

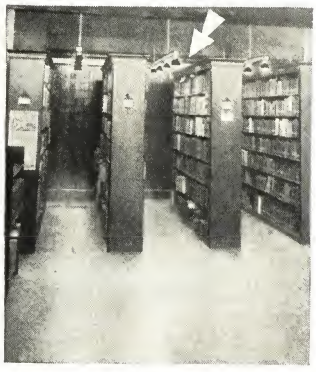
Use CurtiStrip and X-Ray Reflectors for all show window lighting.



The sturdiness of CurtiStrip is demonstrated by these large size industrial reflectors suspended above skylight.

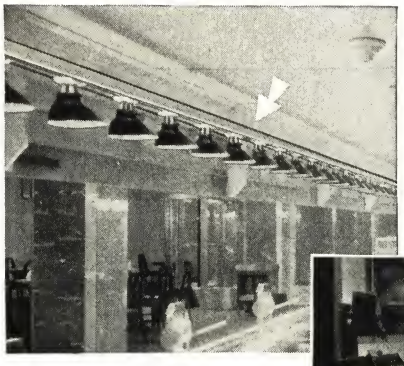


CurtiStrip and No. 4—15-ampere "Plug-In" receptacles provide convenience outlets for testing electrical equipment of all kinds.



X-Ray No. 3 Reflectors with 50-watt lamps mounted on CurtiStrip supported from ceiling with No. 24 Bracket Assembly. Effective for book stacks, stock shelves, etc.

Cove lighting done quicker and better with CurtiStrip. Numerous outlets, wired on the bench—placed in cove like a fixture—large wire capacity, permitting feeders to be brought up at one point—the outstanding features.

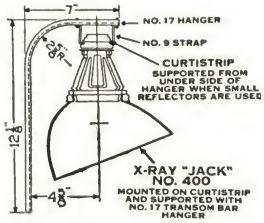


Left:

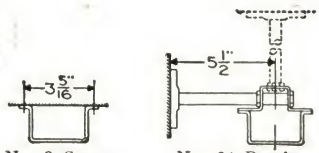
Notice the perfect alignment of CurtiStrip and No. 11 X-Ray Reflectors (using 60-watt lamps), above the cafeteria counter at the left. CurtiStrip is especially practical where numerous outlets are required.

Right:

Outlets for power machinery in offices, shops, etc., are easily and quickly provided with CurtiStrip and No. 4 dead front 15-ampere "Plug-In" receptacle. This provides an inexpensive method of extending outlets in an approved manner. Additional No. 4's can be added by simply removing the "snap-in" cover—*no need to completely rewire.*



Typical method of installing Window Reflectors on No. 17 hanger.

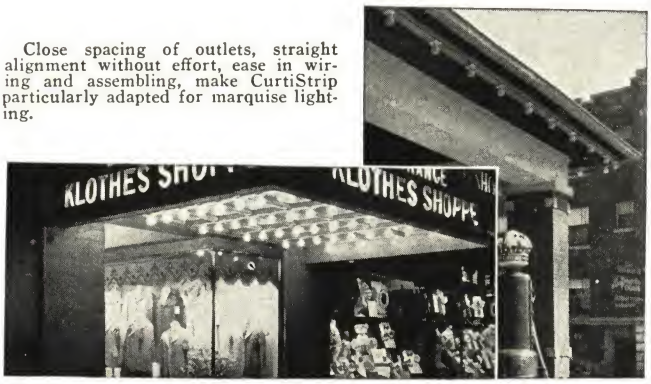


No. 9 Strap — No. 24 Bracket Assembly

Fittings for Mounting CurtiStrip

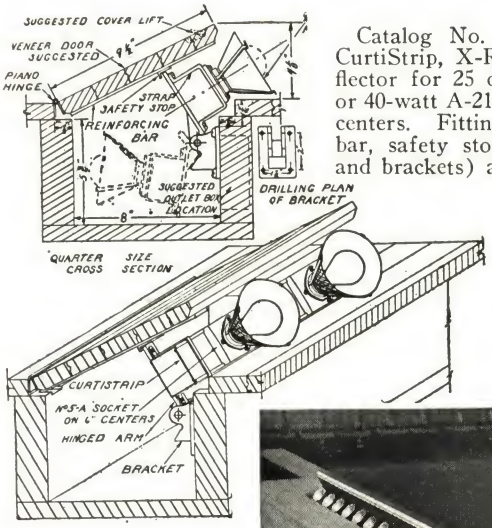
Typical X-Ray cove lighting unit mounted on CurtiStrip.

Close spacing of outlets, straight alignment without effort, ease in wiring and assembling, make CurtiStrip particularly adapted for marquise lighting.



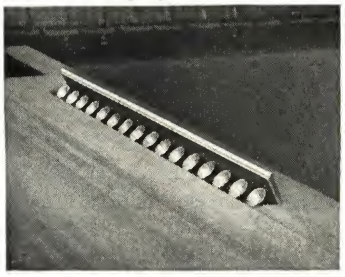
Disappearing Footlights

Disappearing footlights, using CurtiStrip and X-Ray Reflectors, are recommended for schools, clubs, lodges, etc.



Catalog No. 10312 includes CurtiStrip, X-Ray E-15½ Reflector for 25 or 50-watt A-19 or 40-watt A-21 lamp on 6-inch centers. Fittings (reinforcing bar, safety stop, hinged arms and brackets) are included for mounting and hinging footlights. Piano hinge and door are not included.

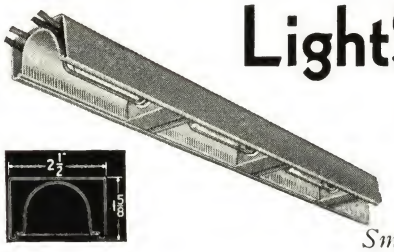
Minimum Space—Width 8 inches, depth 5¾ inches to underside of door. Specify length of No. 10312 required



LightStrip

A Standardized Lighting Channel

Small, Neat, Economical



LightStrip is the only standardized lighting channel available from local stocks that may be made to any length. It is made with CurtiStrip and a reflector unit assembly, Catalog No. 26, for use with 25-watt intermediate base T-6½ lamp (1000 burning hours). This produces a wide spread of light, approximately 90°. Spacing from center to center can be made from 8 in. up to any spacing required. All CurtiStrip fittings and "Plug-In" Receptacles are standard for LightStrip. Its small, compact size, 1⅝ in. by 2½ in., affords many uses.

Panel Lighting—For even lighting on Flashed Opal Glass Panels: *Narrow panels,* distance from front of LightStrip to glass must not be less than panel width. *Wide panels,* spacing between each row of LightStrip must not exceed distance from front of LightStrip to glass. Where room illumination is required from panel lighting, refer to pages 3 and 4.

Uses for LightStrip

General—Panel Lighting, Bulletin Boards, Bookkeepers' or Information Desks, Ticket Offices, Exhibit and Wall Cases, Small Coves, Picture Lighting.

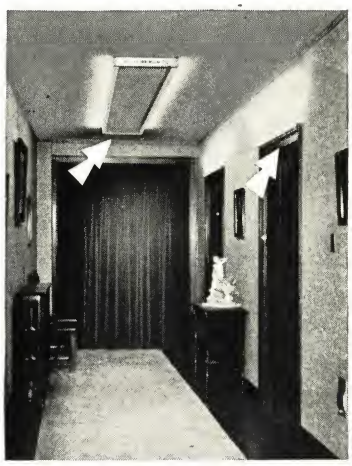
Churches—Small Altars, Sanctuaries, Baptistry, Cross Stations, Niches, Windows.

Banks, Offices and Industrials—Counters, Cages, Mail Rooms, Maps, Exhibits, Inspection and Sorting Tables.

Schools and Libraries—Book Racks, Laboratories, Reading and Inspection Tables, Blackboards.

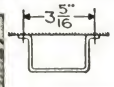
Stores and Shops—Food Shops, Markets, Cafeterias, Cases, Counters, Bargain Tables.

Theatres, Auditoriums and Public Buildings—Small Stages and Settings, Makeup Rooms, Art Galleries, Niches.



LightStrip is built into Moderne channel lighting fixtures, mounted on ceiling, as shown, or suspended from rods. Also for cove sections in narrow rooms, or above doorways, as indicated by arrow.

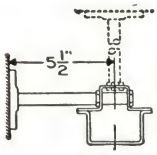
LightStrip Is Made with CurtiStrip



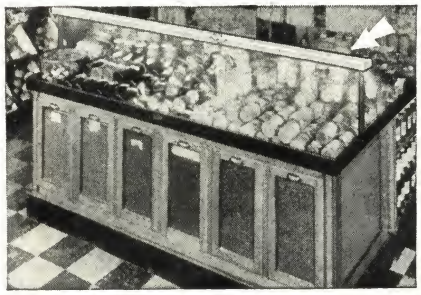
No. 9 Strap used for mounting LightStrip

LightStrip offers an economical and attractively modern method of lighting side walls or stock shelves and wall cases in stores, shops, restaurants.

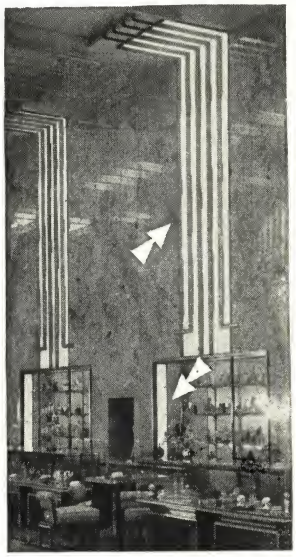
Sorting racks in Industrial Plants, Post Offices, Mail Rooms are efficiently lighted with LightStrip. Low installation cost and straight alignment without effort are important features.



LightStrip can be hung from wall or ceiling using No. 24 Bracket Assembly



LightStrip gives "sales value" to Counters and Bargain Tables. Card-clip (No. 27) is used to hold signs, price cards, etc. Signs made of regular stencil paper. Counters may also be lighted with LightStrip suspended from ceiling on rigid or chain hanger, or from side of counter or wall. No. 24 Bracket Assembly generally used.



LightStrip is adapted to panel lighting because of low cost and time saved in installing.

FLOODLIGHTING

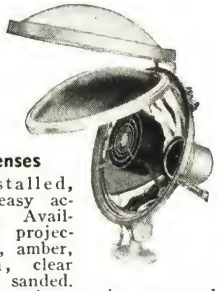
with

X-Ray Projectors

The field of floodlighting may be divided into two general classifications:

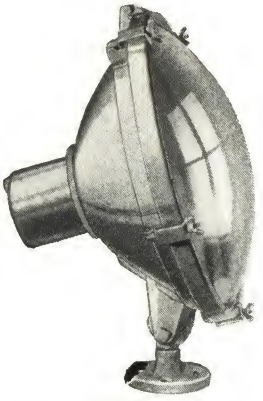
First: The illumination of buildings and monuments for their advertising value, or for their aesthetic effects. This type of floodlighting involves the illumination of vertical surfaces. The floodlights are located either some distance from the surface to be lighted, or they may be mounted on the structure itself. The quantity of light needed for this type of problem is dependent upon the attraction value desired, on the color of the structure, and on the brightness of the surrounding area.

Second: The illumination of large areas for outdoor sports, parking space and industrial uses. In this classification the units are mounted on poles, or towers, for illuminating the horizontal area. The amount of light to be provided for this type of installation is dependent upon the activities involved, the light being needed for utilitarian rather than artistic purposes.



Inside Lenses

Easily installed, hinged for easy access to lamp. Available for all projectors, in ruby, amber, blue, green, clear and one-half sanded. When the projector is mounted against the surface being lighted sanded half lens smooths out the illumination just above the projector. Cut also shows X-Ray Control-Ring.



"Moon"
500 watt size
Diameter 17⅛ in. Depth 13⅝ in.
Height 20¾ in.

"Star"
200-250 watt size
Diameter 13 in. Depth 12 in.
Height 16½ in.

These units equipped for universal adjustment and simple lamp focusing device.

CONCENTRATING TYPES

Cat. No.	Material	Lamp	
		Watts	Type
"Star" 10° to 20° Beam			
25-C	Steel	250	*G-30
205-C	Copper	250	*G-30
11527-C	Steel	200	Standard
12527-C	Copper	200	Standard
"Moon" 10° to 20° Beam			
37-C	Steel	500	*G-40
307-C	Copper	500	*G-40
11539-C	Steel	500	Standard
12539-C	Copper	500	Standard
"Sun, Jr." 15° to 25° Beam			
403-C	Copper	750-1000	Standard
"Sun" 15° to 25° Beam			
49-C	Steel	1500	Standard
409-C	Copper	1500	Standard

Concentrating

DISTRIBUTING TYPES

Cat. No.	Material	Lamp	
		Watts	Type
"Star" 30° to 60° Beam			
25-E	Steel	250	*G-30
205-E	Copper	250	*G-30
11527-E	Steel	200	Standard
12527-E	Copper	200	Standard
"Moon" 30° to 60° Beam			
37-E	Steel	500	*G-40
307-E	Copper	500	*G-40
11539-E	Steel	500	Standard
12539-E	Copper	500	Standard

*Note: This lamp cannot be burned within 45° of base up. Use unit for standard lamp within this angle.

Distributing

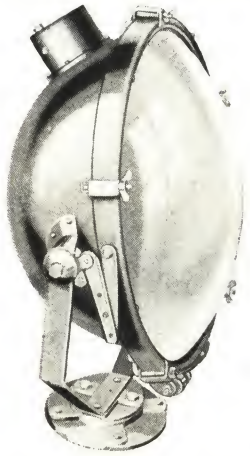
These photographs show the flexibility, "light control" and power of X-Ray Floodlighting Projectors, illustrating their practicability for many purposes.

The following table indicates intensities of illumination recommended. There is also given a column indicating the wattage which should be provided per square foot of area to be lighted. This table is for white lighting. For color lighting the amount of wattage needed depends upon the color of the surface, the color of light desired, and the brightness of the surroundings.

FOOT-CANDLES AND WATTAGE CAPACITY FOR FLOODLIGHTING

Spaces or objects to be lighted	Foot-candles recommended	Watts per sq. ft.
Automobile parking spaces	1	0.2
Building excavation	3	0.5
Floodlighted buildings and monuments:		
In bright surroundings: *Light surface*	10	2.2
Dark surface	20	4.5
In dark surroundings: *Light surface*	6	1.5
Dark surface	12	2.5
Gasoline filling stations	4	0.8
Golf	10	2.0
Playgrounds	4	0.8
Railway yards	0.25	0.05
Stadiums, football, etc.	12	2.5
Swimming pools (outdoor)	5	1.2

Where the light is to be confined to small areas, or for illuminating from long distances, the "C" (concentrating) type unit should be specified. For illuminating large areas from relatively short distances, the "E" (distributing) type should be used.



"Sun"

Diameter 23 in. Depth 14¾ in. Height 31 in.

"Sun, Jr."

Diameter 19 in. Depth 12 in. Height 26½ in.

All X-Ray Projectors are supplied with silver mirrored reflectors designed for the most efficient utilization of light, and are available for all sizes of floodlighting and standard lamps. The housings are non-ventilated and are equipped with deep bowed heat-resisting clear glass cover, or ribbed glass cover, for producing a rectangular beam.

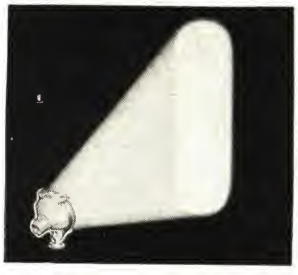
"Sun" and "Sun, Jr." Projectors are equipped with cast trunion base, which allows for universal adjustment. For use with standard PS bulb lamps. "Angle Stops" are available which make it possible to swing back the projector for relamping and resetting it to its original position without readjustment.

RECTANGULAR BEAM TYPES

Recommended where it is desired to secure a shaft or band of light from a point some distance away.

Rectangular Beam X-Ray Projectors with lamp in concentrating position have ratio of 1 to 3 in width to length of beam.

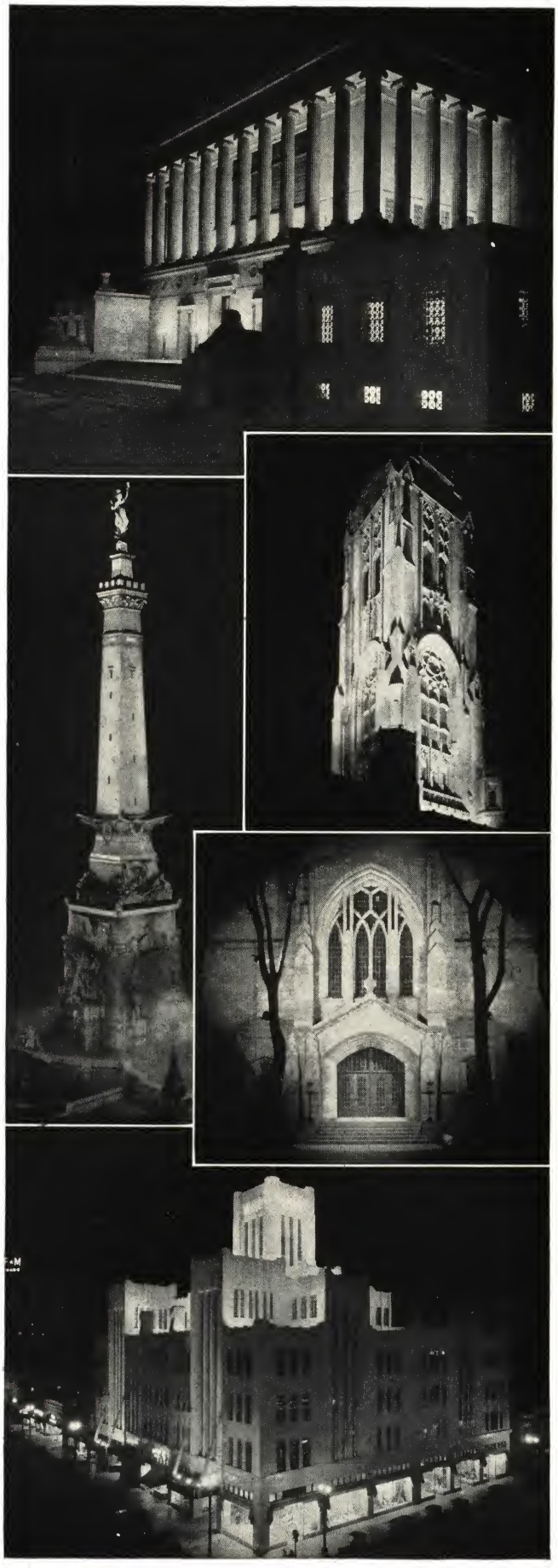
When the lamp is in the distributing position, the ratio is 1 to 1½.



Rectangular Beams

Cat. No.	Material	Lamp	
		Watts	Type
"Star" 10° by 25° or 20° to 25° Beam			
11529-C	Steel	250	*G-30
12529-C	Copper	250	*G-30
11530-C	Steel	200	Standard
12530-C	Copper	200	Standard
"Moon" 10° by 25° or 20° to 25° Beam			
11541-C	Steel	500	*G-40
12541-C	Copper	500	*G-40
11540-C	Steel	500	Standard
12540-C	Copper	500	Standard
"Sun, Jr." 15° by 45° or 50° to 55° Beam			
402-C	Copper	750-1000	Standard
"Sun" 15° by 45° or 40° to 55° Beam			
48-C	Steel	1500	Standard
408-C	Copper	1500	Standard

**Note:* This lamp cannot be burned within 45° of base up. Use unit for standard lamp within this angle.



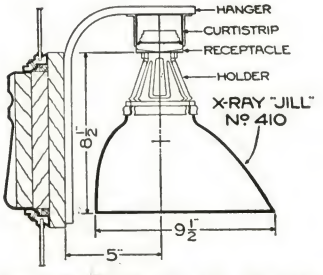
SHOW WINDOW LIGHTING

With Genuine X-Ray Reflectors Golden Armored

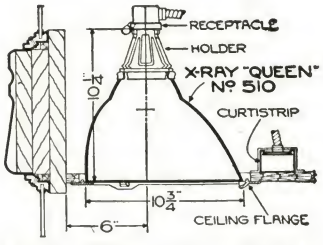
Show windows having a depth of one-half to two-thirds of the height should be lighted with reflectors designed especially . . .

For Shallow Windows

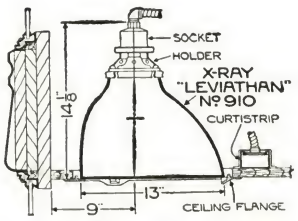
No. 410 "Jill," 150 Watts
No. 510 "Queen," 200 Watts
No. 910 "Leviathan" 500-300 Watts



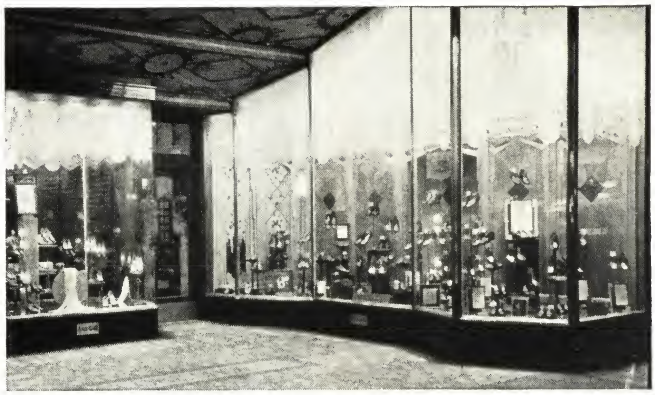
No. 410 (Width: 9⅜ In.) 150 Watt Lamp
Showing No. 17 Hanger Mounting



No. 510 (Width: 10½ In.) 200 Watt Lamp
Recessed Above Window Ceiling



No. 910 (Width: 13 In.) 500-300 Watt Lamp
Recessed with Finishing Flange



There are only two types of windows according to size—deep or shallow as shown in the diagrams. The closer reflectors are spaced, the brighter the windows will be and vice versa. Average spacing for business districts in large cities, 12 in.; suburban districts, 12 to 18 in.; small cities, 12 to 18 in.; towns, 15 to 24 in.

Determine spacing of reflectors according to locality of store, brightness of adjacent windows or street lighting.

Use the following data to determine proper reflector.

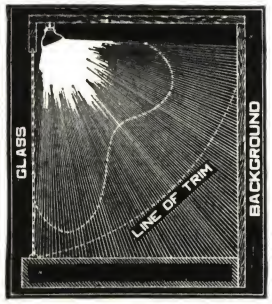
WINDOW IN FT.		HEIGHT OF DISPLAY OR SOLID BACKGROUND IN FEET.							
HEIGHT	DEPTH	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16
4-6	1-3	410							
"	3			400					
"	4								
"	5								
6-8	2								
"	3-5	410							
"	5-7			400					
"	7-9								
8-10	2-4								
"	4-6	510							
"	6-8								
"	8-10			500					
"	10-12								
10-12	3-5								
"	5-6								
"	6-8	510							
"	8-10					500			
"	10-12								
12-14	4-6								
"	6-8								
"	8-10	510							
"	10-12					500			
"	12-14								
"	14-16								
14-16	4-6								
"	6-8								
"	8-10								
"	10-12	510				500			
"	12-14								
"	14-16								

For "*super*-lighting" in large windows, Nos. 900 and 910 should be used in place of Nos. 500 and 510 respectively

Methods of Installing

The construction of show windows often determines the method of installing window reflectors. Diagrams show dimensions, data and offer suggestions for installing for various conditions. CurtiStrip (see Page 17) provides neat, flexible installation and saving in installation cost.

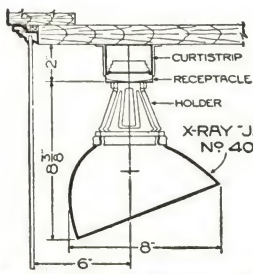
Where reflectors are recessed above false ceiling, finishing flanges are available (see Page 22). Louvres and equipment for color lighting also shown on Page 22.



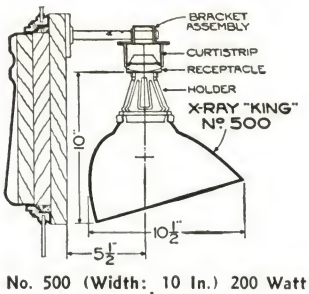
Show windows having a depth or trim about equal to the height should be lighted with reflectors designed especially . . .

For Deep Windows

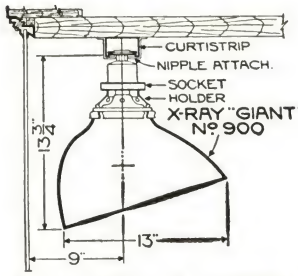
No. 400 "Jack," 150 Watts
No. 500 "King," 200 Watts
No. 900 "Giant," 500-300 Watts



No. 400 (Width: 8½ In.) 150 Watt Lamp
Showing Ceiling Mounting



No. 500 (Width: 10 In.) 200 Watt Lamp
Showing No. 24 Bracket Assembly



No. 900 (Width: 13 In.) 500-300 Watt Lamp
Showing Ceiling Mounting

Curtis Lighting

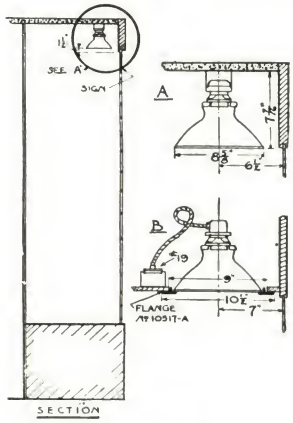
Lighting Narrow Show Windows

Very narrow or shallow show windows require concentrated lighting provided by X-Ray No. 844, 100-watt Reflector. This insures uniform lighting for displays that trim "top-to-bottom," as in drug stores. Where the trim is low it provides the concentration that makes the display "stand out."

No. 844 may be mounted at the ceiling, or supported from transom bar.

For recessing above false ceiling, use either the "open type" finishing flange No. 10517-A, or hinged ceiling rim, No. 13202-B, having 10-in. glass. (See Page 25.)

To uniformly illuminate translucent sign at top of window, bottom of reflector should be at least 1½ in. above the top of the sign with reflectors 12 in. on centers.



Cross section "A" shows No. 844 mounted on CurtiStrip 12 in. on centers. Reflector, 1½ in. above translucent sign.

"B" shows method of recessing No. 844, using No. 10517-A finishing flange in wood ceiling. Diameter of opening is 9 in.

For plaster ceilings, or where hinged rim with glass is wanted, use No. 13202-B. (See page 25.)

No. 844 Reflector

No. 844 delivers an intense center beam of light, as shown at the right

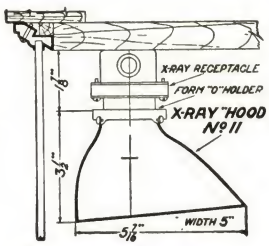
Small Windows and Wall Cases

In small windows (those no more than 5 ft. high) where space permits, the No. 7 "Scoop, Jr." or No. 11 "Hood, Jr." Reflectors are recommended. They can be used with lamps from 25 to 60-watt capacity, spaced as close as 6 in. on centers. Average spacing is 12 to 18 in.

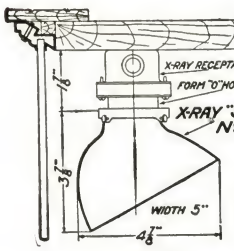
Diagrams below show dimensions and general distribution of light from these reflectors. No. 7 is suggested for small, deep windows, or large deep display cases; No. 11, for small, shallow windows, or large shallow display cases.

CurtiStrip is recommended as the wire-way for mounting reflectors, unless, as in the case of No. 11, equipment is recessed. Where space for mounting equipment is limited, LightStrip (see Page 18) can be used.

For recessing No. 11 in ceiling of window or case, use No. 10394 finishing flange. Minimum spacing is then 7 in. on centers



No. 11 "Hood, Jr." Reflector for 25-60-watt Lamp



Because of their small size, Nos. 7 and 11 have many other uses

No. 7 "Scoop, Jr." Reflector for 25-60-watt Lamp

Accessories for X-Ray Show Window Reflectors

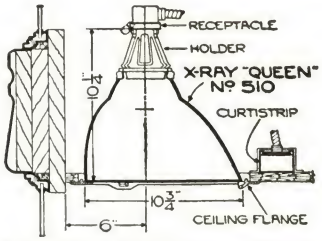
Color Lighting

Color lighting effects in show windows are produced by attaching X-Ray "Color-Ray" to window reflectors.

Each "Color-Ray" unit consists of a light-weight metal frame with spring clips for fastening to the inside of the reflector, and one sheet each of red, blue, green and amber gelatin.

For Reflector No.	Use "Color-Ray" No.
400	440
410	441
500	55
510	55
900	99
910	99

"Color-Ray" attached to X-Ray Window Reflector is shown to the left. Recessing reflectors does not interfere with the use of "Color-Ray"



Recessing Equipment Above False Ceiling

The most finished way to install reflectors is to recess them above a ceiling in the window as shown above.

X-Ray Reflector rests on flange and is connected to CurtiStrip by flexible conduit, carrying wires.

If ceiling is of wood, finishing flange only is used. For plaster ceilings plaster ring is used and installed by plaster or lathing contractor. Finishing flange attaches to plaster ring.

Reflector No.	Lamp, watts	Finishing flange No.	Plaster ring No.
11	60	10394	None
400	150	11400	None
410	150	11410	14006
500	200	11500	None
510	200	11510	14007
900	500	10432	14008
910	500	10432	14008
844	100	10517	10517-A

Louvers

The purpose of louvers is to eliminate glare when reflectors are in the line of vision.

In corner windows louvers have "fins" at right angles to the glass, concealing lamp filament from view and increasing effectiveness of the lighting. Such louvers are designated as type "N." Island windows have louvers with fins parallel to the glass, designated "P."

Reflector No.	Louver No.	
	Type "N"	Type "P"
400	12400-N	.....
410	12410-N	12410-P
500	12500-N	.....
510	12510-N	12510-P
900	12900-N	.....
910	12910-N	12910-P

Louvers are held in reflectors by spring clips. Louvers do not interfere with color equipment or recessing reflectors

INTERIOR FLOODLIGHTING

with

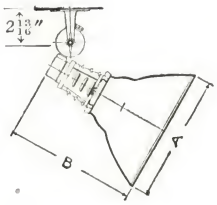
X-Ray Reflectors

Each of the three sizes of interior floodlights has a swivel base; the distinct "light-control" of each fulfills the need for some specific purpose. 200 and 500-watt sizes are available with color frame and gelatins (red, blue, green and amber) for producing color effects.

Interior floodlights are used to highlight or spotlight either alone or supplementing other equipment. In the field of merchandising, it is profitable to spotlight regular or advertised items. In interiors, such as art galleries and museums, it beautifies and gives added prominence. In industry, the units concentrate light where it is most needed—oftentimes, where it is difficult to use other lighting equipment. In theatres and places of amusement, the opportunities are limited only by the ingenuity of the designer.

Where to Use

Church altars
Industrial exhibits
Window displays
Counters
Merchandise displays
Bulletin boards
Art galleries
Lodge and ritual altars
Convention displays
Style shows
Church windows
Display rooms
Community theatricals
Theatre orchestras
Clinic lecture rooms
Hospital operating rooms
Bowling alleys
Night lighting bank vaults
Cafeterias
Stair landings



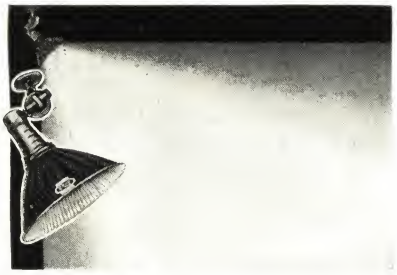
Flood of Light

For *flood of light* use:

No. 338—200-watt.

No. 888—500-watt.

These provide a wide flood of light with maximum concentration of 40° as shown at the right.



Spot Beam

For *spot beam* use:

No. 33-A with No. 13351—200-watt.

No. 88 with No. 18860—500-watt.

No. 13351 and No. 18860 are Control-Rings that conceal the lamp from view and help to produce a powerful "spot" of light as shown at the left.

Center Spot Beam

For *center spot beam* with flood effect, use:

No. 44—100-watt.

No. 33-A—200-watt.

No. 88—500-watt

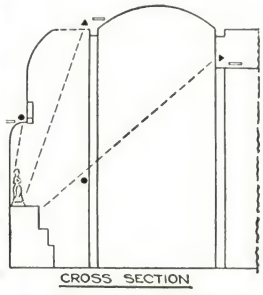
This is shown at the right.

Type for	Lamp size	Catalog No.	Dimensions A	Dimensions B	Color equipment
Flood of Light	200-watt	338 "Floodlight"	10½"	9¾"	See *Note 1*
	500-watt	888 "Floodlight"	13¼"	11⅛"	
Spot Beam	200-watt	33-A "FloodRay" with control	10½"	10¾"	See *Note 1*
	500-watt	88 "Hippo" with control ring No. 18860	13¼"	11¼"	
Center Spot Beam with Flood	100-watt	44 "Pup"	8⅝"	7"	None
	200-watt	33-A "FloodRay"	10½"	10¾"	See *Note 1*
	500-watt	88 "Hippo"	13¼"	11¼"	See *Note 1*

Diameter of base: 3¼ in. Distance from base to swivel joint: 2 13/16 in.

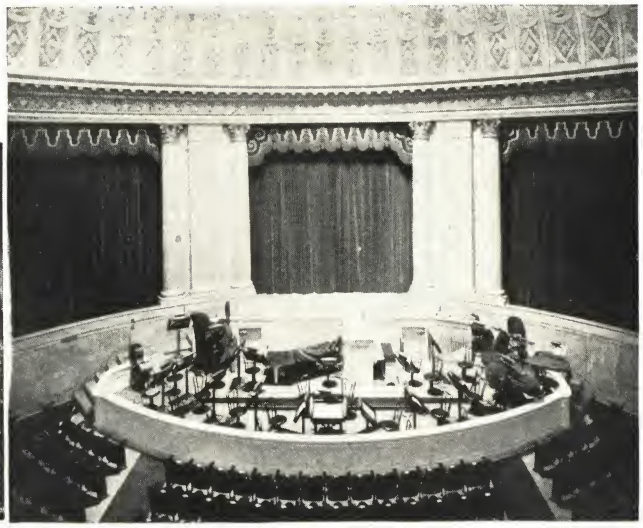
Note 1: Color equipment includes frame with red, blue, green and amber gelatins.

Note 2: All units can be supplied on portable stand, 54 in. high, when required.



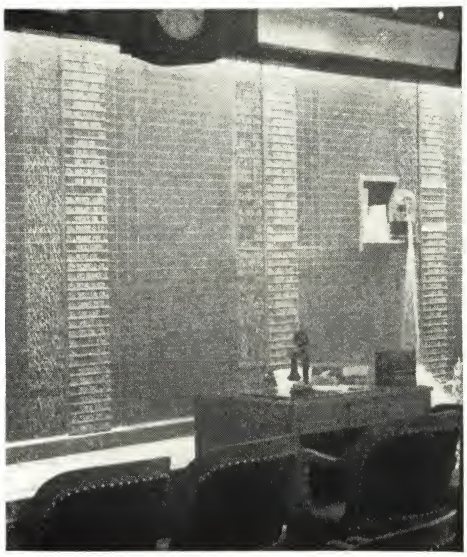
Showing possible locations for concealing floodlights for altar lighting. The type of unit to use depends on lighting result required.

The use of X-Ray Interior Floodlights has proven so profitable and popular, that large and small stores feature "spotlight sales" for regular or advertised special, bringing attention convincingly to items that save money, increasing turnover and profits. Used in show windows and interior of store.



Light concentrated upon the orchestra comes from No. 33-A—200-watt units, concealed in spaces provided in the ceiling. For absolute cutoff on just the orchestra pit, specify either No. 33-A with No. 13351 Control-Ring, or No. 88 with No. 18860 Control-Ring.

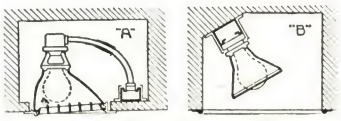
Quotation Board Lighting



High intensity illumination is necessary on Stock Quotation Boards to quickly and accurately read quotations.

The standard method of lighting Stock Quotation Boards is best described by the diagram and photograph.

Where equipment is recessed above the ceiling two methods of lighting may be followed—spacing reflectors 12 in. on centers, and wiring on CurtiStrip. These ideas are pictured below. Distance from board to center line of reflectors should be approximately 28 in.



"A"—No. 11 (60 watt) X-Ray Reflectors mounted on CurtiStrip 12 in. on centers recessed with No. 10594 Louvre Flange; space 9¾ in. wide, 6½ in. high.

"B"—EC-52 (60 watt) X-Ray Reflectors recessed in space 9 in. wide, 7½ in. high, above rippled glass panel

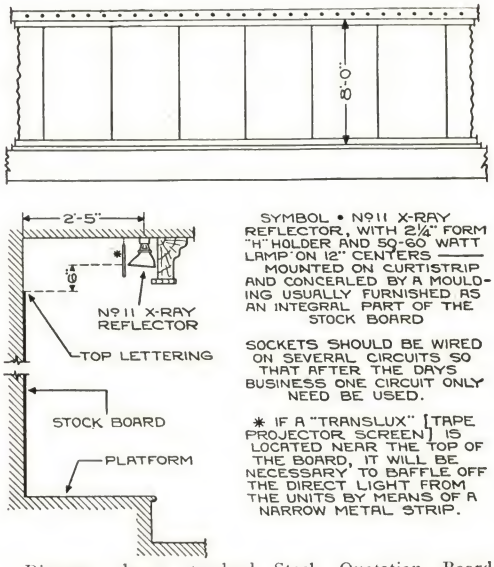
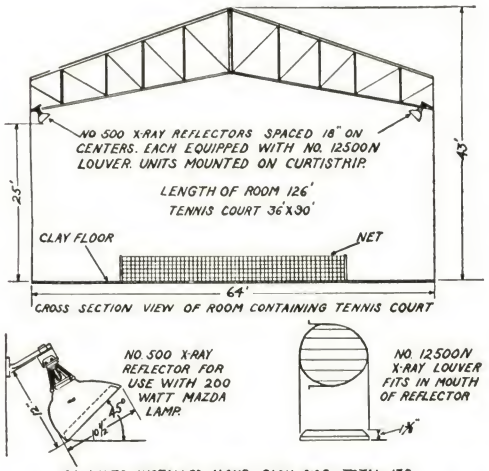


Diagram shows standard Stock Quotation Board lighting, using X-Ray No. 11 Reflectors mounted on CurtiStrip, 12 in. on centers.

Indoor Athletic Courts



This layout used for tennis court adaptable for other sports where player should not experience "change of speed illusion." Intensity of light is very uniformly distributed.

Uniform illumination of sufficient intensity and without glare is essential for Indoor Athletic Courts.

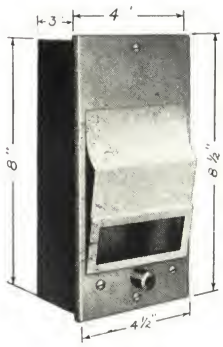
Diagram and photograph show splendid installation, using No. 500 "King" X-Ray Reflectors (200 watt lamp), 18 in. on centers along each side mounted on CurtiStrip.

Louvre No. 12500-N placed in each reflector conceals light source from view.

Wiring with CurtiStrip makes it possible to bring feed wires in at one point, eliminating necessity of several risers.

This entire indoor Tennis court is evenly lighted to a high intensity, which enables the players to see the ball quickly, thus speeding up their game.

Night Light



"Glo-Ray"

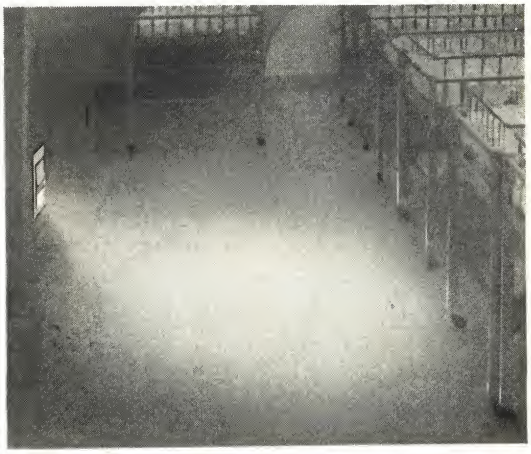
Dimensions
Cover
8½x4½ in.
Box
8x4 in.
3 in. deep

"Glo-Ray" night light is installed about 18 in. above the floor to provide adequate light for stairways, stair landings, corridors, rooms in hospitals, theatres, hotels, dormitories and other buildings. It may be installed in a wall 3 in. deep. The cover fits flush against the wall and is removable to facilitate wiring.

Incorporated in each night light is an X-Ray Reflector which assures evenly distributed illumination. The amount of light passing through the glass window can be changed from the full amount to just a "glow." This is controlled by a simple shutter which can be quickly and easily regulated.

The unit is durably constructed and provided with a wiring compartment in the top. Feed wires can be brought in from both sides, top, or bottom. The cover, which is zinc plated, is ready to be painted the same color as the walls.

Cat. No.	Lamp		Finish	
	Number	Watts	Cover	Box
22	1	15 or 25	Unfinished	Black enamel



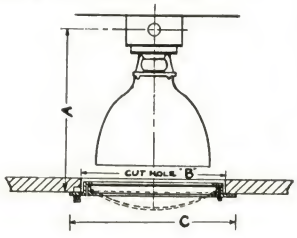
"Glo-Ray" night light is especially desirable in hospitals, because it permits nurses to step into rooms without turning on lights which would be disturbing to patients.

CEILING FLANGES FOR FLUSH MOUNTING

Lighting equipment is mounted flush with the ceiling wherever low ceiling heights or architectural arrangement make recessing lighting equipment necessary. Also for gymnasiums, auditoriums, safety deposit vaults, under balconies, stores, indoor swimming pools, skating rinks, hospital operating rooms, churches, etc. This same equipment is used where space permits to recess and conceal equipment for lighting interiors of buildings, gasoline filling stations, etc.

Spacing Wattage—Spacing between units should not exceed twice mounting height. Two watts per square foot will provide approximately ten foot-candles.

Ceiling Flange with Hinged Rim



Hockey Rink, Coliseum Building, Tulsa, Okla.
SMITH and CENTER, Architects, Dallas, Tex.
No. 590 "Big-Boy" X-Ray Reflector is recessed in space above ceiling using No. 13203-A Ceiling Flange and concentrates light upon the playing floor

Flanges With Hinged Rim

The hinged type of ceiling flange may be installed either in plaster, wood or metal ceiling. For plastered ceilings light weight cast iron "Plaster Rings" attached to the lath by the lathing or plastering contractor provide a ground and support for hinged ceiling flanges.

The following table gives combinations generally used in specifying hinged ceiling flanges with either crackled glass and/or wire guard.

Note: *All crackled, sanded or clear glass mentioned on this page is heat resisting.*

FOR SIZE LAMP INDICATED USE:
(Read down)

Size of lamp, watts	100	150	200	300–500
X-Ray reflector, No.	535	570	575	585
Recessing dimensions, A	7½–8″	11″	11¼″	15″
B	7¾″	10¾″	10¾″	14⅝″
C	9⅝″	12⅜″	12⅜″	16⅞″
Hinged rim with crackled glass	13201B	13202B	13202B	13203B
Hinged rim with crackled glass and dished wire guard	14501XB	14502XB	14502XB	14503XB
Hinged rim with flat wire guard (no glass)	14501XA	14502XA	14502XA	14503XA
Plaster ring	14011	14010	14010	14009
*Hinged flange only (no glass)	13201A	13202A	13202A	13203A
*Diameter of glass	7″	10″	10″	14″
*Clear glass	10445	10281	10281	10310
*Crackled glass	10552	10551	10551	10554
*Sanded glass	10553	10282	10282	10350

*These Nos. of Flanges and glass afford the opportunity of making up hinged ceiling flange units with clear, sanded or crackled glass by specifying number of both flange and glass.

Where Space Above Ceiling Is Limited—One or more lamps without reflectors are mounted on extension outlet box, using one or more X-Ray No. 8251-S (½-in. side outlet), receptacle, as shown in diagram below. No. 13201-B will accommodate one 60 watt lamp (depth A, 4½ in.); No. 13202-B, two 60-100 watt lamps (depth A, 4½ in.); No. 13203-B, four 60-100 watt lamps (depth A, 6 in.). Recess may be painted white to increase efficiency if ceiling is concrete; otherwise sheet metal box is recommended.

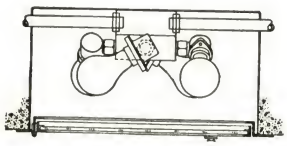
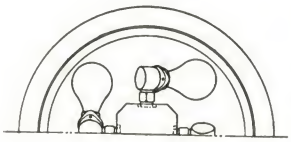
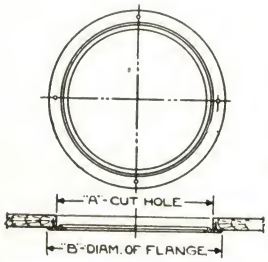


Diagram at left shows four lamps mounted above No. 13203-A. Half plan view is shown at right.



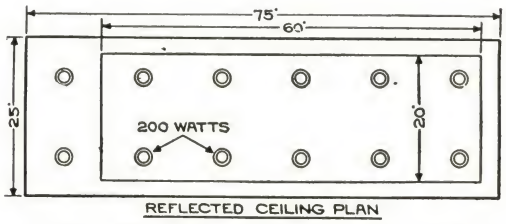
Ceiling Flanges; Not Hinged; No Glass

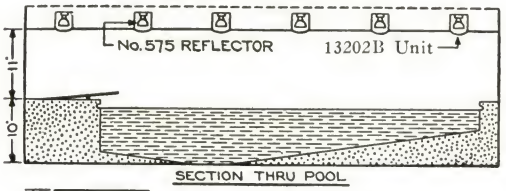
Where glass or wire guards are not required, use the following "open type" Ceiling Flanges.
(Screw holes are ⅛-in. countersunk.)

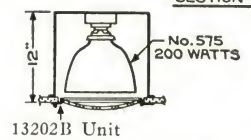


FOR SIZE LAMP INDICATED USE:
(Read down)

Size of lamp, watts	100	150
X-Ray reflector, No.	535	570
Ceiling flange, No.	14001-XA	14012-XA
Recessing dimensions, A	7½–8″	11″
B	7⅝″	10″
Plaster ring, No.	14011	14010







NOTE
For larger pools with high ceilings use X-Ray No. 580 Reflector for 300-500 watt lamps recessed over 13203B 14″ ceiling rim

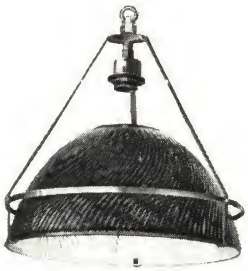
Typical Layout for Lighting Swimming Pool

Operating Room, Lincoln Methodist Hospital, Lincoln, Neb.
FISKE, MCGINNIS and SCHAUMBERG, Architects
No. 33-A 200 Watt X-Ray Reflectors installed above No. 13202-B Units; 13 units provide approximately 200 foot candles, 30 units approximately 750 foot candles.

INDUSTRIAL LIGHTING

with

X-Ray Reflectors



No. 590—"Big Boy"

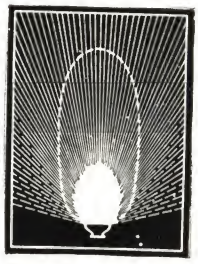
No. 585—"Beehive"

The two types of X-Ray Reflectors for Industrial Lighting, Semi-concentrating and Distributing, are available for local or general lighting, or for recessing above small skylights and glass panels. The 500 to 1500 watt sizes are especially recommended for high-bay mounting.

To determine the proper reflector to use requires only three steps:

(1) Intensity of light required. (See Illumination Standards Table below.)
(2) Area to be lighted by each outlet. (See Chart below.)
(3) Mounting height for reflector equipment.

The entire room will be divided into bays (smaller areas in large rooms), generally determined by building construction, such as dividing beams, columns, etc.

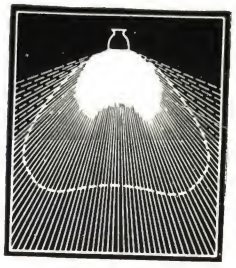


Semi-Concentrating

Semi-concentrating Reflectors have greatest punch of light "down" and a wide spread as shown above

INDUSTRIAL ILLUMINATION STANDARDS

Interior	*Foot-Candles*
Armories	10-12
Assembling	8-30
Cloth Products—Cutting, Sewing	10-20
Foundries	8-15
Garages	3-15
Gymnasiums	12-15
Inspecting	10-25
Machine Shops	10-25
Packing, Boxing	6
Printing:	
Engraving	50-100
Presses	12
Typesetting	10-50
Receiving, Shipping	6
School Manual Training Rooms	12
Skating Rinks (indoor)	8
Steel and Iron Mills:	
Charging, Casting	4
Rolling, Shearing	5
Storage, Stock Rooms	3
Swimming Pools	8
Textile Mills	6-20
Woodworking:	
Rough Sawing	8
Sanding, Veneering	12

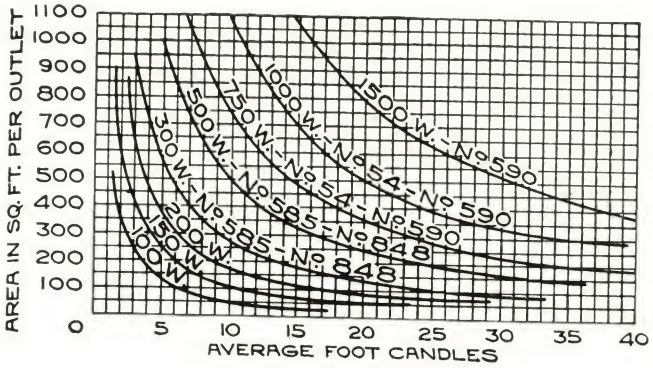


Distributing

Distributing Reflectors have a wide spread of light, averaging about 90° as shown above

REFLECTOR DATA

No.	Diameter	Minimum overall height from ceiling to bottom of reflector	Size lamp, watts
Distributing Reflectors			
3	4½"	6½"	60-25
535	5⅞"	7 "	100
570	8 "	10¼"	150
575	9⅜"	11⅛"	200
585	11⅞"	20 "	500-300
54	16½"	28 "	1500-1000-750
Semi-concentrating Reflectors			
696	8⅜"	8 "	100-60
700	10 "	9 "	150
710	11½"	10 "	200
844	8⅜"	7½"	100
848	13¼"	18 "	500-300
590	20 "	26 "	1500-1000-750



Use Large Size Lamps

Use large size lamps wherever possible as rated efficiency per watt increases with size of lamp.

For Distributing Reflectors spacing between units should *not exceed twice the mounting height*

For Semi-concentrating Reflectors spacing between units should *not exceed the mounting height*

High Mounting No. 590 and 54 X-Ray Reflector Units Are Mounted Above Traveling Crane

Wire Guards

For gymnasiums, armories, etc. Bottom is hinged. Guard is fastened to ceiling.

GUARD DATA

With Reflector No.	Lamp size, watts	Cat. No.	Diam., in.	Depth, in.
570	150	14506A	12	12
575	200	14507A*	13½	13½
575	200	14507B	13½	19½
585	300-500	14508A*	15⅞	16
585	300-500	14508B	15⅞	22
590	750-1500	10590	23	26
54	750-1500	10590	23	26

*Use only when slow burning wire is used. Otherwise use deep guard and 6-in. long nipple.

Sturdily Made

Guards are sturdily made of heavy gauge wire, heavily tinned. Bottom is hinged.

Large Gymnasiums or Arenas Are Effectively Lighted with X-Ray Reflectors

Planned Lighting

. . . Worked out in detail in the architect's office when the structure is being planned, to provide an ideal system of illumination,

. . . Produces harmony between structural arrangement and architectural detail, obviating later costly alterations and compromises in both architectural plans and lighting effect.

. . . Insures the right atmosphere or effect with proper interpretation of architectural values by providing the correct amount of illumination where it is needed.

. . . Provides flexibility for easily and economically increasing intensities of illumination for future needs.

"Planned Lighting" cooperation of Curtis Designers and Engineers is available to all interested!

Curtis Lighting

Chicago New York Toronto Antwerp

Engineers in Principal Cities!

ILLUMINATING GLASSWARE

GILLINDER-BROTHERS-INC

PORT-JERVIS-NEW-YORK

FOREWORD

For use in the selection of illuminating glassware on commercial lighting installations, including schools, hospitals, churches, offices and other public buildings, GILLINDER BROTHERS, INC., have prepared this Catalogue.

As manufacturers of glassware GILLINDER BROTHERS, INC., have developed:—

"PEARLTONE"—a multi-cased Alabaster diffusing glass
"NEOSTROM" —a multi-cased semi-indirect glass.
"OPOLO" —a single layer (homogeneous) opal or white diffusing glass.

In addition to these types of glass, meeting specific demands in the lighting field, GILLINDER BROTHERS, INC., manufacture other items. These include staple lighting shades and dishes and decorated residential lighting glassware.

GILLINDER BROTHERS, INC., are equipped to work with you on special lighting effects in glass, where private mould development is involved.

REPRESENTATIVE

NUMERICAL INDEX

Number	Page	Number	Page	Number	Page	Number	Page	Number	Page
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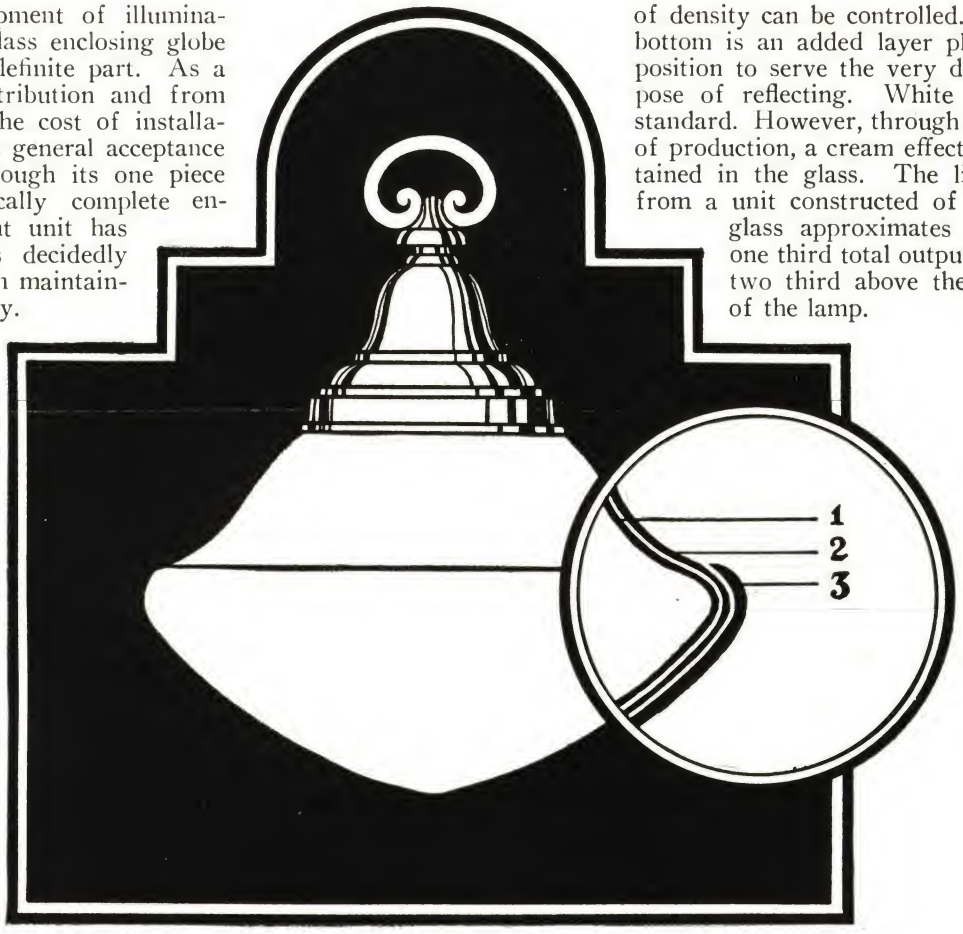
34/413	7	175/496	11	348	13	647	13	990	11
34/438	7	180	10	349	13	648	13	991	4
38 Neostrom	4	180/498	10	350	13	649	13	997	9
38 Pearltone	9	185	10	438	13	650	13	5013	12
38/701	4	185/497	10	608	13	651	13	5014	12
42	13	193	8	608/2057	13	679	12	5020	12
71	11	200	8	608/2058	13	683	12	5030	12
90	11	201	8	610	12	699	13	5721	13
119	11	205	10	611	13	700	13	9020	4
119/479	11	207	10	615	13	747	13	9020/700	4
135	11	208	8	634	12	830	9	9041	9
135/435	11	209	10	638	13	830/430	9	9041/403	9
165	10	340	13	639	13	862	12	9041/406	9
165/498	10	341	13	640	13	878	12	9041/407	9
170	10	342	13	641	13	888	9	9041/408	9
170/497	10	346	13	642	13	918	11	9504	13
						918/173	11	9524	8

NEOSTROM GLASS

With the development of illumination the diffusing glass enclosing globe has played a very definite part. As a means of light distribution and from the view point of the cost of installation and up-keep its general acceptance is recognized. Through its one piece construction, practically complete enclosing, a dust tight unit has resulted. This has decidedly been advantageous in maintaining the light efficiency.



Neostrom Glass—Is a newly developed glass for commercial lighting purposes. This glass now presents the advantages of the enclosing globe in conjunction with the light advantages of semi-indirect illumination. NEOSTROM is cased glass (multi-layer) based on the scientific control necessary to produce cased glass.

(1) A thin skin of opal glass to diffuse light.
(2) A heavy casing of crystal glass to add strength.
(3) A dense opal glass casing to reflect the light upward.

The bowl or lower portion of the enclosing globe in NEOSTROM glass is a dense reflecting opal glass allowing a very small percentage of the light to filter through. The top or neck of the enclosing globe in NEOSTROM glass is constructed of light density Alabaster (cased glass) sufficient to break up direct rays from the source but to allow the light reflected from the bowl to pass through without greatly absorbing it. The accompanying illustration clearly shows the construction of the various layers as referred to.

The density of the top or neck of the globe being dependent upon the structure of the cased glass the degree of density can be controlled. The opal bottom is an added layer placed in its position to serve the very definite purpose of reflecting. White or opal is standard. However, through the method of production, a cream effect can be obtained in the glass. The light output from a unit constructed of NEOSTROM glass approximates a ratio of one third total output below and two third above the horizontal of the lamp.

Hospitals and school boards are recognizing the qualities of NEOSTROM and installations are a part of this recognition.

Advantages of Neostrom Glass

One piece construction a practical dust tight unit.

Mechanically strong (scientifically constructed cased glass).

Will not readily discolor nor disintegrate effecting the maintenance or efficiency after prolonged use.

Surface both inside and outside is smooth and facilitates cleanness.

Possesses the quality of standard type enclosing globes and the ease of installation.

The size as used on the usual commercial installation does not in any way restrict the production of NEOSTROM glass.

Efficient in its performance.

Desirable semi-indirect distribution.

NEOSTROM GLASS

No. 9020

No. 9020/700

No. 991

No. 38

No. 38/701

NEOSTROM GLASS

ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

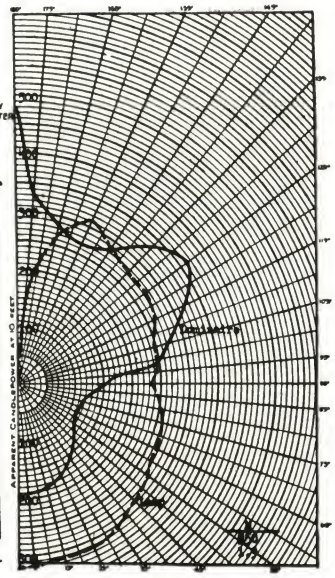
REPORT No. 130257 ORDER No. 49407-8 PLATE No. 25341

CANDLEPOWER DISTRIBUTION
NO.9020 NEOSTROM GLASS GLOBE*
Rendered to Gillinder Brothers, Incorporated

No. Submitted - One

Lamp - 200 Watts; 115 Volts; 3380 Lumens; PS30 Clear Gas-filled Bulb; C-9 Filament; Medium Base; General Service.
Holder
Surface covering globe opening, reflection factor 0.40.
Procedure

Dimensions of Luminaire



a
b 6 in.
c
d 2-1/8
e 6-7/8 to 5/8
f 13-7/8
h 6

Weight of glass 4 lb. 11 oz.

LUMINAIRE DISTRIBUTION DATA

Mean Vertical

MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° ZH	479		90° HZ	149	
175°	337	34	85°	135	147
165°	287	83	75°	117	124
155°	268	124	65°	113	112
145°	284	178	55°	119	107
135°	337	261	45°	137	106
125°	365	325	35°	156	98
115°	323	321	25°	174	83
105°	272	288	15°	185	52
95°	172	206	5°	191	18
			0° MAX.	193	

LIGHT FLUX VALUES

ZONE	LUMENS: LAMP	LUMENS: LUMINAIRE	PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
0° - 60°	925	462	13.5	
0° - 90°	1732	845	25	
90° - 180°	1648	1818	54	79
0° - 180°	3380	2663	79	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH

Locations	A	B	C	D	E	F	G	H	I	J	K	L
ML.	550	580	805	2430	1020	420	880	645	970	1000	600	1240
Cp per Sq In.	1.1	1.2	1.6	5.0	2.1	0.9	1.8	1.3	2.0	2.0	1.2	2.5

NOTE: THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW. *E.T.L. Identification No.4154.

TESTED BY EWS PLOTTED BY WRF COMPUTED BY WRF CHECKED BY EWS ISSUED Sept. 24th, 1931.

APPROVED BY William F. Little ENGINEER IN CHARGE OF PHOTOMETRY

C. E. Horn IN CHARGE OF TEST

ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

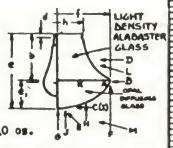
REPORT No. 130257 ORDER No. 49407-8 PLATE No. 25342

CANDLEPOWER DISTRIBUTION
NO.38 NEOSTROM GLASS GLOBE*
Rendered to Gillinder Brothers, Incorporated

No. Submitted - One

Lamp- 150 Watts; 115 Volts; 2355 Lumens; PS25 Clear Gas-filled Bulb; C-9 Filament; Medium Base; General Service.
Holder
Surface covering globe opening, reflection factor 0.40.
Procedure

Dimensions of Luminaire



a
b 5-1/4 in.
c
d 1/8
e 11-3/8 to 2-7/8
f
h 6

Weight of glass 4 lb. 10 oz.

LUMINAIRE DISTRIBUTION DATA

Mean Vertical

MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° ZH	140		90° HZ	93	
175°	136	13	85°	90	94
165°	169	47	75°	72	79
155°	181	84	65°	73	73
145°	206	114	55°	79	71
135°	277	215	45°	85	66
125°	275	244	35°	91.5	57
115°	246	244	25°	99	46
105°	193	204	15°	104	29
95°	147	152	5°	107	10
			0° MAX.	108	

LIGHT FLUX VALUES

ZONE	LUMENS: LAMP	LUMENS: LUMINAIRE	PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
0° - 60°	941	279	12	
0° - 90°	1214	525	22.5	
90° - 180°	1138	1337	56.5	79
0° - 180°	2352	1862	79	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH

Locations	A	B	C	D	E	F	G	H	I	J	K	L
ML.	480	560	560	670	1200	470	1240	650	560	1180	520	740
Cp. per Sq. In.	1.0	1.1	1.1	1.4	2.5	1.0	2.5	1.3	1.1	2.4	1.1	1.5

NOTE: THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW. *E.T.L. Identification No.4163.

TESTED BY EWS PLOTTED BY WRF COMPUTED BY WRF CHECKED BY EWS ISSUED Sept. 24th, 1931.

APPROVED BY William F. Little ENGINEER IN CHARGE OF PHOTOMETRY

C. E. Horn IN CHARGE OF TEST

DIMENSIONS

Number	Diameter, inches	Height, inches	Fitter, inches	Recommended wattage
9020 & 9020/700	9⅜	6¾	4	75-100
	12	8⅛	6	150
	14	8⅞	6	200
	16	10¼	6	300
38 & 38/701	10⅜	8	6	100
	12⅜	8	6	150
	14⅜	10	6	200
	16⅜	11¾	6	300
991	12	9	6	150

PEARLTONE GLASS

PEARLTONE is a scientifically developed glass for use in the field of commercial illumination (enclosing globes) where a high grade product is desirable.

PEARLTONE glass is a cased glass of three layer construction (multi-layer) and is often referred to as Alabaster glass. Through a scientific control two varying types of glass, crystal and opal, are brought together into a welded unit of very definite qualities. This control is made possible through a very close laboratory check and a knowledge of the expansion and contraction coefficient in relationship to glass.

The combination of opal and crystal glass to produce PEARLTONE is brought about in a manner as here described. The inner and outer layers are crystal glass (clear) and the middle opal glass (white).

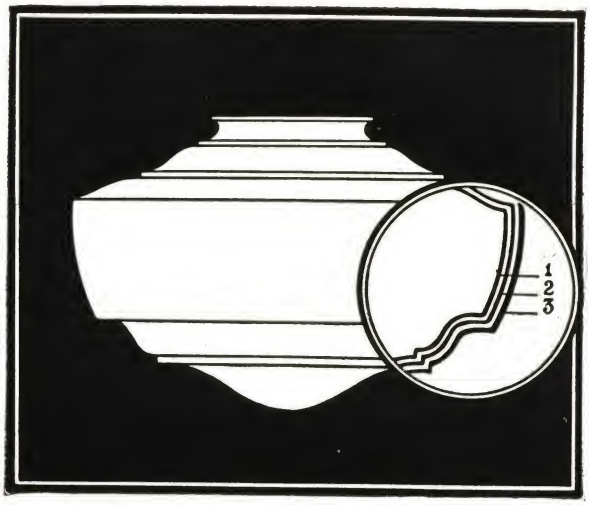
As designated on the accompanying illustration

(1) The inside layer of crystal is sufficient to assure an even distribution of:

(2) A thin skin of opal which serves the purpose of diffusing the light from the source.

(3) The outside layer of crystal gives strength and body to the finished globe.

TRADE-MARK



ELECTRICAL TESTING LABORATORIES
GENERAL OFFICE AND LABORATORIES
80th ST AND EAST END AVE.,
NEW YORK, N. Y.
REPORT No. 39780
Rendered to GILLINDER BROTHERS
VERTICAL DISTRIBUTION OF LIGHT
PEARLTONE ENCLOSING GLOBE No. 34

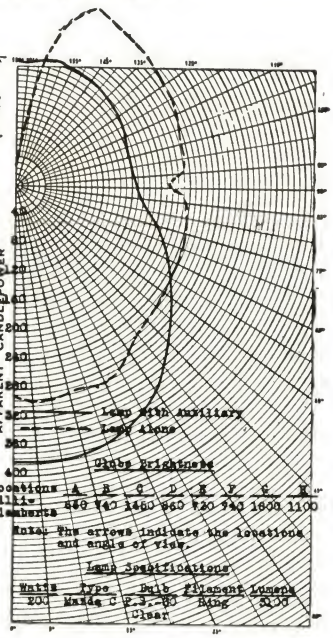
Lamp - 200-Watt Mazda C
Holder --
Photometric Distance - 10 feet
Conditions - Lamp
Auxiliary rotated
Dimensions of
Lamp and Auxiliary
a
b 6 in.
c
d 1 1/2
e 8 7/8
f 15 3/8

Mid-zone Angles	Distribution Mean Vertical			
	App. Candlepower		Zonal Lumens	
	Lamp Alone	Lamp with Aux.	Lamp Alone	Lamp with Aux.
180° Nadir	29	172		
175°	64.5	168	7	16
165°	223	179	63	50
155°	268	179	122	82
145°	258	179	162	112
135°	256	174	197	136
125°	247	170	222	162
115°	241	164	239	163
105°	233	160	246	169
95°	227	163	246	178
90° Horiz.	213	166		
85°	234	171	251	189
75°	242	204	266	215
65°	246	231	244	229
55°	250	264	224	237
45°	258	330	200	232
35°	276	341	173	214
25°	297	367	136	170
15°	294	380	83	108
5°	299	381	28	36
0° Nadir.	289	361		
SPHERICAL VALUES	246	214	2092	2688

Light output = 87%
Weight of glass= 5 lbs.4-1/2 oz.
Tested by Cos.
Computed by Cmc
Plotted by Lca.
Checked by CLO.

Order No. 24236-3
Plate No. 12016
Date July 5th, 1922.
Approved by

Engineer in Charge of Photometry



A. C. Dick.
In Charge of Test.

The Advantages of Pearltone

As previously referred to there are definite PEARLTONE qualities:

An evenly distributed filtered light from the source.

A high efficiency in light output.

An elimination of direct glare and a minimum of light absorption.

A grayish white quality of illumination.

Ease of maintenance through the glazed surface.

A rugged and durable globe.

An assurance of the PEARLTONE quality being maintained.

To substantiate these claims PEARLTONE has been installed in many schools and offices and has been recognized in specifications where the lighting requirements have been carefully considered.

GLASSWARE FOR COMMERCIAL ILLUMINATION

PEARLTONE GLASS

Samuel E. Kennard School, 5031 Potomac Street, St. Louis, Mo., Equipped Throughout with "Pearltone" Unit No. 34

The "Pearltone" Unit No. 34, shown, is one of several especially suitable for installation in schools, other public buildings and offices, where a maximum glareless evenly diffused light is essential

No. 34/438 Tan
DIMENSIONS

Number	Diameter, inches	Height, inches	Fitter, inches	Recommended Wattage
	7⅜	5¾	3¼	50
34	8⅜	6¼	4	75
34/413	9⅜	6⅞	4	75-100
34/438	10⅜	7¾	4-6	100
	11⅜	8½	6	150

No. 34/413 Tan
DIMENSIONS

Number	Diameter, inches	Height, inches	Fitter, inches	Recommended Wattage
	13⅜	9	6	200
34	15⅜	10	6	300
34/413	18⅜	11¼	6-8	500
34/438	20⅜	12	8	750

PEARLTONE GLASS

No. 9524

No. 208

No. 193

No. 200

No. 201

DIMENSIONS

Number	Diameter, inches	Height, inches	Fitter, inches	Recommended wattage
9524	13⅜ 15⅜	9⅞ 11	6 6	200 300
208	14⅝	8⅞	6	200
193	12¼ 14¼	14¼ 16¾	6 6	200 300
201	14⅝	16⅜	6	300
200	12¼ 14¼	5⅝ 7¼	10¼ (opening) 12½ (opening)	

GLASSWARE FOR COMMERCIAL ILLUMINATION

PEARLTONE GLASS

No. 997

No. 888

No.830/430, Tan
No. 830, Undecorated

No. 38

No. 9041/407, *Gothic, Tan
No. 9041, Undecorated

DIMENSIONS

Number	Diameter, inches	Depth, inches	Fitter, inches	Recommended wattage
997	14	10⅜	6	200
830 & 830/430 Tan	6	8	4	75
	7	10	4	100
	8⅜	11⅞	6	150
	10⅜	14½	6	200
	11⅜	16½	6	300
	12	18	6-8	500
38	8⅜	6½	4	75
	10⅜	8	4-6	100
	12⅜	8	6	150
	14⅜	10	6	200
	16⅜	11¾	6	300
	18	12¾	8	500
888	8⅜	6¼	4	75
	9⅜	6⅞	4	75-100
	10⅜	7¾	4-6	100
	11⅜	8⅜	6	150
	13⅜	9	6	200
	14⅜	9½	6	200
	15⅜	10	6	300
	18⅜	12	8	500
9041	8	6	4	75
9041/407	9	7½	4	75-100
9041/406	13	9¾	6	200
9041/403	16	12½	6-8	300
9041/408				

*Also available in Colonial (9041/406), Adam (9041/403) and Classic (9041/408) decoration

OPOLO GLASS

With the wide spread use of the enclosing globe for commercial illumination Gillinder Brothers have developed a highly efficient single piece glass—Opolo.

This glass meets the needs and requirements for light output and distribution and at the same time has been developed to meet the needs in the competitive field.

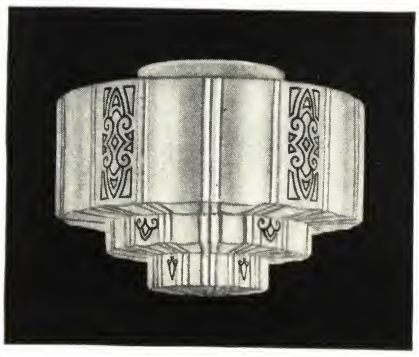
No. 170/497, Black Print
No. 170, Undecorated

No. 207

No. 165/498, Black Print
No. 165, Undecorated

No. 185/497, Black Print
No. 185, Undecorated

No. 205 and No. 209



No. 180/498, Black Print
No. 180, Undecorated

DIMENSIONS

Number	Diameter, inches	Height, inches	Fitter, inches	Recommended wattage
170	6	9	4	60-100
&	9⅝	16⅜	6	300
170/497	11	18	6	500
185 & 185/497	12	9½	6	150
205	13⅜	10½	6	200
209	8½	7	4	75
207	9	16	6	300

Number	Diameter, inches	Height, inches	Fitter, inches	Recommended wattage
165	3⅜	6	3¼	40-60
&	5⅝	9	4	60-100
165/498	7	12	4	150
	9⅝	16¼	6	300
	11	18	6	500
180 & 180/498	12	8⅝	6	150

GLASSWARE FOR COMMERCIAL ILLUMINATION

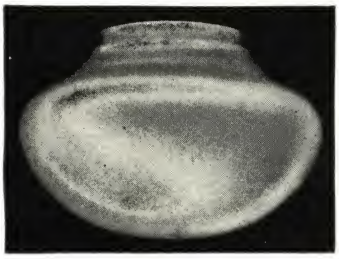
OPOLO GLASS

No. 135/435, Tan
No. 135, Undecorated

119/479, Tan
No. 119, Undecorated

No. 918/173,
Lined (Black, Blue or Green)
No. 918, Undecorated

No. 175/496, Black Print
No. 175, Undecorated



No. 990

No. 71

No. 90

DIMENSIONS

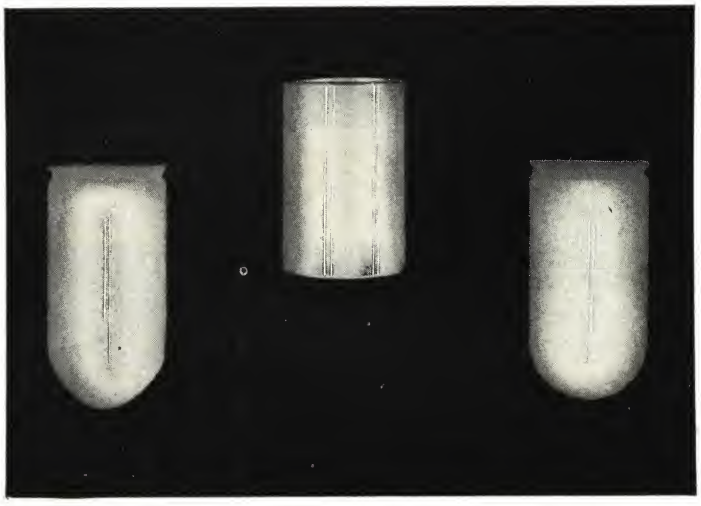
Number	Diameter, inches	Height, inches	Fitter, inches	Recommended wattage
135 & 135/435 Tan	8⅜	6⅜	4	75
	9⅜	7¼	4	75-100
	10⅜	7⅞	4-6	100
	12⅜	8¼	4-6	150
	14⅜	8⅞	6	200
	16⅜	10⅛	6	300
918 & 918/173	8½	6⅞	4	75
175 & 175/496	10¾	16⅜	6	300
71	8⅜	6⅜	4	75
	10⅜	7	4-6	100
	12⅜	8½	6	150
	14⅜	9⅞	6	200
	16⅜	10¼	6	300

Number	Diameter, inches	Height, inches	Fitter, inches	Recommended wattage
119 & 119/479 Tan	8⅜	6½	4	75
	10⅜	6⅞	4-6	100
	12⅜	7½	4-6	150
	14⅜	8⅝	6	200
	16⅜	10	6	300
	18⅜	12	6-8	500
990	12	8½	6	150
	14	9	6	200
	16	10¼	6	300
90	8⅜	6¼	4	75
	9⅜	6¾	4	75-100
	10⅜	7	4-6	100
	12⅜	7½	4-6	150
	14⅜	8½	6	200
	16⅜	9½	6	300
	18⅜	12	6-8	500

SUNBURSTS

DIMENSIONS

Number	Diameter, inches	Height, inches	Fitter, inches
5013	10	2⅛	2¼
5014	12	1¾	2¼
5020	16	3⅝	2¼
5030	20	4⅜	2¼



No. 862 No. 679 No. 878

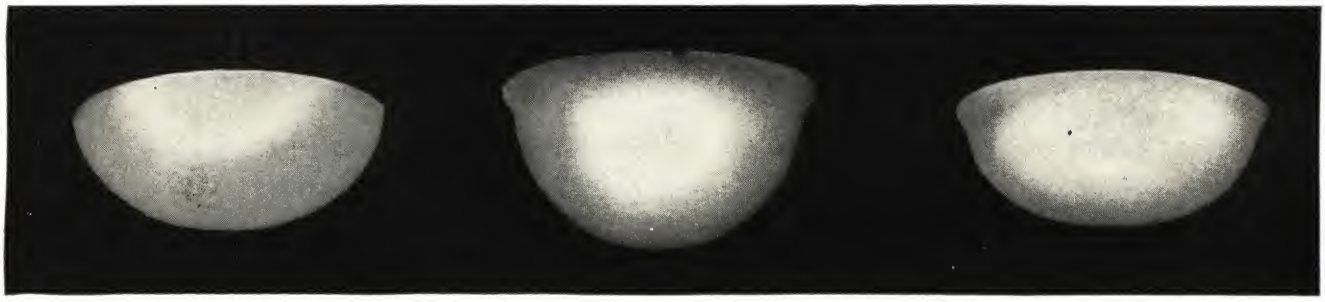
STALACTITES AND CYLINDERS

DIMENSIONS

No. 862			No. 878			No. 679	
Dia., in.	Height, in.	Fitter, in.	Dia., in.	Height, in.	Fitter, in.	Dia., in.	*Extreme length, in.
3⅜	6½	3¼	3⅜	6½	3¼	1⅝	20
4	8	4	4	8	4	1⅞	12
5	9	5	4⅞	10⅝	4⅝	2⅜	20
5	16	5	5	9	5	3	16
5½	11	5½	6½	13	6	3½	24
6	14	6	8	16	8	4	54
8	16	8	8	24	8	4½	7
8	24	8	10	16	10	5	20
9	14	9	12	18	12	6	18
10	16	10				7	10
12	18	12				8	20
						9	12
						10	28
						12	17

*Intermediate lengths available.

NO-LIP AND LIP DISHES



No. 683

DIMENSIONS

Dia., in.	8	10	12	14	16	18	20
Depth, in.	3⅛	4	4½	5⅜	5⅝	6¼	7

No. 610

DIMENSIONS

Dia., in.	8	10	12	14	16	18
Depth, in.	4	5	6	7	8	9

No. 634

DIMENSIONS

Dia., in.	8	10	12	14	16	18	20
Depth, in.	3⅛	4	4½	5	5½	6¼	6¾

GLASSWARE FOR COMMERCIAL ILLUMINATION

Nos. 638-643
Nos. 647-651
No. 5721, Electric

No. 608
No. 42

No. 438 Dish
Nos. 747 and 975
Nos. 340-342
No. 611

No. 608/2057 (One side)
No. 608/2058 (Two sides)
No. 9504

Nos. 615, 699, 700
Nos. 346-350
No. 438, Electric

DIMENSIONS

Number	Diam., inches	Depth, inches	Fitter, inches	Recommended wattage
*638	5¼	3¾	2¼	25
*639	6	4⅝	2¼	40
640	7	5¼	2¼	60
641	8	5¾	2¼	100
642	9	6¾	3¼	150
*643	12	7½	3¼	250
647	7	2¾	2¼	40
648	8	3½	2¼	60
649	9	4	2¼	100
*650	11	4⅞	2¼	150
*651	11	4⅞	3¼	150
5721 Electric	4⅝	5	2¼	40
**608	5	..	3¼	..
**608	6	..	3¼	..
**608	7	..	3¼	..
**608	8	..	4	..

Number	Diam. inches	Depth, inches	Fitter, inches	Recommended wattage
**608	9	..	6	..
**608	10	..	4, 5	..
**608	12	..	4, 5, 6	..
**608	14	..	6, 8	..
**608	16	..	6, 8	..
**608	18	..	8, 10	..
**608	20	..	8	..
42	5½	3⅜	2¼	40
438 Dish	12	5	10	..
438 Dish	16	6¾	14	..
747	4¾	4⅝	2¼	40
975	6⅛	5	2¼	40
975	7	5¼	2¼	60
340	6	4½	2¼	40
341	7	5⅛	2¼	60
342	8	5⅞	2¼	100

Number	Diam. inches	Depth, inches	Fitter, inches	Recommended wattage
**611	6	4½	3¼	..
**611	7	5	3¼	..
**611	8	5	4	..
**611	10	6⅜	4	..
608/2057	6	..	3¼	..
608/2057	8	..	4	..
9504	5⅝	3½	2¼	40
615	6	4	2¼	40
699	7	5	2¼	60
700	8	5	2¼	100
346	7	2¾	2¼	25
347	7½	3⅝	2¼	40
348	9	3⅞	2¼	60
*349	11	4⅝	2¼	100
*350	11	4⅝	3¼	100
438 Electric	4¾	5	2¼	40

* Not carried in stock.

** Other size fitters available on No. 608 and No. 611. Information on request.

LAKE ONTARIO
BUFFALO
NEW YORK
ALBANY
VERMONT
NEW HAMPSHIRE
MASS.
BOSTON
GILLINDER·BROTHERS·INC.
CLEVELAND
CHICAGO
ST. LOUIS
PORT JERVIS
NEW HAVEN
PENNA.
NEW YORK
BROOKLYN
NEWARK
NEW BRETON
PITTSBURGH
PHILADELPHIA
JERSEY
BALTIMORE
WASHINGTON
D. C.
DEL.
ATLANTIC OCEAN

GLEASON-TIEBOUT GLASS COMPANY

CELESTIALITE DIVISION

Manufacturers of Lighting Glassware

200 Fifth Avenue, NEW YORK, N. Y.

FACTORY: 99 Commercial Street, BROOKLYN, N. Y.

(Address all inquiries about our glass, other than Celestialite, to 99 Commercial Street, Brooklyn, N. Y.)

"Celestialite—Next to Daylight"

The question of proper illumination—the consideration of eye strain—is an important one.

Choosing the correct lighting glass for a large office building or, in fact, any structure, is one of the most important problems that confronts the specification writer.

Daylight is the ideal in illumination, therefore illumination can best be judged by its comparison to daylight.

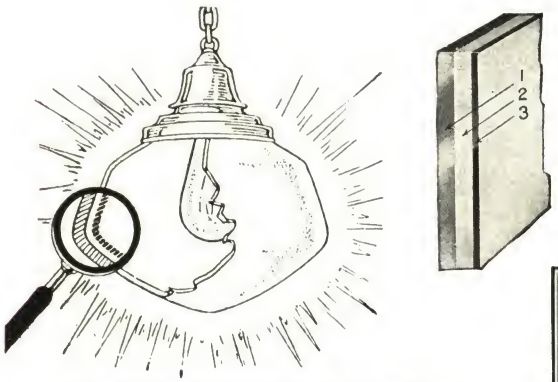
CELESTIALITE

REG. U. S. PAT. OFF.

Celestialite combined with the Mazda lamp furnishes illumination that is one of the most natural substitutes for actual daylight.

Construction—Celestialite is a patented glass *of three layers* made in strict accordance with the best scientific knowledge. The three layers of glass, one clear, one translucent and one blue, combine with the Mazda lamp to give an illumination as close to actual daylight as is practical for general lighting purposes. It is "next to daylight"—a light soft and restful to the eyes, but powerful to see by.

Features—The rays of light from the Mazda lamp in passing through the 3-layer Celestialite are modified and perfected in a way comparable to nature's method of producing daylight.



The 3-Layer Construction of Celestialite

Layers—*First Layer*—One of crystal clear transparency for body and strength.

Second Layer—One of a special white glass to diffuse the rays and filter out the glare. Provides low intrinsic brilliancy and perfect eye comfort.

Third Layer—One of transparent blue glass to whiten, clarify and perfect the light.

This method of construction gives in practical, usable form all the most recent research developments in light combined with the highest skill of the glassmaker.

Strength and Finish—The special annealing process used, and the three-layer construction make Celestialite sturdy enough to withstand hard shocks, heat, cold and sudden changes of temperature. The surface is so smooth that dust does not adhere readily.

Decorated Celestialite—A wide variety of standard shapes and sizes is made in five colors and seven styles.

Celestialite Installation, Columbia University, New York

After careful comparative tests by a committee of scientific men, Celestialite was selected for the equipment of the new Physics Building.

Catalogue and Sample

We will gladly send a catalogue on request. Write for a free fragment showing the unique construction of Celestialite glass.

Celestialite Unit No. 11585W

A popular modern unit. There are sizes and shapes for every building.

Technical Information

Use 1½ to 2 watts per sq. ft. of floor area, never less than 1 watt per sq. ft.

The filaments of the lamps should be centered in the glass globes to avoid bright spots in the bottom.

Use globes of generous proportions to secure low intrinsic brilliancy. Too large a lamp in too small a globe produces glare. For given sizes of Mazda lamps, Celestialite globes should be at least as large as in the table herewith.

SIZE OF MAZDA LAMP RECOMMENDED WITH CELESTIALITE

Mazda lamp, watts	Size of globe, in.	Mazda lamp, watts	Size of globe, in.	Mazda lamp, watts	Size of globe, in.
40	6	200	14	500	22
60	8	300	16	750	23
100	10	500	18	1000	24
150	12	500	20	1500	26

GRAYBAR ELECTRIC COMPANY

INCORPORATED

Commercial, Industrial and Floodlighting Equipment

Graybar Building, Lexington Avenue and 43rd Street
NEW YORK, N. Y.

For Distributing Houses, see our Page on Electrical Equipment
For Graybar Electrical Equipment for Home, Office and Industry, also Graybar Inter-Communicating Telephone Systems, see Manufacturers' Index

GRAYBAR COMMERCIAL LIGHTING

Balanced Lighting

Balanced Lighting is the Graybar name for planned lighting which, after due consideration of all the various elements of good lighting practice, strikes a balance between the extreme qualities of different systems of lighting and results in the correct selection of the most suitable unit to meet the specific lighting need. Horizontal light vs. reflected glare, vertical light vs. direct glare, shadow depth vs. flat shadows, first cost vs. maintenance—the compromise between these and many other factors is considered in Balanced Lighting.

Graybar Lighting Service

Graybar offers to those who specify and buy lighting equipment a three-fold service: (1) A most complete line of commercial, industrial and floodlighting fixtures and glassware—each item selected with care based on many years of practical lighting experience. (2) A well selected stock of standard fixtures and glassware in 77 distributing houses throughout the country—plus special service on special fixtures. (3) An advisory service (not harnessed to one type or system) on lighting layouts and suggestions available wherever and whenever it is wanted.

Graybar Commercial Glassware for Direct or Semi-indirect Lighting Systems

Graybar "99" Globe

For direct lighting the Graybar "99" glass has given satisfaction in schools, offices, stores, hospitals, etc., throughout the country. It is supplied in Cora (cased) Glass or Nuite. Cora Glass is made up of two layers—a fine quality opal diffusing glass with an outer layer of crystal glass. It is superior in strength and uniformity of brightness. Nuite Glass (a homogeneous opal diffusing glass) at a lower cost has proved most satisfactory for ordinary lighting needs. Both transmit over 80% of the light produced by the lamp within and both meet approved standards. "99" globes can be furnished either plain or decorated.

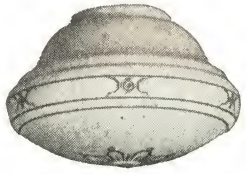
Graybar "66" Globe

The Graybar "66" Globe shape is preferred by many and has proved to be satisfactory. The glass used in the "66" is Nuite as described above—a homogeneous opal diffusing glass of the best quality. It, like the "99," transmits 80% of the lamp output. "66" globes are available in plain glass or in a variety of decorated designs.

Graybar "33" Reflex Globe

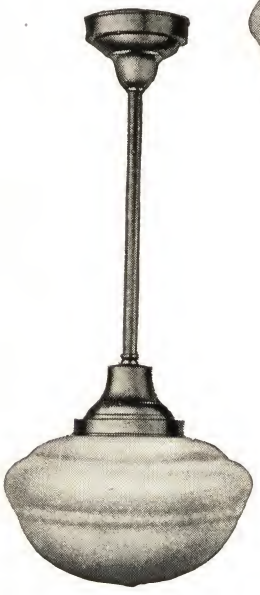
Where a softer, more diffused light is required and a semi-indirect lighting system is chosen, the Graybar "33" Reflex Globe will fill every requirement. The shape of the "33" is similar to the "99" with a slightly flatter top. It is made of clear crystal glass, the lower part being covered outside with a fired silica enamel which will not chip or discolor, while the top part remains clear except for a slight acid etching which eliminates filament images and ceiling shadows. The enameled lower part transmits only a small part of the light, the greater part being reflected from the ceiling (indirect.) The transmission efficiency is high, however, for a semi-indirect globe, and equals 76% of the lamp output. Plain or decorated glass.

"99" Globe



"66" Globe

"33" Reflex Globe



Graybar Commercial Fixtures

The Shelcrest Line

Shelcrest Lighting Fixtures are made of bakelite and have all the warmth of color, permanence of finish, accuracy of moulding and wearing qualities associated with that material.

They are supplied in stem suspension or ceiling type fixtures to properly accommodate lamps from 75 to 300 watts. The patented safety holder used on Shelcrests is safe and simple and will support Graybar "99," "66," or "33" globes either plain or decorated, which permits a wide variety of lighting effects.

Shelcrest Lighting Fixtures are unique in the field of lighting equipment. They are distinctively different from the ordinary commercial fixture and they have been successfully used in the better type of office, school, hotel, hospital and institutional building. For complete information on this unusual line of fixtures and wide selection of other commercial fixtures and glassware write for Graybar New Commercial Lighting Catalogue.

W-Type Fixtures

For installations requiring a quality metal fixture with safety holder, Graybar has developed the W-Type fixture. Correct lighting design, rugged construction, convenience in maintenance and nice finish are all found in W-Type fixtures. They are furnished in stem or chain type suspension fixtures or ceiling fixtures and will accommodate Graybar "99," "66," or "33" globes.

X-Type Fixtures

Where the lighting budget is slightly limited and low initial cost is a factor, X-Type fixtures will answer the needs of this situation. They are well made and correctly designed and have given good service in many commercial installations. They are supplied with a convenient safety holder to accommodate Graybar "99," "66" or "33" globes. Stem or chain type hanging fixtures and ceiling fixtures are available in a complete range of sizes.

A-Type Fixtures

Where low cost is of primary importance A-Type fixtures will meet the price without sacrificing lighting qualities. Economy in material and manufacture have made A-Type low in cost but high in value. Supplied in chain or stem suspension fixtures and ceiling fixtures to support Graybar "99," "66" or "33" globes. Write for complete information in the New Graybar Commercial Lighting Catalogue.

Lincrest

Lincrest Fixtures are made of highly polished brass and combine beauty of design and finish with correct lighting qualities. They have been adopted as standard equipment in many large buildings. Available in stem or chain suspension and in ceiling fixtures to accommodate Graybar "99," "66" or "33" globes. Convenient safety holders.

Stancrest

For those who wish a high grade metal fixture at a lower cost than safety holder fixtures, the Stancrest screw type fixture meets the requirements. In design, finish and construction the Stancrest stands high. Furnished in stem or chain suspension and in ceiling fixtures to accommodate Graybar "99," "66" or "33" globes.

Faircrest

For buildings requiring a low cost screw type fixture, without sacrificing correct design and appearance, Graybar offers the Faircrest. It is furnished in the chain suspension or ceiling type fixture to accommodate Graybar "99," "66" or "33" globes.

Note: *For complete information on all the globes and fixtures described in these two pages write for a New Graybar Commercial Lighting Catalogue.*

GRAYBAR INDUSTRIAL FLOODLIGHTING AND SPECIAL FIXTURES AND GLASSWARE

Industrial and Floodlighting

For industrial lighting and floodlighting of all types, indoor or outdoor, Graybar has assembled a wide variety of fixtures and accessories. As in the commercial field, our wide experience in industrial lighting enables us to offer special service in factory, mine, flood, warehouse, prison or special outdoor lighting. R.L.M., glassteel diffusers, floodlights, vaporproof fixtures and special fixtures to meet special conditions—all are available from a nearby Graybar warehouse. If desired, a Graybar lighting specialist will be glad to consult with you on either commercial or industrial lighting requirements.

A complete Graybar Commercial or Industrial Lighting Catalogue will be sent on request.

Special Fixtures

Many architects prefer to design lighting fixtures to fit the architectural detail of the building. Graybar is well prepared to furnish any type of special fixture required quickly and economically, and with the assurance that these special fixtures will be absolutely right from the viewpoint of good lighting.

Call on us at any time for suggestions, sketches or information or give us your sketches to figure.

THE EDWIN F. GUTH COMPANY

Designers and Manufacturers of Lighting Equipment

ST. LOUIS, MO.

SALES OFFICES

ATLANTA, GA., 17 11th St., N. E.
COLUMBUS, OHIO, 1436 W. Second Ave.
DETROIT, MICH., 12071 Cloverlawn Ave.
FORT WORTH, TEX., 321 Emma St.
LAKEWOOD, OHIO, 1068 Leedale Ave.
LOS ANGELES, CALIF., 501 San Fernando Bldg.
NEW YORK, N. Y., 47 W. 34th St.
ST. PAUL, MINN., 1598 Berkley Ave.
SAN FRANCISCO, CALIF., 407 Call Bldg.

Products and Service

Designers and manufacturers of LIGHTING EQUIPMENT for every purpose, including all types of Indirect, Semi-indirect and Direct Lighting. Guth patents cover the New Brascolite, Guth-Fan, GuthLite Aglite, Guth-Glo, One-piece Porcelain Enameled Reflector Flange, Industrolite, Aristolite, Mazelite, Safety Globe Holders and the Surgery-Lite.

In addition to our large line of standard fixtures, a few of which are shown here, we design and manufacture special fixtures to meet special architectural requirements, and welcome the opportunity of submitting to architects, designs prepared according to their specifications or requirements without obligation.

Our Engineering Department will be glad to co-operate in planning correct lighting. Engineers—designers of lighting equipment since 1902.

Architectural Catalog No. 19, Guth Fan Catalog No. 3, Indirect Lighting Catalog No. 26, Brascolite Bulletin, Commercial Catalog No. 25, and Guth-Glo Catalog (Redirected Lighting) No. 27, will be gladly sent on request.

Type R3816—4 Lights

Can be supplied with or without lighting fixture

Guth-Fan

(T. M. Reg. Pat. Nos. 1,699,201 and No. 1,791,125. Other United States and Foreign Patents pending)

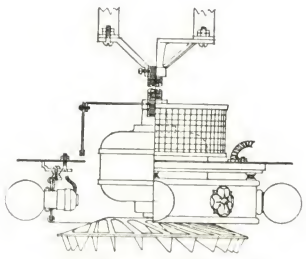
The Guth Fan and Fixture embodies scientific air circulation with correct and decorative lighting from a ceiling outlet. Guth Fan circulates 5134 cu. ft. of air per minute and will adequately cool 400 sq. ft. when placed in the center of a 20-ft. bay.

New Principle—Breeze from the Guth Fan is directed over the entire occupied area of the room. The cooler air below the fan is drawn up, then forced out and slightly downward. The breeze is continuous to the walls, down to the floor, back to the center of the room, and again up to the fan blade.

The heat of the motor and lamps rises to the upper part of the room and is not circulated or mixed with the cooler air.

Healthful Aid to Breathing—Guth Fan provides complete cooler air circulation without drafts. Circulation of air all around aids breathing and cools the entire body evenly, by evaporation, thus reducing body temperature.

Guth Fans can be supplied in alternating or direct current in many different fixture designs. Also has separate switch control for light and fan. Write for literature.



Guth Fan for Elevators

Type R3236—4 lights. Many sizes and designs. Write for literature

No. R1478

No. R1383

Standards and Brackets

Lighting fixtures should harmonize with the period treatment of a building. Otherwise they should offer a distinct contrast to commonplace types.

Experience of our artists enables us to design harmonious and appropriate fixtures.

Special designs will be gladly submitted for all types of lighting

GuthLite, Type H896

Patent No. 1453794. Trade-mark reg.

A totally enclosed unit that gives a scientifically correct, diffused and redirected light. Its light distribution covers a wide area and its construction eliminates ceiling shadows. Patented features simplify installation, cleaning and relamping. Reflector has three coats of Lumo Vitro Enamel fired on steel at 1700° F. For general good illumination we recommend that 1 watt per sq. ft. be figured for GuthLite.

In 3 sizes and 4 designs.

Write for complete information

Guth Glass Steel Unit, Type K3726

(U. S. patents pending)

Made for 200, 300, 500-watt lamps

Guth Glass Steel Unit reduces glare, both direct and reflected, and softens shadows. It is made of steel porcelain enameled, brown outside, white inside. It has a heavy gauge wire guard and pressed white glass diffusing bowl. The guard releases on one side and swings down giving immediate access to bowl and reflector, for cleaning and relamping.

Greater production, less errors, increased profits depend upon the ability to see fast and sure

New Brascolite, Type W3466

Pat. Nos. 14680, 1147717, 81470, 1304963

Trade-mark registered

One of the most efficient lighting units on the market.

High efficiency of the Brascolite is obtained through the relation of bowl to reflector, directing all the emitted light to working plane.

Reflector is finished with 4 coats of Lumo-Vitro enamel fired on steel at 1700° F., guaranteed not to peel, check or discolor. It is very easily cleaned and will retain its initial efficiency indefinitely. Low maintenance cost is brought about by low rate of depreciation, rugged construction and high efficiency of 90%. Furnished in 3 sizes and 4 styles, decorated or plain, and ceiling or chain hanger type.

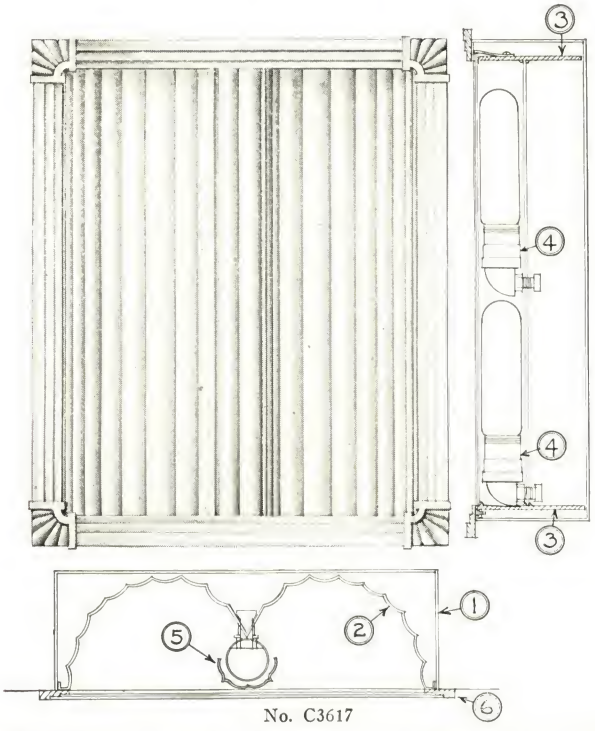
Write for literature

Guth-Glo Indirect Wall Illumination

(Design and mechanical patents pending.)

This new development of reflected lighting provides a simple, practical, efficient and decorative means of incorporating indirect lighting in walls.

Guth-Glo reflectors are vitreous glazed porcelain finish, the most desirable colors being pale green, white or ivory.



No. C3617

Reflector and Recessed Cabinet Sizes

GUTH-GLO REFLECTOR UNITS

Type	Length, in.	Width, in.	Lights
For T 10, 25 and 40-watt Lamps			
A	7½	13½	1
B	15	13½	2
C	22½	13½	3
D	30	13½	4
E	37½	13½	5
F	45	13½	6

Each additional 7½ in.

For T 10, 150-watt Lamps			
G	15	13½	1
H	30	13½	2
I	45	13½	3
J	60	13½	4

Each additional 15 in.

Guth-Glo Recessed Cabinets—Width, 13¼ in. Depth, 3⅝ in. Length, 7½ in., and up. Made of sheet steel of approved gauge. Udylite plated against rust.

Type AX for type A Guth-Glo Unit
Type BX for type B & G Guth-Glo Unit
Type CX for type C Guth-Glo Unit
Type DX for type D & H Guth-Glo Unit
Type EX for type E Guth-Glo Unit
Type FX for type F & I Guth-Glo Unit
Type JX for type J Guth-Glo Unit
Each additional 7½ in.

(1) Standard recessed iron cabinet.

(2) Reflector is colored porcelain enamel.

(3) Cast end plates to which all reflectors are attached making a complete assembly ready for installation in Box No. 1.

(4) Standard medium base sockets properly spaced for use with T-10 Mazda lamps of 25, 50 and 150 watts.

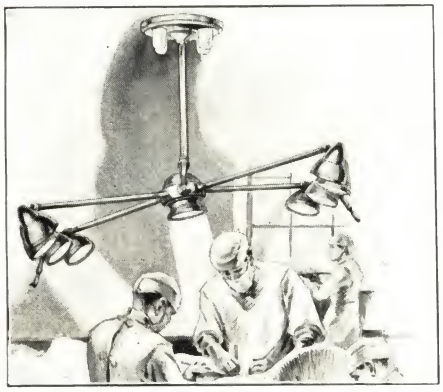
(5) Reflector shield easily removed for cleaning and relamping without the use of tools.

(6) Frames made of brass, aluminum or copper, in a variety of designs and sizes; suitable for any installation.

Write for catalog No. 27.

Finished with three coats of Lumo-Vitro Enamel fired on the iron at 1800° F. Easily cleaned and guaranteed against chipping, checking or discoloring.

Porcelain Enameled Line



Guth Vaporproof Surgery-Lite

(Patents pending)

The light that reveals with perfect safety and satisfaction.

Reveals hidden pathological conditions in the deepest cavities and recesses of the wound thereby lessening the fatigue of operating.

Advantages of Guth Vaporproof Surgery-Lite.

(1) Entirely vaporproof, eliminating all danger of explosions. Sockets, lamps and wiring are hermetically sealed, preventing high explosive gases coming in contact with electric arcs and sparks.

(2) Worm gear control for manipulation of light to any spot on operative field.

(3) Multiple lamps remove the uncertainty of a single lamp which will burn out leaving the surgeon in darkness.

(4) Heat absorbing glass in reflectors stops 80% of the heat rays from reaching the operative field.

(5) Light rays are projected from so great a spread that shadows are eliminated.

(6) Can be operated from a storage battery in event of current interruption.

(7) Made in 115-volt and 6-volt size—with chromium plated finish preventing corrosion and deterioration from fumes.

Write for literature.

Guth Flange and Guth Aglite

(Patented)

The Guth Flange is a one-piece unit with a double reflecting surface and a patented spring key for engaging or releasing the glass. The spring action of the key allows for expansion of glass thereby reducing breakage to a minimum. Guth Flange is non-vibrating—self-adjusting, dustproof with no visible screws.

The Guth Aglite is ideal for use in bathrooms, bedrooms, halls, closets, kitchens, hospitals and all other places where cleanliness and sanitation is paramount. Aglites harmonize with practically all interiors and are finished in Shaded Orchid, Shaded Apple Green, Solid Ivory, Solid Gray or pure white.

Write for Catalog No. 25

No. R3616

No. R3622

Guth Indirect-Lite

(Patents applied for)

Guth Indirect-Lite produces illumination on the working plane that is entirely free from glare, thereby producing better vision, greater mental alertness and less mind and body fatigue. The distribution is wide and uniform, literally flooding an entire room with light, at the same time shielding the light source from the eyes.

Guth Indirect-Lites are made in a variety of sizes and designs to meet various requirements.

Design No. R3616 illustrates the unit with china bowl exposed in bottom of reflector—through which is emitted a soft mellow light.

Write for special Catalog No. 26 for recommendations and designs.

HOLOPHANE COMPANY, INC.

Illuminating Engineers and Manufacturers of Scientific Lighting Equipment

342 Madison Avenue
NEW YORK, N. Y.

BRANCH OFFICES: SAN FRANCISCO, CAL. and CHICAGO, ILL.

WORKS: NEWARK, OHIO

CANADA: Holophane Co., Ltd., 385 Yonge Street, TORONTO

The Holophane Company

The HOLOPHANE COMPANY, INC., was the pioneer company in the field of scientific illumination and has been a leader in this field for more than a third of a century. Our large business with architects has been built through our knowledge of the fundamentals of correct lighting.

Holophane Engineering Service

The maximum service from a lighting installation requires careful engineering design and planning. To this end the HOLOPHANE COMPANY, INC. maintains a competent Engineering Department which will draw up complete illumination specifications without charge.

Planned Lighting

The public is urged to take advantage of Holophane Engineering Service to ensure the selection and correct use of proper lighting equipment and to gain the full benefits of Holophane Planned Lighting.

Advantages of Holophane

All Holophane products are prismatic. The prism offers the most accurate and scientific means for controlling light. In the prism the change in light direction is a function of its shape and independent of its surface. There is nothing to deteriorate. A prismatic light director can always be restored to 100% performance by cleaning.

Holophane Specifics

The HOLOPHANE COMPANY, INC., believes it is better to design lighting units to exactly fit given needs than to offer to the public "general service" all-purpose units that may go on all jobs, yet fit none. Each Holophane unit is a "specific" that fits the needs it is designed to meet, better than general purpose units. Holophane specifics cover every known requirement of lighting.

*Holophane Types for Various Locations

Location	Holophane Specific	Holophane Bulletin
Armories	No. 691 Line	No. 1
Art galleries	Lenses	Data Sheet
Auditoriums	No. 691 Line and 752 Lens	No. 375J
Aviation fields	No. 2203 Line	No. 6
Banks	Send plans for layout	No. 375J
Barber shops	Filterlites	No. 375J
Chemical plants	No. 02328 Line	No. 448B
Churches	Send plans for layout	Sketches
Clubrooms	Send plans for layout	Sketches
Corridors	No. C-2172 and 1011-8420 Lines	No. 375J
Courtrooms	Ornamental Holophane	No. 900
Dance halls	Send plans for layout	Sketches
Dental offices	No. 3354	No. 1200
Drafting rooms	Filterlite with opaque liner	No. 375J
Dyehouses	No. 02328 Line	No. 448B
Factories	Industrial Line	No. 448B
Foundries	No. 691 Line	No. 1
Garages	No. 02328 and 6541 Line	No. 375J
Gasoline stations	No. 830 Line	No. 600
Gymnasiums	No. 691 Line with wire guards	No. 10
Handball courts	Lenses	Data Sheets
Hospitals:		
Corridors	No. C-7327 (write for data)	
Operating rooms	M. C. L. S. Nos. 15, 18 and 21, etc.	No. 1200
Wards	Twilites	No. 1200

Location	Holophane Specific	Holophane Bulletin
Hotels	Send plans for layout	Sketches
Libraries	R-r and Filterlites	No. 375J
Library stacks	No. 02176	No. 375J
Markets	R-r, 6541 Line and Lenses	No. 375J
Museums	Lenses	No. 375J
Offices	R-r and Filterlite Lines	No. 500
Outdoor tennis courts	No. 691-AL-W Line	No. 375J
Outside working and storage areas	No. 830 Line	No. 4 / No. 475
Prize fight rings	No. 691-AL-W Line	No. 10
Psychiatric wards	No. A-755	Data Sheet
Powerhouses	Industrial Line	No. 7
Restaurants	Send plans for layout	Sketches
Schools	R-r and Filterlites	No. 344A
Show windows	Window Reflectors	No. 480
Silk mills	Industrial Line	No. 5
Skating rinks	No. 691-AL Line	No. 10
Steel plants	Industrial Line	No. 448B
Stock bins	No. 02176 or No. C-2172	No. 1000
Stores	R-r Filterlites and Special	No. 444A
Studios	Lenses	No. 375J
Swimming pools	Send plans for layout	Special
Theaters	Send plans for layout	Special
Vaults	No. 02176	No. 1000
Warehouses	No. 830 or 2328 Line	No. 9
Wharves	No. 830 or 2328 Line	No. 375J

*The Holophane line is so varied and extensive that architects and others are invited to write for any of the Specific Data listed which will be furnished gratis.

INLAND GLASS WORKS

Illuminating Glassware

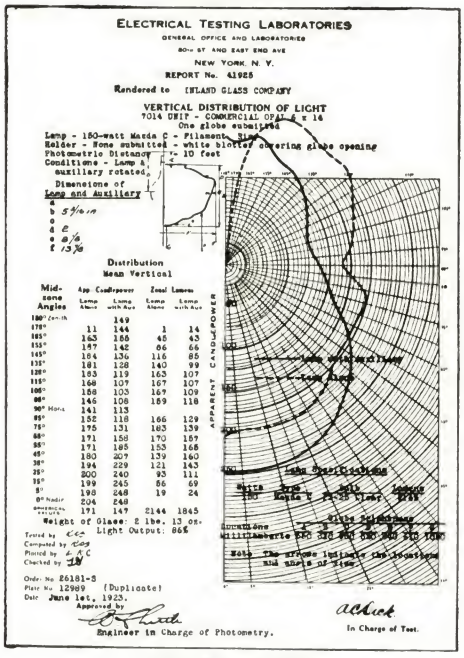
20 North Wacker Drive, CHICAGO, ILL.

Product

ILLUMINATING GLASSWARE for interior purposes, correctly designed for stores, offices, auditoriums, halls, schools, classrooms, university lecture halls, etc. Fixtures are of two general types, Ceiling Type or Hanging Type, as illustrated.

"Snow-White" glass is produced exclusively by Inland. It is a pure white glass of the finest texture, having diffusing qualities that provide efficient illumination without glare.

Inland
TRADE-MARK


ELECTRICAL TESTING LABORATORIES
GENERAL OFFICE AND LABORATORIES
80th ST. AND EAST END AVE.
NEW YORK, N. Y.
REPORT No. 41925
Rendered to INLAND GLASS COMPANY
VERTICAL DISTRIBUTION OF LIGHT
7014 UNIT - COMMERCIAL OPAL E x 16
One globe submitted
Lamp - 150-watt Mazda C - Filament, Size
Holder - None submitted - white blotter covering globe opening
Photometric Distance - 10 feet
Conditions - Lamp & auxiliary rotated
Dimensions of Lamp and Auxiliary
a 5¾in
b
c
d
e 8⅞
f 13⅜
Distribution Mean Vertical
Mid-zone Angles | Lamp Above | Lamp with Aux. | Lamp Above | Lamp with Aux.
180° Zenith 149
170° 11 144 1 14
165° 163 150 46 43
155° 157 142 66 66
145° 164 136 116 85
135° 181 128 140 99
125° 183 119 163 107
115° 168 107 167 107
105° 158 103 167 109
96° 146 108 159 118
90° Horiz. 141 113
85° 152 118 166 129
75° 175 131 163 139
65° 191 158 170 189
55° 191 185 153 168
45° 180 207 139 160
35° 194 229 121 143
25° 200 240 93 111
15° 199 245 86 69
8° 190 248 19 24
0° Nadir 204 248
Average 191 147 2144 1845
Weight of Glass: 8 lbs. 13 oz.
Tested by CCC Light Output: 86%
Computed by CAG
Plotted by A A C
Checked by JW
Order No. 26181-S
Plate No. 12989 (Duplicate)
Date June 1st, 1923.
Approved by
Engineer in Charge of Photometry.
In Charge of Test.

Light Output 86%

The "77" Line

With Decoration D-50. Conventional design in combination of red, blue and tan with band in tan. No. 226 holder. Correctly designed for offices, stores, schools, etc.

Service

A nationwide distribution of Inland units provides quick and efficient service for original installations and assures unexcelled service for replacements.

The "70" Line

In plain "Snow-White" glass with No. 226 holder. Correctly designed for offices, schools, stores, etc.

The "La Salle"

"Snow-White" glass. Chain hanger No. 56. For fine stores, shops, restaurants, etc.

The Luminaire

Scientifically designed for semi-indirect illumination of offices, stores, schools, hospitals, etc. The clear top feature provides a uniform distribution of light to ceiling and sidewalls, while direct downward light is subdued, eliminating all glare and eyestrain.

The "Modernaire"

"Snow-White" glass with decoration D-5 "Art Moderne" design in silver gray and black. No. 56 hanger. For fine stores, restaurants, etc.

ESTABLISHED 1896

KLIEGL BROS.

CABLE ADDRESS "KLIEGLIGHT" N. Y.

UNIVERSAL ELECTRIC STAGE LIGHTING CO., INC.

TELEPHONE
Columbus 5-0130

321 West 50th Street
NEW YORK, N. Y.

THEATRICAL, DECORATIVE AND SPECTACULAR LIGHTING

A Complete Line

A complete line of lighting specialties, electrical devices, and animated color and scenic lighting effects for theatre, stage, and auditorium; photographic studios; window displays; showrooms; exhibitions; pageants; outdoor theatricals; outdoor and interior floodlighting; spectacular advertising; ballrooms; cabarets; schools; lodge rooms; and other commercial or industrial applications.

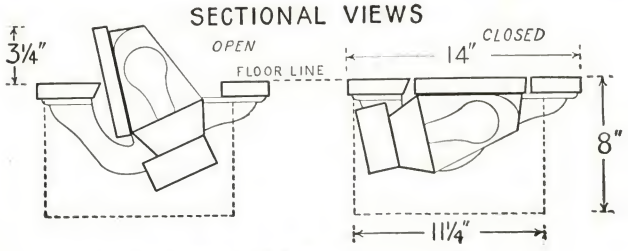
Aisle and Step Lights
Borderlights
Cab Calls
Colormatic Dimmers
Corridor Lights
Cove Light Strips
Dimmer Banks
Exit and Directional Signs
Floodlights
Floor Pocket and Plugs
Footlights
Numeral Flashers
Panelboards with dimmers
Panel Pockets and Plugs
Picture and Sign Board Lights
Proscenium Lights
Spotlights
Taxi Calls
Wall Pockets and Plugs

Disappearing Footlights

For use wherever footlights are only occasionally required, as in schools, clubs, lodge rooms, lecture halls, etc.—so constructed that when not in use they may be closed down flush with the stage floor leaving an unobstructed platform.

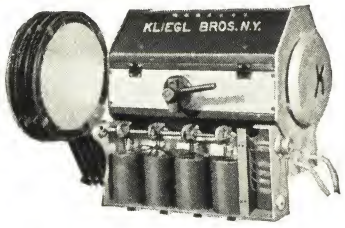
Specifications—Contractor shall furnish and install in recess provided in stage floor ( ) 5-ft. standard sections of Kliegl No. 829 Disappearing Footlights, open trough type. Each section being a self-contained unit fitted with 15 medium screw-base receptacles in a single row, spaced 3½ ins. on centers for 60-, 75-, or 100-watt lamps; supported in an all-metal fireproof housing, pivoted on each end, and with wooden floor panel attached. Flooring to be 1-in. thick, of red oak kiln dried laminated wooden strips tenoned and glued together with grain running in different directions, and impregnated with paraffin oil and varnished—providing straight, solid, continuous flooring that will not warp or crack. Cross brackets to be of malleable iron providing a sturdy support for the movable section and securely holding parts together in their exact and proper relationship. Flush ring-pull spring latch provided at the center of each panel. Each section equipped with 30-ampere mercury-enclosed type switches, one for each circuit, assembled and mounted on a bakelite block, with connecting screws for incoming and outgoing wires, to avoid all splicing in the terminal box. Mercury switches to automatically disconnect all circuits of the section when the footlight is closed, making it impossible for the lamps to be left burning when they are concealed under the floor. Completely wired with three 2-wire circuits for independent control of three colors.

SECTIONAL VIEWS



Automatic Spotlights

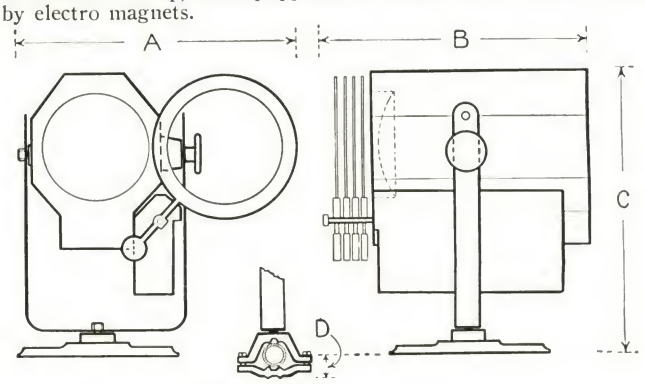
For stage lighting from the balcony front and other concealed locations. Incandescent spotlights with magnetically operated color frames permitting entire service of spotlights, including white lighting, color lighting, and dimming, all to be controlled electrically from a distant point.



No. 72-B Kliegl Spotlight
With magnetically operated color frames and line drawings showing over-all dimensions

Specifications

Contractor shall furnish and install in balcony front or as shown on plans ( ) Kliegl Spotlights [No. 72-B fitted with a 6-in. lens] [No. 73-B with 8-in. lens] and mogul prefocus base receptacle for 1000- or 2000-watt G lamp, and equipped with four color frames operated by electro magnets.



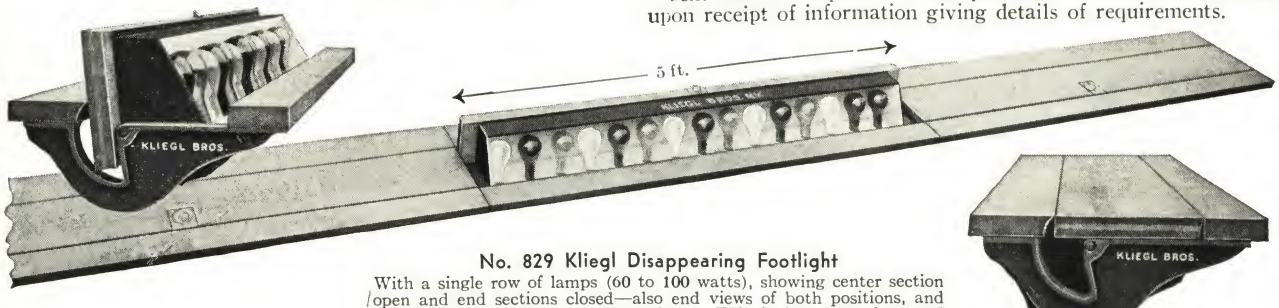
Optional: pipe-clamp mounting

OVER-ALL DIMENSIONS, INCHES

Cat. No.	A	B	C	D
72-B	19	19¾	18⅝	1¾
73-B	22	20¾	21	1¾

Catalogue and Quotations

Ready reference to essential and important information regarding our products can be had by procuring a copy of our catalogue—sent free on request. Price quotations or estimates furnished upon receipt of information giving details of requirements.



No. 829 Kliegl Disappearing Footlight
With a single row of lamps (60 to 100 watts), showing center section open and end sections closed—also end views of both positions, and drawings indicate over-all dimensions. This is but one of several standard models available. No. 830 is similar to No. 829 but equipped with individual reflectors and colored glass roundels

KOPP GLASS, INC.

Modernistic and Conventional Lighting Units

SWISSVALE, PA.

Kopp Lighting Units

Below are illustrated some of the Lighting Units we manufacture.

These are furnished in the usual sizes in various Modernistic and Conventional effects.

Detail information pertaining to sizes, finishes and prices will be gladly furnished on request.

THE NEWMAN MANUFACTURING CO.

MIDWEST ART METAL DIVISION

Makers of Wrought Iron, and Cast and Wrought Brass, Bronze, Aluminum, Nickel and Monel Lighting Fixtures

PLANT

CINCINNATI, OHIO

SALES OFFICES IN ALL PRINCIPAL CITIES OF THE UNITED STATES

Products

Makers of especially designed LIGHTING FIXTURES of every description, particularly CEILING FITMENTS, LANTERNS, BRACKETS and STANDARDS, fabricated of wrought iron and of cast and wrought brass, bronze, copper, aluminum, nickel silver, Benedict Nickel, Monel Metal, and stainless (rustless) steel.

Unsurpassed facilities for handcrafting complete installations of special fixtures for the finer theatres, banks, public buildings, hotels, apartment houses, residences, etc.

For our pages on Ornamental Metal Work, and Revolving Doors, see Manufacturers' Index.

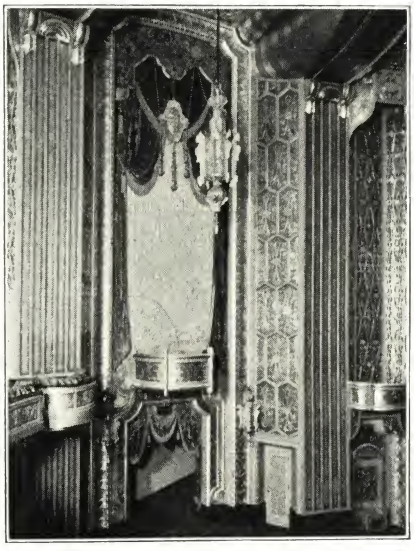
Facilities

Foundry, forge and fabricating departments positively second to none in the United States today. Newman "Midwest" fixtures are produced by a corps of the best artisans in the world.

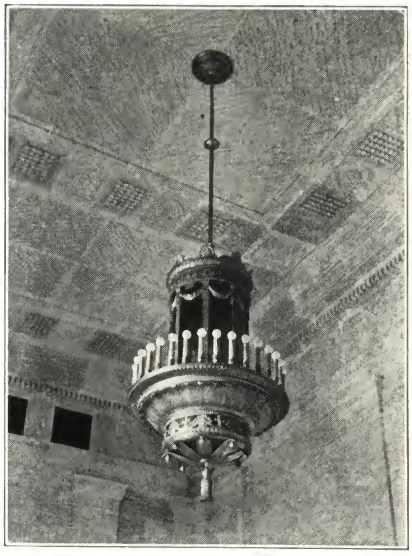
We maintain a splendid Sketch and Detailing Department to serve our friends among the architects. It is always a pleasure to submit individual sketches or complete layouts with estimates of cost, in open competition, without any obligations.

Write for our Residence Fixture Portfolio and Catalogues of wrought iron railings, gates, etc.

Masonic Temple, Cincinnati, Ohio
HARRY HAKE, Architect

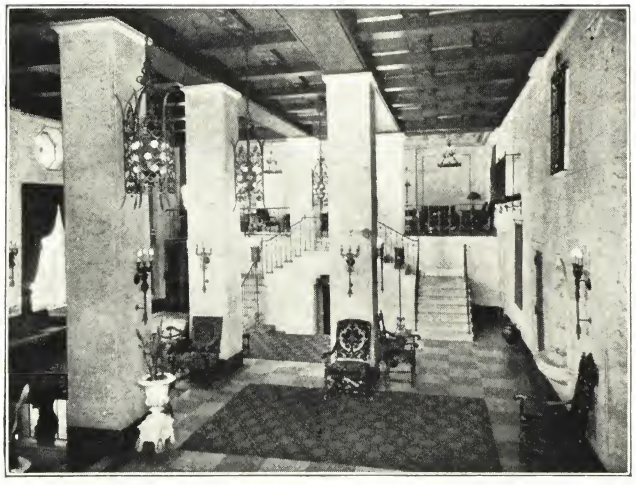


Warner Bros. Theatre, Erie, Pa.
C. W. & GEO. L. RAPP, Architects



St. Bernard School Gym, Cincinnati, Ohio
GUSTAVE W. DRACH, INC., Architects

Methodist Church, Muncie, Ind.
HOUCK & SMENNER, Architects



James Robertson Hotel, Nashville, Tenn.
MARR & HOLMAN, Architects

MACBETH

LIGHTING GLASSWARE

Macbeth-Evans Glass Company

Charleroi – Pennsylvania

CATALOG NO. 215-A

FOREWORD

APPRECIATING the fact that the architect is desirous of having at his command a selection of materials and patterns which he can use to add the final touch in bringing the building which he has designed to that state of perfection in which he has conceived it, MACBETH-EVANS GLASS COMPANY offers for the consideration of the architect a complete line of lighting glassware for schools, churches, stores and all other types of public buildings.

Macbeth enclosing globes are available in six distinctly different glasses, namely, Monax, Galax, Cremax, Topaz, Lumite and Alba. All of these are physically homogeneous single-layer glasses, and, consequently, are as strong mechanically as it is possible to make glass. Since they are single-layer glasses they are not subject to the differential expansion strains and the consequent breakage when in service, inherent to the multi-layer (cased) enclosing globes.

An extremely high standard of selection for glass quality as well as for uniformity in weight is maintained at all times. Macbeth Illuminating Glassware is free from such defects as streaks, cords, stones, blisters, checks or other imperfections which will impair the strength and appearance or detract from the general quality. The net result of such a high standard of selection is a uniform installation of attractive appearance and maximum efficiency.

Each type of Macbeth glass possesses desirable illuminating qualities of a very high degree. A trained technical staff, highly specialized in illuminating glassware research, is not only continuously at work seeking to improve Macbeth quality and pioneering into new types of illuminating glasses, but is constantly on the alert to see that improved quality is carefully maintained. As an aid in their work, there is maintained at the Charleroi Works a complete photometric laboratory, the facilities of which are also available to the architect for any special investigations he may desire to have made.

Macbeth enclosing globes further possess the advantages of extremely low depreciation in illuminating efficiency while in service. One-piece in construction, they are as nearly dust-tight as is possible to make a lighting unit. Smooth-surfaced initially, since they are especially resistant to weathering attack, they continue to be smooth-surfaced and, accordingly, dust and dirt do not settle upon them to the extent that they do on less resistant glasses. In the latter even a slight weathering film renders the glass surface such that atmospheric dust adheres strongly to the glass and quickly depreciates its illuminating efficiency.

MACBETH LIGHTING GLASSWARE

IN each of the several illuminating glasses marketed by MACBETH-EVANS GLASS COMPANY, a certain nicety of balance has been struck between the two important illuminating considerations, efficiency and surface brightness, which enables each glass to fulfill to maximum advantage its particular purpose.

MACBETH MONAX is the pioneer white diffusing glass for illuminating purposes. It has, through the medium of constant research in the Macbeth Laboratories, maintained its position as the peer in its field. Highly diffusing in character, Monax also possesses maximum lighting efficiency. Each enclosing globe is stamped "Macbeth Monax."

MACBETH CREMAX is a patented composition yielding a glass of rich creamy tint. Cremax illumination is of a warm, welcoming quality and is essentially decorative in character. Each enclosing globe is stamped "Macbeth Cremax."

MACBETH GALAX semi-indirect lighting enclosing globes combine high efficiency with all the desirable eye-protecting qualities of this type of lighting. They are single-piece units of physically homogeneous texture, but of dual opacity. The bottom of the globe is of a dense white, highly reflecting opacity, assuring low intrinsic brightness with a high percentage of light directed upward. The top of the globe is of much lighter opacity, but sufficient to eliminate lamp filament striations and shadows on the ceiling and walls. It permits a very high proportion of the upward light to be transmitted without material absorption loss. Macbeth Galax should not be confused with either enameled or cased bottom enclosing globes which are in reality not truly semi-indirect either in the character of their distribution of the light or in their glare characteristics. The two opacities found in the top and bottom respectively of a Galax globe result from a special manufacturing treatment of a single piece of physically homogeneous glass of patented composition. Because of its permanently high lighting efficiency, simplicity of installation and maintenance, and its inherent strength, Macbeth Galax should find application in every place where the semi-indirect type of lighting can be advantageously used. Each enclosing globe is stamped "Macbeth Galax."

MACBETH TOPAZ is a transparent, delicately-tinted yellow glass combining brilliance of appearance with a neutrality of hue which harmonizes readily with any color scheme. It embodies a color within the glass itself entirely free from the harsh green casts so common to most pale yellow tinted glasses without approaching the heaviness of tone characteristic of amber glasses.

MACBETH LUMITE (Crystal) is a clear glass of high luster. It is extremely resistant to weathering. The present vogue of modernistic lighting has brought with it a certain demand for crystal-etched glassware, for which Macbeth Lumite has proven itself unexcelled.

MACBETH ALBA is a translucent diffusing glass specially adaptable for manufacture of heavy pressed ware.

These six inherently different types of glass are available in different shapes ranging from conservative commercial to distinct modernistic.

From a variety of decorations, the architect may select one suitable for almost any interior where decorative treatment is desirable. All colors are permanently fired on the globes, thus becoming an inherent part of the glass.

MACBETH-EVANS GLASS COMPANY offers a comprehensive line of lighting glassware embracing a high standard of quality and varied design, coupled with technical assistance. This service has been planned to assure a complete and efficient lighting installation with a minimum expenditure of time and effort on the part of the architect.

INTERPRETATION OF PHOTOMETRIC DATA

WHEN comparing the photometric data for a number of different illuminating enclosing globes, caution should be exercised to make certain:

(1) That the tests have been made under conditions as nearly approaching the actual conditions of installation as possible.

(2) That the test data have been obtained on a sufficient number of pieces of the ware to make the data actually representative of the manufacturers' product.

To assist prospective purchasers of lighting glassware in making an accurate estimate of the merits of enclosing globe lighting units, the Illuminating Engineering Society, the National Electric Light Association and the Illuminating Glassware Guild have sponsored a procedure for testing, known as I. E. S. specifications for testing diffusing type enclosing glassware, which is based on the above considerations.

The photometric data for the glassware represented herein have been obtained in tests made by the Electrical Testing Laboratories, New York City, in accordance with the I. E. S. specifications.

These specifications for testing differ from the procedure commonly used in the past in three important particulars, namely: 1. The method of selecting the samples for test. 2. The position of the light source within the globe. 3. The cover used over the fitter opening of the globe. These aspects are discussed briefly below.

SELECTION OF SAMPLES

A common practice in the past has been to have photometric tests made on a single piece of glass, which in some cases may have been a specially made sample, and the data thus obtained were submitted as being representative of the manufacturers' product. Such data were obviously questionable and, at best, altogether incomplete. The I. E. S. specifications provide that the selection of the samples for test be made by a representative of the testing laboratory, and that he shall examine and weigh no less than 25 pieces chosen at random from the lot of ware which is to be inspected. From this group of 25 or more globes thus examined, one globe representing the minimum, one the maximum and four of medium weight (six globes in all), shall be selected and forwarded to the testing laboratory for photometric tests. After determining the transmission efficiency for these six units, the globe which most nearly approaches the average efficiency of the six is further tested for distribution characteristics and brightness values. The data thus obtained on this average globe are considered to be as nearly representative an estimate of the illuminating qualities of the manufacturers' product as it is readily possible to obtain.

LAMP POSITION

The position of the light sources within an enclosing globe has a great influence upon the photometric characteristics of the unit. Thus, in general, the closer the lamp is placed to the bottom of the enclosing globe, the greater the transmission efficiency which is obtained. At the same time, however, the brightness values over the bottom will be increased, thus making the globe less desirable from this standpoint.

Because of these possible variations, the I.E.S. specifications have provided that globes of a given diameter shall be tested with the lamp in prescribed position. Where this position has been deviated from in the test, as it may be advisable to do in the case of an elongated or stalactite-shaped globe, this departure must be cited in the test report as an exception.

COVER FOR FITTER OPENING

The resulting illuminating efficiency is likewise influenced by the material used as a cover for the fitter opening of the globe in the test. The cover material adopted as standard in the past was a white blotter having a reflection factor of about 70%. It was recognized that the white blotter reflected more and absorbed less of the light which fell on the fitter opening than would practically all of the canopy materials on the market, but that it did establish a standard on which comparisons could be intelligently based. An investigation of a number of representative canopies disclosed that a material having a reflection factor of 40% more nearly represented the average value for the materials most generally used for fitter canopies. The test reports shown herewith give the values for transmission efficiency, using a material of 40% reflection factor. These values simulate very closely actual installation conditions.

SUGGESTED SPECIFICATIONS FOR LIGHTING GLASSWARE OF MACBETH QUALITY

(1) GENERAL

This specification outlines the detailed requirements of enclosing globes for use in the (name of building). Enclosing globes will be required for all ceiling outlets. These outlets together with respective lamp sizes are shown in the architect's plans for this building.

(2) SHAPE AND SIZE OF GLOBE

The globes shall conform in contour to shape exemplified by MACBETH-EVANS GLASS COMPANY'S (name of globe) shown in SWEET'S ARCHITECTURAL CATALOGUES for 1932.

Enclosing globes shall be in accordance with the following schedule of sizes for respective lamp wattages:

Lamp Size	Minimum diam. of globe	Lamp Size	Minimum diam. of globe
100 watts	10 in.	300 watts	16 in.
150 watts	12 in.	500 watts	18 in.
200 watts	14 in.	750 watts	20 in.

(3) MATERIAL

(a) (*Specification for Monax Type Glassware*)

Glassware to be furnished on this installation shall be of Macbeth Monax or its equivalent. Units shall be of highly diffusing white glass of homogeneous texture throughout.

(a) (*Specification for Galax Type Glassware*)

Glassware to be furnished on this installation shall be of Macbeth Galax or its equivalent. Units shall be totally enclosed except for fitter opening, and constructed of a uni-layer, physically homogeneous glass in such manner that the bottom of the globe is of a dense white highly reflecting character causing a major portion of the light emitted by the enclosed lamp to be reflected upward according to the semi-indirect lighting principle, while the upper portion of the globe is of a slightly diffusing, highly transmitting character, permitting a large percentage of the upwardly directed light to be transmitted.

(a) (*Specification for Cremax Type Glassware*)

Glassware to be furnished on this installation shall be of Macbeth Cremax or its equivalent. Units shall be of a rich creamy tint, highly diffusing glass of homogeneous texture throughout.

(b) All of the glassware supplied shall be uniform in quality and shall be free from such imperfections as streaks, cords, stones, blisters, checks, etc., as will impair the strength or appearance or otherwise detract from the general quality of the glassware for lighting purposes.

(c) Glassware shall be highly resistant to attack by weathering, and shall show no sign of disintegration or attack after being immersed in boiling distilled water for two hours.

(d) The glassware shall be mechanically strong.

(e) The glassware shall be properly annealed and free from any internal strains which may cause breakage.

(f) Enclosing globes when suspended from three points shall hang plumb.

(4) PHOTOMETRIC CHARACTERISTICS

The bidder shall submit data showing results of photometric tests on the glassware which he proposes to supply, made by a competent testing laboratory according to the provisions of the "I.E.S. Specifications for Testing Diffusing Type Enclosing Glassware" or,

If the architect so elects he may require the bidder to submit photometric tests made by a competent testing laboratory on samples selected by the architect's representative from the bidder's or manufacturer's warehouse stock, said samples to be selected and tests made exactly in accordance with the "I.E.S. Specifications for Testing Diffusing Type Enclosing Glassware" with the exception that the samples for test shall be selected by the architect's representative instead of a representative of the testing laboratory.

Test reports submitted in accordance with either of the above specifications shall show that the proposed glassware meets the following requirements for illuminating efficiency (ratio of light output of unit to light output of bare lamp) and for surface brightness:

(For Monax Type Glassware.) Efficiency shall be not less than 82%. The maximum surface brightness at any point on the globe in the line of vision when installed shall not exceed 4 candle power per square inch.

(For Galax Type Glassware.) The efficiency shall be not less than 75%. The maximum surface brightness at any point on the globe in the line of vision when installed shall not be in excess of 2 candle power per square inch. It is further specified that the distribution of the light shall be such that not more than 25% of the light output of the bare lamp shall be directed below the horizontal plane passing through the lamp filament.

(For Cremax Type Glassware.) The efficiency shall be not less than 65%. The maximum surface brightness at any point on the globe in the line of vision when installed shall not be in excess of 3 candle power per square inch.

(5) INSPECTION

All globes delivered for this installation will be subject to inspection by the architect or his representative and if any are found not to conform to these specifications, the entire lot or any individual globe may be rejected.

(6) TYPES OF GLOBES AND LOCATIONS

(Under this heading the architect should include in either list or table form the selected types of globes and the locations in which they are to be installed. For data on code numbers which will assure the proper style, size, decoration, etc., see "To Specify" for each type of globe illustrated on the following pages.)

SOME USERS OF MACBETH LIGHTING GLASSWARE AND SOME TYPICAL INSTALLATIONS

SCHOOLS

Detroit, Michigan
—*Cappen School*
MacKenzie School
Denby School
Post School

St. Louis, Missouri
—*West Farrell School*
Dumlach School
Hadley Vocational School

Oak Park, Illinois
—*William Beye School*

Flint, Michigan
—*Calvin Coolidge School*

Pontiac, Michigan
—*Pontiac High School*
Washington Jr. High School

Upper Merion, Philadelphia
—*Merion Square Grade School*

Lower Merion, Philadelphia
—*Gladwin Grade School*

Houston, Texas
—*Rufus Cage Elementary School*

Cleveland, Ohio
—*St. Joseph's Academy*

Pittsburgh, Pennsylvania
—*Pennsylvania College for Women*

Homestead, Pennsylvania
—*St. Mary's Magdalene School*

OFFICE BUILDINGS, HOSPITALS, HOTELS AND CHURCHES

Springfield Baptist Hospital
—*Springfield, Missouri*

Presbyterian Church
—*New Albany, Indiana*

Spring Grove State Hospital
—*Catonsville, Maryland*

Schoen Building
—*Baltimore, Maryland*

Guardian Bank
—*Detroit, Michigan*

Racine County Court House
—*Racine, Wisconsin*

Garland Building
—*Chicago, Illinois*

James A. Hearn & Son Department Store
—*New York, New York*

Railway Exchange Building
—*St. Louis, Missouri*

International Shoe Company
—*St. Louis, Missouri*

St. Mary's Hospital
—*St. Louis, Missouri*

Lenox Hill Hospital
—*New York, New York*

Homeopathic Hospital
—*Wilmington, Delaware*

U. S. Naval Aircraft Building
—*Philadelphia, Pennsylvania*

Holy Name of Jesus Hospital
—*Jackson, Alabama*

Hanover Bank Building
—*New York, New York*

Times Trust Building
—*Akron, Ohio*

Central Depositors' Bank Bldg.
—*Akron, Ohio*

Greensburg National Bank
—*Greensburg, Indiana*

Forestry Building
—*Fredericton, New Brunswick*

Scottish Rite Temple
—*McAlester, Oklahoma*

First National Bank Building
—*Oklahoma City, Oklahoma*

Reading Y. M. C. A. Building
—*Reading, Pennsylvania*

Canadian Bank of Commerce
—*Toronto, Ontario, Canada*

Hale Brothers Department Store
—*San Jose, California*

U. S. Marine Hospital
—*San Francisco, California*

Prominent among the recent semi-indirect Galax installations are the Potomac Electric Power Company Building, Washington, D. C., and the Ohio Power Company, Canton, Ohio, Gulf Building, Pittsburgh, Pa., and additions to Wellesley College, Wellesley, Massachusetts.

SIMPLIFIED ILLUMINATION CALCULATION PROCEDURE FOR MACBETH ILLUMINATING GLASSWARE

FIRST

Determine foot-candles required from Table I.

SECOND

Determine "Conditions Factor" for the interior, whether "Favorable," "Average" or "Unfavorable," from Table II, following page. The "Conditions Factor" will depend upon the room proportions, color of ceiling and upper walls, and the maintenance of equipment. Typical "Average Conditions Factor" consists of:

Room proportions.....
Width approximately twice ceiling height

Color of ceiling and walls.....Medium

Maintenance of equipment.....Fair

The "Conditions Factor" becomes more "Favorable" as the width of the interior increases in proportion to its height; as the color of ceiling and upper walls becomes lighter; and as the maintenance of equipment improves.

THIRD

Decide which type of illuminating glassware (Monax, Galax or Cremax) is desired.

FOURTH

Decide mounting height. Ordinarily, an overall fixture length (ceiling to underside of enclosing globe) of one-fourth ceiling height may be used for all Macbeth enclosing globes. Ceiling type fitters should be used on low ceilings.

FIFTH

Locate in first column, Table II, the contemplated "Area Per Outlet" or "Approximate Spacing" and further narrow this down to the "Conditions Factor" determined in second step. Then traverse Table II horizontally to the right until the desired foot-candle intensity (as determined in first step) is located in the correct glassware section. If not so found, then go to a closer spacing until desired foot-candle intensity is located. Directly above in the column heading is the required lamp size.

TABLE I. LIGHTING INTENSITIES FOR GENERAL ILLUMINATION OF COMMERCIAL INTERIORS

Specific Commercial Interiors	Foot-Candles		Specific Commercial Interiors	Foot-Candles	
	Recommended	Minimum		Recommended	Minimum
Auditoriums	5	3	Lunch Rooms	12	8
Automobile Show Rooms	15	10	Markets	12	8
Bank Lobbies	10	6	Office Buildings		
Barber Shops	15	10	Private and General	15	10
Churches			Same—no close work	10	8
Auditorium	3	2	File Room	6	4
Sunday School Room	8	5	Corridors	5	3
Club Rooms			Restaurants	8	5
Lounge	5	3	Schools		
Reading Room	12	8	Auditorium	8	5
Court Rooms	10	6	Class Rooms, Library and Office	12	8
Dance Halls	6	4	Corridors and Stairways	5	3
Depot Waiting Rooms	8	5	Drawing Rooms	25	15
Drafting Rooms	25	15	Manual Training	12	8
Gymnasiums			Laboratories	12	8
Main Exercising Floor	12	8	Sewing Rooms	25	15
Swimming Pool	8	5	Study	12	8
Shower and Locker Rooms	6	4	Stores—Department and Large Specialty		
Halls, Passageways in Interiors	3	2	Main Floors	15	10
Hospitals			Basement Store	15	10
Corridors	3	2	Other Floors	12	8
Private Rooms	8	5	Stores—Medium Size		
Wards (with local illumination)	5	3	Clothing	15	10
Laboratories	15	10	Drug	15	10
Hotels			Dry Goods	15	10
Lobby	8	5	Grocery	12	8
Dining Room	6	4	Furniture	15	10
Bed Rooms	8	5	Shoe	15	10
Corridors	3	2	Confectionery	12	8
Libraries			Meat	12	8
Reading Rooms	12	8	Toilet and Wash Rooms	6	4
Lodge Rooms	6	4			

TABLE II. DETERMINATION OF LAMP SIZE AND OUTLET SPACING

Using the proper section for glassware selected, the mounting height* and conditions factor decided upon, choose such spacing and lamp size as will give the desired foot-candle intensity

Area per outlet or †approximate spacing	Conditions factor	Macbeth Monax — Average foot-candles					Macbeth Cremax — Average foot-candles					Macbeth Galax For semi-indirect lighting — Average foot-candles				
		100-watt	150-watt	200-watt	300-watt	500-watt	100-watt	150-watt	200-watt	300-watt	500-watt	100-watt	150-watt	200-watt	300-watt	500-watt
55 to 65 sq. ft.	Favorable	8–10	12–15	18–23			5–7	9–12	13–18			7–9	10–14	15–22		
or	Average	6–7	9–12	12–16			3–5	6–9	8–13			5–6	7–10	11–15		
7¾x7¾-ft. spacing	Unfavorable	4–5	6–8	9–11			2.5–3.0	4–6	5–8			3–4	4–6	7–9		
65 to 75 sq. ft.	Favorable	7–8	11–15	15–20			4–6	8–11	11–15			6–7	9–13	13–19		
or	Average	5.0–5.5	8–11	11–15			3–4	5–8	7–11			4.5–5.0	6–9	9–13		
8½x8½-ft. spacing	Unfavorable	3.0–3.5	5–7	7–9			2–3	3.5–5.0	5–7			2.5–3.0	4–6	6.5–8.0		
75 to 85 sq. ft.	Favorable	6–7	10–13	13–18			3.5–5.0	7–9	8–12			5–6	8–11	11–17		
or	Average	4.5–5.0	7–10	10–13			2.5–3.5	4–7	6–8			4.0–4.5	5–8	8–11		
9x9-ft. spacing	Unfavorable	3.0–3.5	5–6	6–8			1.5–2.5	3–4	4–6			2.5–3.0	3.5–5.0	6–7		
85 to 95 sq. ft.	Favorable	4.5–6.0	8–11	11–16	18–25		3–4	6–8	8–11	14–19		4.0–5.5	7–10	10–14	17–24	
or	Average	4.0–4.5	6–8	8–10	12–18		2–3	4–6	5–8	9–14		3.5–4.0	5–7	7–9	11–17	
9½x9½-ft. spacing	Unfavorable	2.5–3.0	4–5	6–7	8–12		1.5–2.0	2.5–4.0	4–5	6–9		2.0–2.5	3–4	5–6	7–11	
95 to 110 sq. ft.	Favorable	4.0–5.5	7–10	10–14	16–22		3.0–3.5	5–7	7–10	12–17		3.5–5.0	6–9	9–12	15–21	
or	Average	3.5–4.0	5–7	7.5–9.0	11–16		2.0–2.5	3–5	5–7	8–12		3.0–3.5	4–6	6–8	9–15	
10x10-ft. spacing	Unfavorable	2.0–2.5	3–4	5–6	7–10		1.5–2.0	2.5–3.0	3.5–5.0	5–8		1.5–2.0	2.5–4.0	4.5–5.0	6–9	
110 to 125 sq. ft.	Favorable	4–5	6–9	9–12	14–20		2.5–3.5	4–6	6–9	11–15	20–27	3–4	5–7	8–11	13–19	
or	Average	3.0–3.5	4.5–6.0	7.0–8.5	10–14		1.5–2.0	3–4	4–6	7–11	13–20	2.5–3.0	4.5–5.0	5.5–7.0	8–13	
11x11-ft. spacing	Unfavorable	2.0–2.5	3–4	4.5–5.5	7–9		1.0–1.5	2–3	3–4	5–7	9–13	1.5–2.0	2.5–3.0	4.0–4.5	6–8	
125 to 145 sq. ft.	Favorable	3.5–4.5	5.5–8.0	8–11	12–17		2–3	3.5–5.0	5–7	9–13	17–23	2.5–3.5	5–6	7–9	11–16	
or	Average	2.5–3.5	4–5	6.5–8.0	9–13		1.0–1.5	2.5–3.5	3.5–5.0	6–9	11–17	2.0–2.5	3.5–4.5	5–6	7–11	
11½x11½-ft. spacing	Unfavorable	1.5–2.0	2.5–3.5	4–5	6–8		....	1.5–2.5	2.5–3.5	4–6	8–11	1.0–1.5	2–3	3.5–4.0	5–7	
145 to 170 sq. ft.	Favorable	3–4	5–6	7–10	10–15	18–25		3.5–4.0	4–6	8–11	15–20	2–3	3.5–5.0	6–8	9–14	17–25
or	Average	2.0–2.5	3.5–4.0	6–7	8–10	12–18		2.0–3.5	3–4	5–8	9–15	1.5–2.0	3.0–3.5	4.5–5.0	6–9	11–17
12½x12½-ft. spacing	Unfavorable	1.0–1.5	2–3	3.5–4.0	5–7	8–12		1.5–2.0	2–3	3.5–5.0	6–9	0.5–1.0	1.5–2.5	3.0–3.5	4–6	7–11
170 to 200 sq. ft.	Favorable	2–3	4.5–5.5	6–8	9–12	16–22		3–4	3.5–5.0	7–9	12–17	1.5–2.5	4–5	5–6	8–11	14–21
or	Average	1.5–2.0	3.0–3.5	5–6	6–9	11–16		1.5–3.0	2.0–3.5	4–7	8–12	1.0–1.5	2.5–3.0	4.0–4.5	5–8	9–14
13½x13½-ft. spacing	Unfavorable	1.0–1.5	2.0–2.5	3.0–3.5	4–6	7–10		1.0–1.5	1.5–2.0	3–4	5–8	....	1.5–2.0	2.5–3.0	3.5–5.0	6–9
200 to 230 sq. ft.	Favorable		4–5	5–6	8–11	14–20		2.5–3.5	3.5–4.0	6–8	10–14		3–4	4–5	7–10	12–18
or	Average		2.5–3.0	4.0–4.5	5–8	10–14		1.5–2.5	2–3	4–6	7–10		2.0–2.5	3.5–4.0	4–7	8–12
14¾x14¾-ft. spacing	Unfavorable		1.5–2.0	2.5–3.0	3.5–4.5	7–9		....	1.5–2.0	2.5–4.0	5–7		1.0–1.5	2.0–2.5	3–4	5–8
230 to 260 sq. ft.	Favorable		3.5–4.0	4.0–4.5	7–10	12–17		2–3	3–4	5–7	9–12		2.5–3.5	3.5–4.0	6–9	10–14
or	Average		2.0–2.5	3.5–4.0	4.5–7.0	9–13		1.5–2.0	2.0–2.5	3–5	6–9		1.5–2.0	3.0–3.5	3.5–6.0	7–10
15½x15½-ft. spacing	Unfavorable		1.5–2.0	2.0–2.5	3–4	6–8		....	1.5–2.0	2.5–3.0	4–6		1.0–1.5	1.5–2.0	2.0–3.5	5–7
260 to 300 sq. ft.	Favorable		3–4	3.5–4.0	6–8	10–15			2.5–3.0	4–6	8–11		2–3	3–4	5–7	9–13
or	Average		1.5–2.0	3.0–3.5	4–5	8–10			1.5–2.0	3–4	6–8		1.0–1.5	2.5–3.0	3–5	6–9
16¾x16¾-ft. spacing	Unfavorable		1.0–1.5	1.5–2.0	3–4	6–8			1–2	2–3	3–4		....	1.0–1.5	2.5–3.0	4–6
300 to 340 sq. ft.	Favorable			3.5–4.0	5–7	9–12			2–3	3.5–5.0	7–9			3–4	4–6	8–10
or	Average			2.5–3.0	3.5–4.0	6–9			1.0–1.5	2.5–3.5	5–7			2.0–2.5	3–4	5–8
18x18-ft. spacing	Unfavorable			1.0–1.5	2.5–3.0	4–6			....	1.5–2.5	3–5			....	2.5–3.0	3.5–5.0
340 to 390 sq. ft.	Favorable			3.0–3.5	4–6	8–10				3–4	6–8			2.5–3.0	3.5–4.5	7–10
or	Average			2.0–2.5	3.0–3.5	5–8				2–3	4–6			1.5–2.0	2.5–3.5	4–7
19x19-ft. spacing	Unfavorable			1.0–1.5	2.5–3.0	3.5–5.0				1.5–2.0	3–4			....	2.0–2.5	3–4
390 to 440 sq. ft.	Favorable			2.5–3.0	3.5–5.5	7–9				3–4	5–7			2.0–2.5	3–5	6–9
or	Average			1.5–2.0	2.5–3.0	4.5–7.0				1.5–3.0	3.5–5.0			1.0–1.5	2.0–3.5	4–6
20½x20½-ft. spacing	Unfavorable			1.0–1.5	2.0–2.5	3–4				1.0–1.5	2.5–3.5			....	1.5–2.0	3–4
440 to 500 sq. ft.	Favorable			2.0–2.5	3–4	5–8				2.5–3.5	4–6			1.5–2.5	3–4	5–8
or	Average			1.0–1.5	2–3	3–5				1.5–2.5	3–4			....	2–3	3–5
21¾x21¾-ft. spacing	Unfavorable			....	....	2.5–3.0				....	2–3			....	....	2.5–3.0

*Note—Ordinarily units may be mounted using an overall fixture length equal to one-fourth the ceiling height. For low ceilings, fitters of the ceiling type should be used.

†Note—Between walls and first rows of lights allow not more than ½ inch spacing.

"The MODERNISTIC"

THE "Modernistic" displays modern French influence combined with the popular reverse "set back." The design is restrained in form and decoration, without bizarre characteristics and is thus suitable for use in almost any location.

In the table below the number D-144 indicates a gray, fired-color tint applied to the elaboration in Monax glass. On Cremax glass the same number indicates a brown, fired tint. Satin Topaz indicates a Topaz natural-colored glass with satin-etched and high-lighted finish.

TO SPECIFY

The architect should write into his own specification, the data under the headings "Mould No." and "Description" for the particular globe desired. This will automatically assure the selected style, size, color, glass and decoration. For example, "Macbeth Modernistic 5698 D-144 Cremax" will designate the design shown in Cremax glass with a brown, fired-color tint applied to the decoration of a globe 6 in. in diameter, 9 1/16 in. in depth, with a fitter 4 in. in diameter.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position	Recommended wattage
5698	D-144 Cremax	6	9 1/16	4	1 in. above	100
5695	D-144 Cremax	8 1/16	13 1/2	6	1/2 in. above	150
5980	D-144 Cremax	10	16 3/8	6	1/4 in. below	200
5696	D-144 Cremax	12	20	8	1 in. below	300
5697	D-144 Cremax	16	27	12	3 in. below	500
5698	Satin Topaz	6	9 1/16	4	1 in. above	100
5695	Satin Topaz	8 1/16	13 1/2	6	1/2 in. above	150
5980	Satin Topaz	10	16 3/8	6	1/4 in. below	200
5696	Satin Topaz	12	20	8	1 in. below	300
5697	Satin Topaz	16	27	12	3 in. below	500
5698	D-144 Monax	6	9 1/16	4	1 in. above	100
5695	D-144 Monax	8 1/16	13 1/2	6	1/2 in. above	150
5980	D-144 Monax	10	16 3/8	6	1/4 in. below	200
5696	D-144 Monax	12	20	8	1 in. below	300
5697	D-144 Monax	16	27	12	3 in. below	500

*Lamp position—Represents the distance in inches of the lamp contact above or below the plane of the fitter screws in the fixture.

NOTE—Due to the very large size and great weight of globe No. 5697 safety should be insured by means of auxiliary support such as an inside safety holder, ring and chains, rods or other safety devices recommended by the fixture manufacturer.

"The CUBISTIC"

AGAIN modernism with cubist influence and the double "set back." Simplicity is the keynote of this design which is suitable for almost any location where modernistic lighting is desired.

In the table below, D-120 indicates a leaded effect upon the vertical ribs of the globe—black is used with Monax globes and brown with Cremax. K-309 indicates a brown modernistic decoration in negative and positive etching on alternate panels. All colors are permanently fired on the glass.

TO SPECIFY

The architect should write into his own specification, the data under the headings "Mould No." and "Description." This will automatically assure the selected style, size, color, glass and decoration. For example, "Macbeth Cubistic 5677 D-120 Monax" will designate the decoration shown in Monax with black vertical lines upon a globe 12 in. in diameter, 16⅜ in. in depth, with a fitter 6 in. in diameter.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, below, in.	Recommended wattage
5676	D-120 Cremax	9¼	12½	4	2	100
5677	D-120 Cremax	12	16⅜	6	2½	200
5678	D-120 Cremax	14	19	6	2½	300
5676	D-120 Monax	9¼	12½	4	2	100
5677	D-120 Monax	12	16⅜	6	2½	200
5678	D-120 Monax	14	19	6	2½	300
5676	K-309 Cremax	9¼	12½	4	2	100
5677	K-309 Cremax	12	16⅜	6	2½	200
5678	K-309 Cremax	14	19	6	2½	300

*Lamp position—Represents the distance in inches of the lamp contact below the plane of the fitter screws in the fixture.

"The SEVILLE"

THE Seville may be obtained in all sizes in Monax or Cremax glass, plain and decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 5297 Monax, representative for all sizes in Monax glass, tested according to the I.E.S. specifications.

ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No 47052 ORDER No 40367-S PLATE No 21610

CANDLEPOWER DISTRIBUTION
No.5297 Macbeth Monax Globe*
Rendered to Macbeth Evans Glass Company

No.Submitted - Six. Light output range 83-84. Average 83.5 per cent.

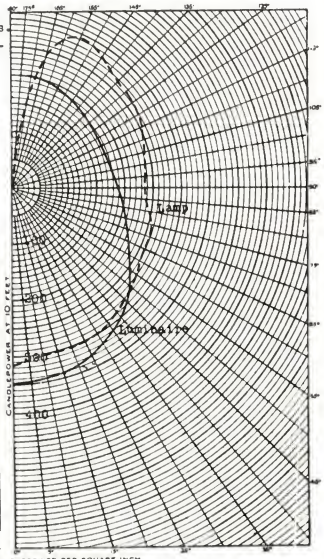
Lamp - 200-Watts; Gas-filled; 3280 Lumens; Bulb PS30 Clear; Medium base; Filament C9; General service; 115 volts.

Holder - None submitted - Surface covering globe opening - reflection factor 40 per cent.

Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE
a — 4 ins.
b — 6
c — 2
d — 9-1/8
e — 14
h — 6

WEIGHT OF GLASS 2 lb.12 oz(44 oz)
White diffusing glass



LUMINAIRE DISTRIBUTION DATA
Mean Vertical

MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° ZEN.	206		90 HOR.	188	
175°	201	17	85°	195	213
165°	201	57	75°	206	218
155°	196	91	65°	223	222
145°	188	118	55°	255	229
135°	182	141	45°	287	222
125°	179	161	35°	310	195
115°	179	178	25°	329	152
105°	180	190	15°	342	98
95°	182	199	5°	350	33
			0° AXIS	350	

LIGHT FLUX VALUES

ZONE	LUMENS LAMP	LUMENS LUMINAIRE	PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
0°-60°	899	925	28	83.
0°-90°	1698	1582	48	
90°-180°	1595	1153	35	
0°-180°	3283	2735	83	

LUMINAIRE BRIGHTNESS
MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K
ML	800	1000	1200	1550	1250	880	1900	1300	1100	1200	900
CP PER SQ IN	1.6	2.1	2.5	3.2	2.6	1.8	3.9	2.7	2.3	2.5	1.85

TESTED BY DWJ PLOTTED BY DWJ "E.T.L. Identification No.1967." COMPUTED BY JWM CHECKED BY JWM ISSUED Nov.24, 1928.

APPROVED Wilbur F. Rood ENGINEER IN CHARGE OF PHOTOMETRY

J. F. Morray IN CHARGE OF TEST

TO SPECIFY

The architect should write into his own specification, data tabulated below under headings "Mould No." and "Description," thus, "Macbeth Seville 5340 Cremax." The brown, printed decoration with color permanently fired in the glass as shown in third illustration may be applied to all sizes in either Monax or Cremax glass by adding J-103 and glass desired after the mould number. For example, "Macbeth Seville 5297 J-103 Monax 14 in." The banded decoration shown in lower illustration may be applied to all sizes in blue, green, brown or gray by adding D-56 and color desired, as, "Macbeth Seville 5296 D-56 Cremax Brown 12x6 in."

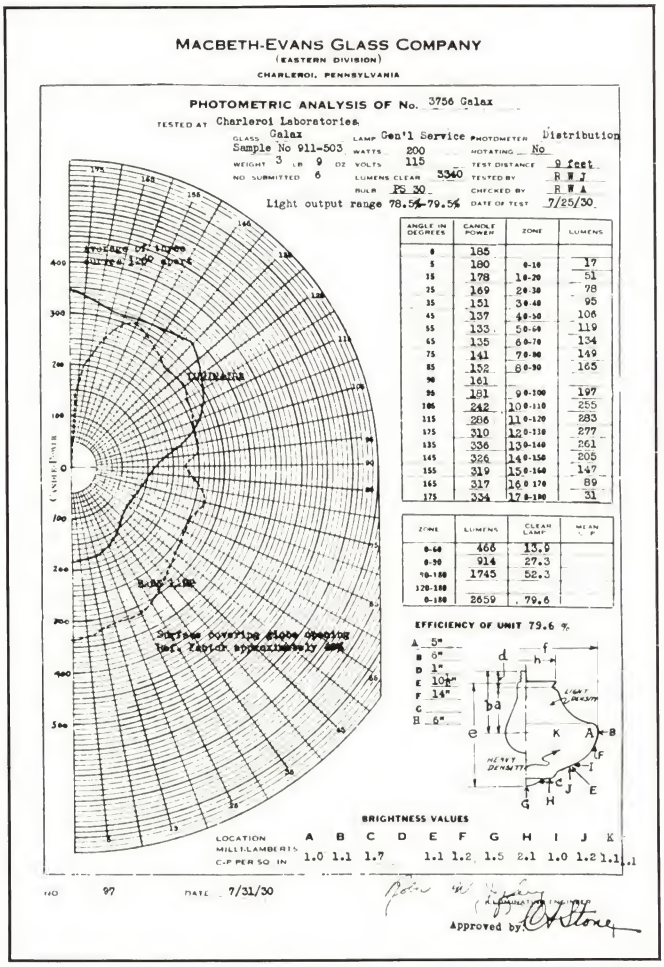
Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5294A	Monax or Cremax	8½	5 9/16	4	1½	100
5340	Monax or Cremax	9	6½	4	1½	100
5295	Monax or Cremax	10	6½	4	1½	100
5296	Monax or Cremax	12	7¾	6	2	150
5296A	Monax or Cremax	12	7¾	4	1½	150
5297	Monax or Cremax	14	9	6	2	200
5298	Monax or Cremax	16	10¼	6	2	300
5645A	Monax or Cremax	18	11 3/8	6	3	500
5666	Monax or Cremax	20	12¾	8	3	750
5294A	J-103 Monax or Cremax	8½	5 9/16	4	1½	100
5340	J-103 Monax or Cremax	9	6½	4	1½	100
5295	J-103 Monax or Cremax	10	6½	4	1½	100
5296	J-103 Monax or Cremax	12	7¾	6	2	150
5296A	J-103 Monax or Cremax	12	7¾	4	1½	150
5297	J-103 Monax or Cremax	14	9	6	2	200
5298	J-103 Monax or Cremax	16	10¼	6	2	300
5645A	J-103 Monax or Cremax	18	11 3/8	6	3	500
5666	J-103 Monax or Cremax	20	12¾	8	3	750
5294A	D-56 Monax or Cremax	8½	5 9/16	4	1½	100
5340	D-56 Monax or Cremax	9	6½	4	1½	100
5295	D-56 Monax or Cremax	10	6½	4	1½	100
5296	D-56 Monax or Cremax	12	7¾	6	2	150
5296A	D-56 Monax or Cremax	12	7¾	4	1½	150
5297	D-56 Monax or Cremax	14	9	6	2	200
5298	D-56 Monax or Cremax	16	10¼	6	2	300
5645A	D-56 Monax or Cremax	18	11 3/8	6	3	500
5666	D-56 Monax or Cremax	20	12¾	8	3	750

*Lamp position—Represents the distance in inches of lamp contact above plane of fitter screws in fixture.

"The HALLSTADT"

SEMI-INDIRECT

THE Semi-Indirect Hallstadt, manufactured from Macbeth Galax Glass, was designed to utilize most effectively the upward component of light reflected from the dense white reflecting lower portion of the globe. It is freely transmitted through the light opacity slightly diffusing upper section of the globe, its freedom unhampered by restricting angles. Below is shown a reproduction of testing laboratories' report on 3756 Galax. The results obtained are representative for all sizes.



MACBETH-EVANS GLASS COMPANY
(EASTERN DIVISION)
CHARLEROI, PENNSYLVANIA

PHOTOMETRIC ANALYSIS OF No. 3756 Galax

TESTED AT Charleroi Laboratories

GLASS Galax — LAMP Gen'l Service — PHOTOMETER Distribution
Sample No 911-503 — WATTS 200 — ROTATING No
WEIGHT 3 LB 9 OZ — VOLTS 115 — TEST DISTANCE 9 feet
NO. SUBMITTED 6 — LUMENS CLEAR 3340 — TESTED BY R W J
BULB PS 30 — CHECKED BY R W A
Light output range 78.5% - 79.5% — DATE OF TEST 7/25/30

ANGLE IN DEGREES	CANDLE POWER	ZONE	LUMENS
0	185		
5	180	0-10	17
15	178	10-20	51
25	169	20-30	78
35	151	30-40	95
45	137	40-50	106
55	133	50-60	119
65	135	60-70	134
75	141	70-80	149
85	152	80-90	165
90	161		
95	181	90-100	197
105	242	100-110	255
115	286	110-120	283
125	310	120-130	277
135	336	130-140	261
145	326	140-150	205
155	319	150-160	147
165	317	160-170	89
175	334	170-180	31

ZONE	LUMENS	CLEAR LAMP	MEAN C.P.
0-60	466	13.9	
0-90	914	27.3	
90-180	1745	52.3	
120-180			
0-180	2659	79.6	

EFFICIENCY OF UNIT 79.6 %

A 5" B 6" D 1" E 10½" F 14" C H 6"

BRIGHTNESS VALUES

LOCATION	A	B	C	D	E	F	G	H	I	J	K
MILLI-LAMBERTS C.P. PER SQ. IN.	1.0	1.1	1.7		1.1	1.2	1.5	2.1	1.0	1.2	1.1

NO 97 DATE 7/31/30

Approved by

TO SPECIFY

The architect should write into his own specification the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Semi-Indirect 4309A Galax." The light-etched decoration shown in the lower illustration may be obtained in brown, or gray, fired colors in all sizes by adding K-325 and the color desired, after the mould number. For example, "3756 K-325 Galax Gray 14 in."

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
4385	Galax	10	7⅝	4	½	100
4309	Galax	12	9½	6	¼	150
4309A	Galax	12	9½	4	¼	150
3756	Galax	14	10	6	1	200
4386	Galax	16	12	6	1	300
5667	Galax	18	13⅛	8	zero	500
4385	K-325 Galax	10	7⅝	4	½	100
4309	K-325 Galax	12	9½	6	¼	150
4309A	K-325 Galax	12	9½	4	¼	150
3756	K-325 Galax	14	10	6	1	200
4386	K-325 Galax	16	12	6	1	300
5667	K-325 Galax	18	13½	8	zero	500

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture. Zero indicates the lamp contact is in the same plane as the fitter screws in the fixture

See page 12 for Monax and Cremax.

"The ROMANESQUE"

SEMI-INDIRECT

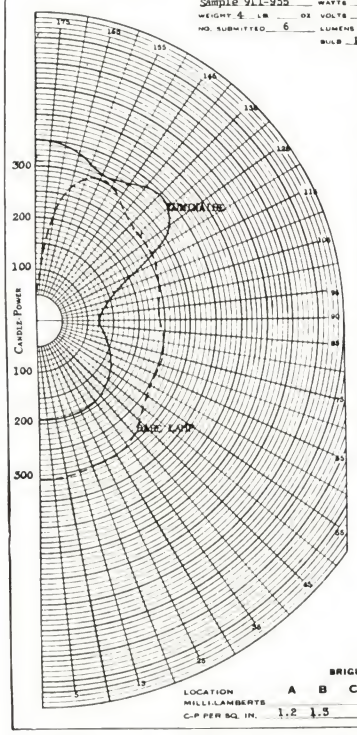
THE Romanesque, a new shape manufactured from Macbeth Galax, (semi-indirect) glass was designed to utilize most effectively the upward component of light reflected from the dense white reflecting lower portion of the globe. The upper section from the shoulder to the fitter opening of the globe is of light opacity and slightly diffusing in character. Below is shown a reproduction of testing laboratory report on 12011 Galax. The results obtained from this test are representative for all sizes. NOTE—These globes in all sizes may be obtained in Monax glass, plain and decorated.

MACBETH EVANS GLASS COMPANY
(EASTERN DIVISION)
CHARLEROI, PENNSYLVANIA

PHOTOMETRIC ANALYSIS OF No. 12011 Galax

TESTED AT Charleroi Laboratories

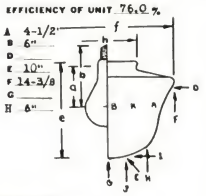
GLASS Galax LAMP Clear PHOTOMETER Distribution
Sample 911-955 WATTS 200 ROTATING No
WEIGHT 4 LB OZ VOLTS 115 TEST DISTANCE 9 feet
NO. SUBMITTED 6 LUMENS CLEAR 3540 TESTED BY R W A
BULB PS 30 CHECKED BY H B A
DATE OF TEST 7/25/31



ANGLE IN DEGREES	CANDLE POWER	ZONE	LUMENS
0	195		
5	194	0-10	19
15	194	1 0-20	65
25	194	2 0-30	90
35	189	3 0-40	119
45	181	4 0-50	140
55	172	5 0-60	154
65	153	6 0-70	152
75	140	7 0-80	148
85	125	8 0-90	136
90	121		
95	123	9 0-100	134
105	145	10 0-110	154
115	214	11 0-120	213
125	317	12 0-130	285
135	341	13 0-140	264
145	319	14 0-150	200
155	309	15 0-160	143
165	336	16 0-170	95
175	348	17 0-180	53

ZONE	LUMENS	% CLEAR LAMP	MEAN C P
0-60	577	17.3	
0-90	1013	30.5	
90-180	1521	45.5	
120-180			
0-180	2534	76.0	

EFFICIENCY OF UNIT 76.0 %



BRIGHTNESS VALUES

LOCATION	A	B	C	D	E	F	G	H	I	J	K
MILLI-LAMBERTS C-P PER SQ. IN.	1.2	1.5		1.0	1.8	1.8	1.9	1.9	1.5	1.9	1.3

NO. 203 DATE 7 27 31

R W Nelson
ILLUMINATING ENGINEER

Approved by C A Stone

TO SPECIFY

The architect should write into his own specification, the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Semi-Indirect Romanesque 12011 Galax." The light-etched decoration shown in the lower illustration may be obtained in brown, or gray, fired colors in all sizes by adding K-330 and the color desired after the mould number, as, "12013 K-330 Galax Brown 18 in." If required in Monax, white diffusing glass, substitute the word Monax for Galax.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam. in.	*Lamp position, above, in.	Recommended wattage
12009	Galax or Monax	10	7 7/16	4	1 1/2	100
12010	Galax or Monax	12	8 3/4	6	1 1/2	150
12011	Galax or Monax	14	10	6	1 1/2	200
12012	Galax or Monax	16	11 3/8	6	2	300
12013	Galax or Monax	18	12 1/2	8	2	500
12009	K-330 Galax or Monax	10	7 7/16	4	1 1/2	100
12010	K-330 Galax or Monax	12	8 3/4	6	1 1/2	150
12011	K-330 Galax or Monax	14	10	6	1 1/2	200
12012	K-330 Galax or Monax	16	11 3/8	6	2	300
12013	K-330 Galax or Monax	18	12 1/2	8	2	500

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

"The RAVENNA"

THE Ravenna, in a complete range of sizes, may be obtained in Monax glass, plain or decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 5198 Monax, tested according to the I.E.S. specifications. The results obtained from this test are representative for all sizes. Additional data will be furnished upon request.

ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No. 47249 ORDER No. 41095-S PLATE No. 21899

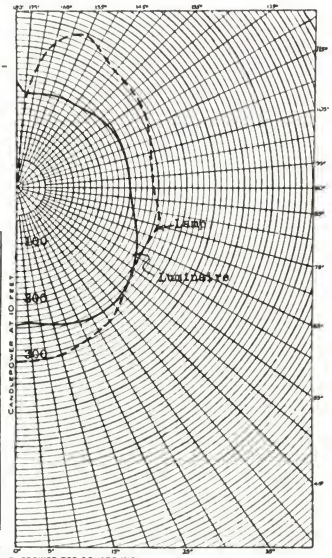
CANDLEPOWER DISTRIBUTION
NO. 5198 MACBETH MONAX GLOBE*

Rendered to Macbeth Evans Glass Company

No. Submitted - Six - Light output range 82 - 83. Average 82.5 percent.
Lamp - 200 Watts; Gas-filled; 3280 lumens; Bulb PS30 Clear; Medium base; Filament C-9; General service; 115 Volts.
Holder - None submitted - Surface covering globe opening - reflection factor 40%.
Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE
a 4 in.
b 6
c
d 2
e 11-1/8
f 13-3/4
h 6

WEIGHT OF GLASS 3 lb. 12 oz.
White diffusing glass.



LUMINAIRE DISTRIBUTION DATA
Mean Vertical

MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° Ib	183		90° mbs	200	
175°	165	16	85°	201	219
165°	171	48	75°	216	229
155°	178	82	65°	233	231
145°	179	112	55°	252	226
135°	187	145	45°	267	207
125°	195	175	35°	271	170
115°	197	195	25°	266	122
105°	200	212	15°	252	71
95°	200	218	5°	241	23
			0° Axial	246	

LIGHT FLUX VALUES

ZONE	LUMENS		PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
	LAMP	LUMINAIRE		
0° 60°	877	819	25	
0° 90°	1665	1498	46	82.5
90° 180°	1615	1203	36.5	
0° 180°	3280	2701	82.5	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K
ML	1000	1200	940	1200	1150	680	980	1000	1050	820	1100
CP PER SQ IN.	2.1	2.5	1.9	2.5	2.4	1.4	2.0	2.1	2.2	1.7	2.3

TESTED BY [illegible] PLOTTED BY [illegible] COMPUTED BY [illegible] CHECKED BY [illegible] ISSUED Feb. 15, 1929
*E.T.L. Identification No. 2074.
APPROVED BY William F. Little ENGINEER IN CHARGE OF PHOTOMETRY
J. Morray IN CHARGE OF TEST

TO SPECIFY

The architect should write into his own specification, the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Ravenna 5179 Monax 8 in." The brown, light-etched decoration shown in the lower illustration, with color permanently fired on the glass, may be applied to all sizes by adding the number K-314 after the mould number. For example, "Macbeth Ravenna 5179 K-314 Monax 8 in."

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5179	Monax	8	6	4	1 1/2	100
5881	Monax	9	6 3/4	4	1 1/2	100
5196	Monax	10	7 1/2	6	2	100
5196A	Monax	10	7 1/2	4	1 1/2	100
5197	Monax	12	9 1/2	6	2	150
5197A	Monax	12	9 1/2	4	1 1/2	150
5198	Monax	14	11 1/8	6	2	200
5199	Monax	16	12 3/4	6	2	300
12000	Monax	18	14 1/4	8	2	500
5179	K-314 Monax	8	6	4	1 1/2	100
5881	K-314 Monax	9	6 3/4	4	1 1/2	100
5196	K-314 Monax	10	7 1/2	6	2	100
5196A	K-314 Monax	10	7 1/2	4	1 1/2	100
5197	K-314 Monax	12	9 1/2	6	2	150
5197A	K-314 Monax	12	9 1/2	4	1 1/2	150
5198	K-314 Monax	14	11 1/8	6	2	200
5199	K-314 Monax	16	12 3/4	6	2	300
12000	K-314 Monax	18	14 1/4	8	2	500

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

"The HALLSTADT"

THE Hallstadt, in a complete range of sizes, may be obtained in Monax or Cremax glass, plain or decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 3756 Monax, tested according to I.E.S. specifications. The results obtained from this test are representative for all sizes in Monax glass. Additional data will be furnished upon request.

ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No. 47046 ORDER No. 40367-S PLATE No. 21607

CANDLEPOWER DISTRIBUTION
NO. 3756 MACBETH MONAX GLOBE*

Rendered to Macbeth-Evans Glass Company

Number Submitted - Six - Light output range 83-86. Average 84.5 percent.

Lamp - 200-Watts; Gasfilled; 3280 Lumens; Bulb PS30 Clear; Medium base; Filament C9; General Service; 115 Volts.

Holder - None submitted - Surface covering globe opening; refl. fac. 40 percent.

Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE
a 4 in.
b 6
c 2
d 10-1/4
e 13-3/4
h 6

WEIGHT OF GLASS 3 lbs. 6 oz. (54 oz.)

White Diffusing Glass

LUMINAIRE DISTRIBUTION DATA

Mean Vertical

MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° Zen.	200		90° Hor.	201	
173°	200	17	85°	207	226
168°	200	57	75°	212	224
158°	200	93	65°	223	221
148°	200	126	55°	234	210
139°	200	155	45°	261	202
129°	197	177	35°	290	182
119°	189	188	25°	312	144
109°	190	201	15°	330	33
99°	200	218	5°	330	31
			0° Nadir	330	

LIGHT FLUX VALUES

ZONE	LUMENS LAMP	LUMENS LUMINAIRE	PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
0°-90°	899	862	26	
0°-90°	1688	1533	47	84.5
90°-180°	1595	1232	37.5	
0°-180°	3283	2765	84.5	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K	E1
ML	1100	1300	1150	1800	1300	960	1150	1250	1200	1250	1200	1400
CP PER SQ IN	2.3	2.7	2.4	3.7	2.7	2.0	2.4	2.6	2.5	2.6	2.5	2.9

*E.T.L. Identification No. 1957.

TESTED BY C. W. PLOTTED BY C. W. COMPUTED BY C. W. CHECKED BY M. M. ISSUED NOV. 22, 1928.

APPROVED BY William F. Little, ENGINEER IN CHARGE OF PHOTOMETRY

J. Morroz, IN CHARGE OF TEST

TO SPECIFY

The architect should write into his own specification, the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Hallstadt 4309 Monax." The brown, printed decoration with color permanently fired on the glass as shown in the bottom illustration may be applied to all sizes by adding the number J-95 after the mould number. For example, "Macbeth Hallstadt 3756 J-95 Cremax 14 in."

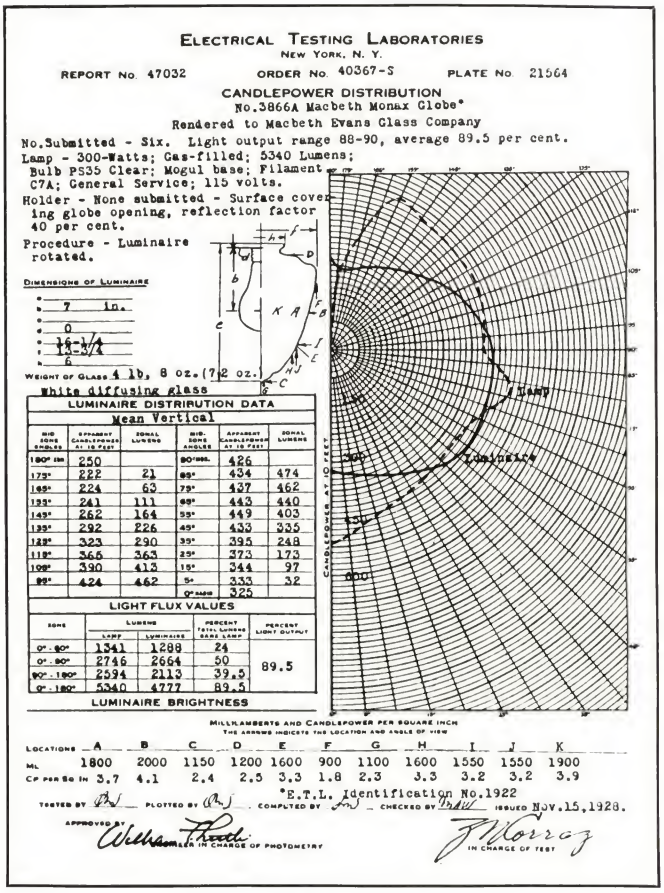
Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
4385	Monax or Cremax	10	7⅝	4	1½	100
4309	Monax or Cremax	12	9½	6	2	150
4309A	Monax or Cremax	12	9½	4	1½	150
3756	Monax or Cremax	14	10	6	2	200
4386	Monax or Cremax	16	12	6	2	300
5667	Monax or Cremax	18	13½	8	3	500
4385	J-95 Monax or Cremax	10	7⅝	4	1½	100
4309	J-95 Monax or Cremax	12	9½	6	2	150
4309A	J-95 Monax or Cremax	12	9½	4	1½	150
3756	J-95 Monax or Cremax	14	10	6	2	200
4386	J-95 Monax or Cremax	16	12	6	2	300
5667	J-95 Monax or Cremax	18	13½	8	3	500

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

See page 9 for Semi-Indirect Galax.

"The ACORN"

THE Acorn, in a complete range of sizes, may be obtained in plain or decorated Monax glass. Below is shown a reproduction of Electrical Testing Laboratories' report on 3866A Monax, tested according to I.E.S. specifications. The results obtained from this test are representative for all sizes. Additional data will be furnished upon request.



ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No. 47032 ORDER No. 40367-S PLATE No. 21564

CANDLEPOWER DISTRIBUTION
No.3866A Macbeth Monax Globe*
Rendered to Macbeth Evans Glass Company

No.Submitted - Six. Light output range 88-90, average 89.5 per cent.
Lamp - 300-Watts; Gas-filled; 5340 Lumens;
Bulb PS35 Clear; Mogul base; Filament C7A; General Service; 115 volts.
Holder - None submitted - Surface covering globe opening, reflection factor 40 per cent.
Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE
A 7 in.
B 0
C 12-3/4
G

WEIGHT OF GLASS 4 lb. 8 oz. (72 oz.)
White diffusing glass

LUMINAIRE DISTRIBUTION DATA
Mean Vertical

MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° Up	250		90° Horiz.	426	
175°	222	21	85°	434	474
165°	224	63	75°	437	462
155°	241	111	65°	443	440
145°	262	164	55°	449	403
135°	292	226	45°	433	335
125°	323	290	35°	395	248
115°	365	363	25°	373	173
105°	390	413	15°	344	97
95°	424	462	5°	333	32
			0° Nadir	325	

LIGHT FLUX VALUES

ZONE	LUMENS LAMP	LUMENS LUMINAIRE	PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
0° - 90°	1341	1288	24	
0° - 90°	2746	2664	50	89.5
90° - 180°	2594	2113	39.5	
0° - 180°	5340	4777	89.5	

LUMINAIRE BRIGHTNESS
MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K
ML	1800	2000	1150	1200	1600	900	1100	1600	1550	1550	1900
CP PER SQ IN	3.7	4.1	2.4	2.5	3.3	1.8	2.3	3.3	3.2	3.2	3.9

*E.T.L. Identification No.1922

TESTED BY [illegible] PLOTTED BY [illegible] COMPLETED BY [illegible] CHECKED BY [illegible] ISSUED Nov.15,1928.

APPROVED BY [illegible] ENGINEER IN CHARGE OF PHOTOMETRY

[illegible] IN CHARGE OF TEST

TO SPECIFY

The architect should write into his own specification, the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Acorn 3869 Monax." The light-etched decorations with colors permanently fired on the glass may be applied to all sizes. For the center decoration add K-181 after the mould number. For example, "Macbeth Acorn 3870 K-181 Monax Gray." K-181 may be ordered in either gray or brown. For the bottom decoration which is furnished in brown or gray add K-307. For example, "Macbeth Acorn 3866A K-307 Monax Brown."

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position	Recommended wattage
3870	Monax	8	9⅝	4	zero	100
3864	Monax	10	11⅞	6	zero	150
3869	Monax	12	14	6	zero	200
3866A	Monax	14	16½	6	zero	300
3870	K-181 Monax	8	9⅝	4	zero	100
3864	K-181 Monax	10	11⅞	6	zero	150
3869	K-181 Monax	12	14	6	zero	200
3866A	K-181 Monax	14	16½	6	zero	300
3870	K-307 Monax	8	9⅝	4	zero	100
3864	K-307 Monax	10	11⅞	6	zero	150
3869	K-307 Monax	12	14	6	zero	200
3866A	K-307 Monax	14	16½	6	zero	300

*Lamp position—Zero indicates that the lamp contact is in the same plane as the fitter screws of the fixture.

"The GOTHIC"

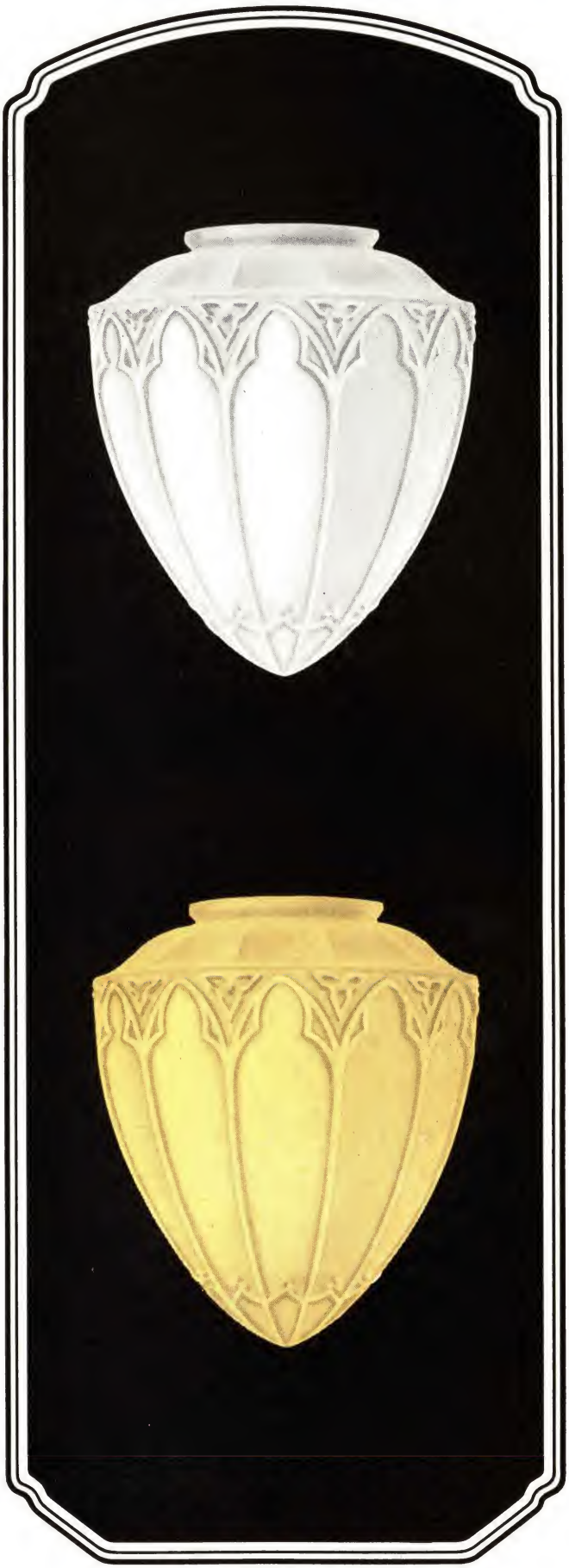
THE Gothic, especially suitable for church lighting, is available in a complete range of sizes in both Monax and Cremax glass.

TO SPECIFY

The architect should write into his own specification, the data tabulated under the headings "Mould No." and "Description," thus, "Macbeth Gothic 3804 Monax" (or Cremax if the more colorful glass is desired).

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
3801	Monax	6	6⅝	3¼	½	60
3802	Monax	8	8⅞	4	zero	100
3803	Monax	10	11¼	5	zero	150
3804	Monax	12	13½	6	zero	200
3805A	Monax	14	15½	6	zero	300
3801	Cremax	6	6⅝	3¼	½	60
3802	Cremax	8	8⅞	4	zero	100
3803	Cremax	10	11¼	5	zero	150
3804	Cremax	12	13½	6	zero	200
3805A	Cremax	14	15½	6	zero	300

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture. Zero indicates same plane as the fitter screws.



"The FLORENTINE"

THE Florentine in a complete range of sizes may be obtained in Monax glass, plain and decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 5130 Monax, tested according to the I.E.S. specifications. Results obtained from this test are representative for all sizes in Monax glass. Additional data will be furnished upon request.

ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No 47042 ORDER No 40367-3 PLATE No 21594

CANDLEPOWER DISTRIBUTION
No.5130 Macbeth Monax Globe*

Rendered to Macbeth Evans Glass Company

No.Submitted - Six. Light output range 82-83. Average 82.5 percent.

Lamp - 200-Watts; Gas-filled; 3280 Lumens; Bulb PS30 Clear; Medium base; Filament C-9; General service;115 volts

Holder - None submitted - surface covering globe opening - reflection factor 40percent.

Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE

a	4 in.
b	6
c	
d	2
e	9-1/4
f	14
h	6

WEIGHT OF GLASS 3 lb. 4 oz. 52 oz.

White diffusing glass

LUMINAIRE DISTRIBUTION DATA

Mean Vertical

MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° to 170°	198		90° Hor.	184	
175°	182	17	85°	188	205
165°	194	55	75°	197	209
155°	194	90	65°	210	208
145°	197	124	55°	244	219
135°	197	152	45°	275	213
125°	197	177	35°	298	187
115°	188	187	25°	317	147
105°	184	195	15°	323	91
95°	182	198	5°	324	31
			0° Nadir	320	

LIGHT FLUX VALUES

ZONE	LUMENS LAMP	LUMENS LUMINAIRE	PERCENT TOTAL LUMENS EACH LAMP	PERCENT LIGHT OUTPUT
0° - 60°	899	888	27	82.5
0° - 90°	1688	1510	46	
90° - 180°	1595	1195	36	
0° - 180°	3283	2705	82	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K
ML	1000	1200	1400	1900	1600	960	1650	1350	1350	1500	1100
CP PER SQ IN	2.1	2.5	2.9	3.9	3.3	2.0	3.4	2.8	2.8	3.1	2.3

*E.T.L. Identification No.1947

TESTED BY OR PLOTTED BY OR COMPUTED BY OR CHECKED BY MAW ISSUED Nov. 20th, 1928.

APPROVED BY William Stark
ENGINEER IN CHARGE OF PHOTOMETRY

F. H. Corraz
IN CHARGE OF TEST

TO SPECIFY

The architect should write into his own specification, data tabulated below under headings "Mould No." and "Description," thus, "Macbeth Florentine 5122 Monax." The brown, printed decoration with color permanently fired on glass as shown in bottom illustration may be applied to all sizes by adding J-104 after mould number. For example, "Macbeth Florentine 5123A J-104 Monax 12x4 inches."

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5122	Monax	9	5 7/8	4	1 1/2	100
5123	Monax	12	7 5/8	6	2	150
5123A	Monax	12	7 5/8	4	1 1/2	150
5130	Monax	14	9 5/16	6	2	200
5133	Monax	16	10 1/4	6	2	300
5138	Monax	18	11 1/2	8	3	500
5122	J-104 Monax	9	5 7/8	4	1 1/2	100
5123	J-104 Monax	12	7 5/8	6	2	150
5123A	J-104 Monax	12	7 5/8	4	1 1/2	150
5130	J-104 Monax	14	9 5/16	6	2	200
5133	J-104 Monax	16	10 1/4	6	2	300
5138	J-104 Monax	18	11 1/2	8	3	500

*Lamp position—Represents the distance in inches of lamp contact above plane of fitter screws in fixture.

MODERN LANTERNS AND BOWLS

A NEW Macbeth offering is Topaz glass. The two lanterns illustrated are manufactured from Topaz with a satin-etched background. The decorative treatment is transparent Topaz. These lanterns contribute an effective bit of decorative lighting to halls or sun rooms. Commercially they may be used to obtain interesting effects for tea rooms and gift shops or other installations requiring moderately colorful, yet decorative illumination.

The square ceiling bowl of Lumite (clear) glass, satin-etched outside, represents a type of lighting equipment used quite extensively in modernistic installations. These bowls may be used as single units or grouped in various combinations. The metal parts are obtainable from manufacturers of lighting fixtures.

TO SPECIFY

The architect should write into his own specification, the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth No. 5693 S7 Topaz" indicates the lantern illustrated at the top of the panel; "Macbeth No. 5694 S6 Topaz" indicates the lantern in the center illustration; "12143 Lumite Satin" describes the 12¾" bowl shown at the bottom of the panel.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5693	S-7 Topaz	7⅞	12	4	½	150
5694	S-6 Topaz	9½	11⅜	4	1	100
12142	Lumite Satin	10¾	3¾			100
12143	Lumite Satin	12¾	4½			150

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

"The DIJON"

THE Dijon, a lantern of interesting design, may be obtained in three sizes. Three distinctive decorations on Cremax glass may be applied to all sizes. The colors are permanently fired on the glass.

TO SPECIFY

The architect should write into his own specification, the data under the headings "Mould No." and "Description" for the particular globe desired. This will automatically assure the selected size and decoration. For example, "Macbeth Dijon 4454 K-291 Cremax" indicates a lantern 7½x10⅝x4 in. decorated as shown in the top illustration. "Macbeth Dijon 4470 K-284 Cremax" indicates a lantern 10x13⅞x6 in. with the decoration shown in the center illustration and "Macbeth Dijon 4477 K-108 Cremax" indicates a lantern 12x16½x6 in. with the Gothic decoration shown in the bottom illustration. All decorations are lightly etched on the glass.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position	Recommended wattage
4454	K-291 Cremax	7½	10⅜	4	zero	100
4470	K-291 Cremax	10	13⅞	6	zero	200
4477	K-291 Cremax	12	16½	6	zero	300
4454	K-284 Cremax	7½	10⅜	4	zero	100
4470	K-284 Cremax	10	13⅞	6	zero	200
4477	K-284 Cremax	12	16½	6	zero	300
4454	K-108 Cremax	7½	10⅜	4	zero	100
4470	K-108 Cremax	10	13⅞	6	zero	200
4477	K-108 Cremax	12	16½	6	zero	300

*Lamp position—Zero indicates that the lamp contact is in the same plane as the fitter screws of the fixture.

"The TERRELL" (ORIGINAL)

Etched and Decorated in Colors

DISTINCTLY "moderne" design by Miss Maude P. Terrell, erstwhile dramatic artist whose success in selling artistic lighting effects has been definitely established in metropolitan New York. This globe in Cremax glass is used in lighting the American Women's Association Building recently completed in New York.

In the table below K-308 indicates a lightly-etched and permanently-fired brown decoration on Cremax globes and D-121, lines of blue, green, brown, or black, fired colors around the steps of either Monax or Cremax globes. The first and second illustrations represent plain Cremax and Monax globes.

TO SPECIFY

The architect should write into his own specification, the data under the headings "Mould No." and "Description" for the particular globe desired. This will automatically assure the selected style, size, color, glass and decoration. For example "Macbeth Terrell 5651D-121 Cremax Black" will designate a Cremax globe, 14 in. in diameter, 10 3/16 in. in depth with a fitter 6 in. in diameter, the globe decorated with black lines permanently fired on the glass.

NOTE—Macbeth-Evans Glass Company is licensed by M. P. Terrell to manufacture and sell "The Terrell Globes" under U. S. Patent 77794.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5649	Cremax or Monax	8	6 1/16	4	1 1/2	100
5652	Cremax or Monax	10	7 5/8	4	1 1/2	100
5653	Cremax or Monax	12	9	6	2	150
5653A	Cremax or Monax	12	9	4	1 1/2	150
5651	Cremax or Monax	14	10 3/16	6	2	200
5654	Cremax or Monax	16	11 1/2	6	2	300
5649	K-308 Cremax	8	6 1/16	4	1 1/2	100
5652	K-308 Cremax	10	7 5/8	4	1 1/2	100
5653	K-308 Cremax	12	9	6	2	150
5653A	K-308 Cremax	12	9	4	1 1/2	150
5651	K-308 Cremax	14	10 3/16	6	2	200
5654	K-308 Cremax	16	11 1/2	6	2	300
5649	D-121 Cremax or Monax	8	6 1/16	4	1 1/2	100
5652	D-121 Cremax or Monax	10	7 5/8	4	1 1/2	100
5653	D-121 Cremax or Monax	12	9	6	2	150
5653A	D-121 Cremax or Monax	12	9	4	1 1/2	150
5651	D-121 Cremax or Monax	14	10 3/16	6	2	200
5654	D-121 Cremax or Monax	16	11 1/2	6	2	300

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

MODERNISTIC SHADES AND CUBE GLOBES

THE shades at the top of the panel may be used effectively for auxiliary lighting with "The Modernistic" globes illustrated on page six. Conservative in design they are also suitable for any lighting installation of modernistic influence, which requires bracket lights or central luminaires with upright shades.

The Monax shades are lightly toned with gray and the Cremax with brown.

The third illustration from the top 2306 D-133, represents the French influence in modernistic lighting. It is made from Cremax glass decorated with a colorful floral spray. The shade can be used on individual brackets or grouped effectively on a central luminaire which has been fitted with an upright holder, similar in type to the "gallery" of an oil lamp.

The next three illustrations represent a five-step shade. They may be obtained in plain Monax or Cremax glass and with decorations to match the "Terrell" globes on page eighteen. D-121 indicates a lined decoration applied to the steps of the shades in blue, green, brown or black on Monax or Cremax glass. K-308 indicates a modernistic brown decoration and is standard in Cremax glass only. All colors applied to the glassware illustrated on this page are permanently fired on the glass.

The bottom illustration represents a square globe made in a range of sizes from Monax glass. These may be used where lighting effects of geometric design are desirable.

TO SPECIFY

The architect should write into his own specification, the data under the headings "Mould No." and "Description" for the particular glass desired. This will automatically assure the selected size, color, glass and decoration. For example, "Macbeth 2324 D-144 Cremax" will designate the shade in Cremax glass with brown tone as illustrated at the top of panel. "Macbeth 2306 D-133 Cremax" will designate the shade illustrated third from the top of the panel. "Macbeth 2266 D-121 Monax Black" will designate a five-step shade in Monax glass with black lines around the steps. "Macbeth 12089 Monax" will designate a 7-inch cube globe with a 4-inch fitter.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	Outside diam. bottom opening in.	Recommended wattage
2324	D-144 Cremax	$4\frac{3}{16}$	$5\frac{7}{8}$		$1\frac{3}{4}$	40
2324	D-144 Monax	$4\frac{3}{16}$	$5\frac{7}{8}$		$1\frac{3}{4}$	40
2306	D-133 Cremax	$4\frac{7}{8}$	$6\frac{1}{16}$		$1\frac{3}{4}$	40
2266	Monax or Cremax	4	$4\frac{1}{4}$	$2\frac{1}{4}$		40
2266	D-121 Monax or Cremax	4	$4\frac{1}{4}$	$2\frac{1}{4}$		40
2266	K-308 Cremax	4	$4\frac{1}{4}$	$2\frac{1}{4}$		40
12087	Monax	$4\frac{3}{8}$	$4\frac{3}{8}$	$3\frac{1}{4}$		40
2347	Monax	6	6	$3\frac{1}{4}$		50
12089	Monax	7	6	4		60
12088	Monax	8	8	4		100

Romanesque Stalactites and Shallow Bowls in CREMAX GLASS

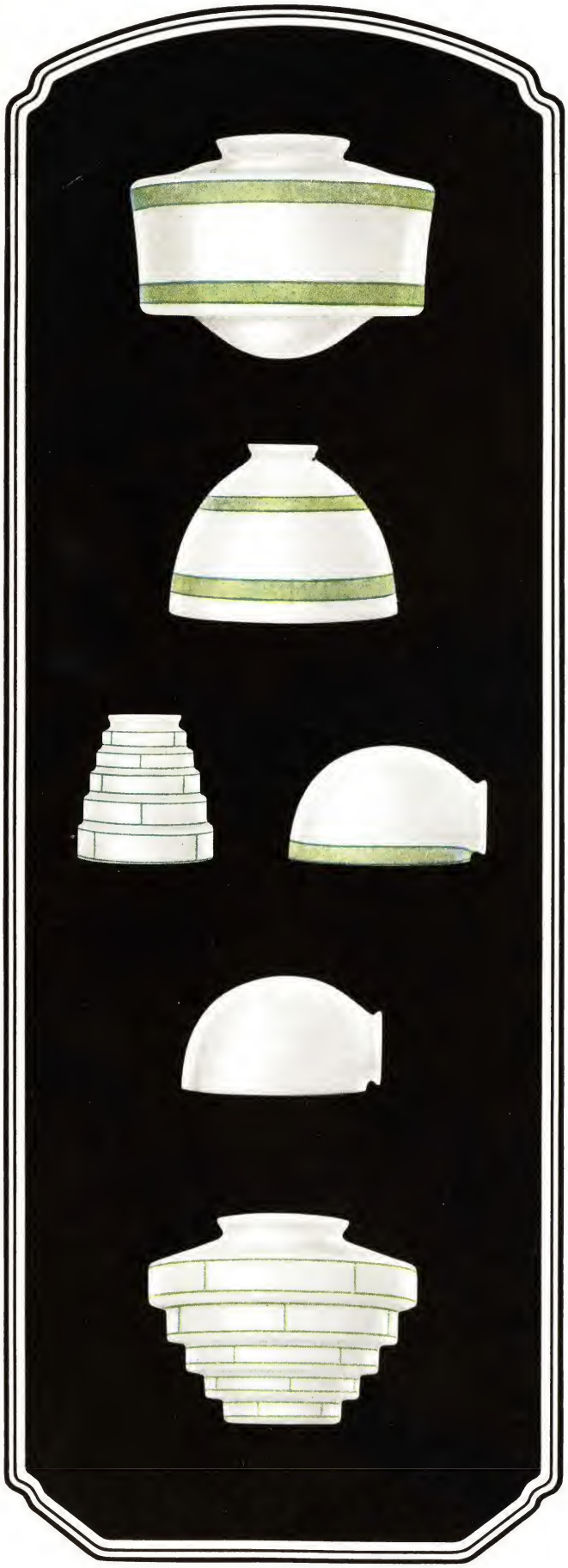
ROMANESQUE stalactites in a variety of sizes are especially suitable for church lighting. They are regularly supplied only in Cremax glass.

In the table below you will note that the shallow bowls may be secured in plain or iridescent Cremax; D-121 black, fired-color lines; K-300 decoration, a light etching in black with touches of red, fired colors; K-301 light-etched design in brown, fired color. The bowls will be drilled with a ½-inch hole in the center for supporting stem unless other drilling is specified.

TO SPECIFY

The architect should write into his own specification, the data under the headings "Mould No." and "Description" for the particular glass desired. This will automatically assure the selected style, size, color, glass and decoration. For example, "Macbeth Romanesque Stalactite 4683 Cremax" will designate a Cremax stalactite with 6-in. diameter, 11-in. depth, with a fitter diameter of 6 in., or "Macbeth Shallow Bowl 5013 K-300 Cremax" will designate a Cremax bowl 14 in. in diameter, 4 1/16 in. in depth, with K-300 light-etched decoration and ⅛-in. hole drilled in the center of the bottom.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	Recommended wattage
2346	Cremax Stalactite	4	6	4	60
4468	Cremax Stalactite	4	8	4	100
4682	Cremax Stalactite	5	9 1/2	5	100
4683	Cremax Stalactite	6	11	6	150
4686	Cremax Stalactite	7	14	7	200
4684	Cremax Stalactite	8	16	8	300
4685	Cremax Stalactite	9	14	9	200
4691	Cremax Stalactite	9	18	9	500
4695	Cremax Stalactite	10	20	10	750
9007	Cremax Bowl	8	3 1/8		40
4999	Cremax Bowl	10	3 1/8		100
5012	Cremax Bowl	12	3 3/4		100
5013	Cremax Bowl	14	4 1/16		150
5014	Cremax Bowl	16	5		200
9007	Cremax, Iridescent Bowl	8	3 1/8		40
4999	Cremax, Iridescent Bowl	10	3 1/8		100
5012	Cremax, Iridescent Bowl	12	3 3/4		100
5013	Cremax, Iridescent Bowl	14	4 1/16		150
5014	Cremax, Iridescent Bowl	16	5		200
9007	D-121 Cremax Bowl	8	3 1/8		40
4999	D-121 Cremax Bowl	10	3 1/8		100
5012	D-121 Cremax Bowl	12	3 3/4		100
5013	D-121 Cremax Bowl	14	4 1/16		150
5014	D-121 Cremax Bowl	16	5		200
9007	K-300 Cremax Bowl	8	3 1/8		40
4999	K-300 Cremax Bowl	10	3 1/8		100
5012	K-300 Cremax Bowl	12	3 3/4		100
5013	K-300 Cremax Bowl	14	4 1/16		150
5014	K-300 Cremax Bowl	16	5		200
9007	K-301 Cremax Bowl	8	3 1/8		40
4999	K-301 Cremax Bowl	10	3 1/8		100
5012	K-301 Cremax Bowl	12	3 3/4		100
5013	K-301 Cremax Bowl	14	4 1/16		150
5014	K-301 Cremax Bowl	16	5		200



DECORATIVE MONAX GLOBES and SHADES for Kitchen and Bathroom

THE first illustration represents No. 5257 Monax globe with D-56 green-banded decoration. Immediately below is illustrated No. 1623 A D-56 seven-inch open shade to match. The right center illustration represents No. 4221 D-56 bracket shade. The same shade in plain Monax glass is shown just below and can also be furnished in Cremax glass. The decorated glassware is standard in green, but can be supplied in other colors when required. The illustration at left center represents No. 2266 D-143 Monax shade with decoration in green-tiled effect, with No. 5649 D-143 globe to match at the bottom of panel. D-143 design is also standard in green, but can be furnished in other colors when required. All colors are permanently fired on the glass.

TO SPECIFY

The architect should write into his own specification, the data under the headings "Mould No." and "Description." This will automatically assure the correct style, size, color and decoration. Specifications should read for example, "Macbeth No. 5257 D-56 Monax green." "Macbeth 2266 D-143 Monax green."

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5257	D-56 Monax Green	9	$6\frac{3}{8}$	4	$1\frac{1}{2}$	100
1623A	D-56 Monax Green	7	5	$2\frac{1}{4}$		50
4221	D-56 Monax Green	6	$3\frac{7}{32}$	$2\frac{1}{4}$		40
4221	Monax or Cremax	6	$3\frac{7}{32}$	$2\frac{1}{4}$		40
2266	D-143 Monax Green	4	$4\frac{1}{2}$	$2\frac{1}{4}$		25 to 60
5649	D-143 Monax Green	8	$6\frac{1}{16}$	4	$1\frac{1}{2}$	100

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

MONAX and ALBA HEMISPHERES and SHADES

THE first illustration represents a Monax lip-type blown hemisphere which can also be supplied in Cremax glass. The bottom illustration represents a ribbed hemisphere of pressed Alba glass. These are for use particularly with hinged, close ceiling bands where unusually low ceilings prevail. The illustration second from the top, represents the "Bowl-type" shade, obtainable in three sizes. The illustration third from the top represents the ever useful "Mission Bell type" blown shade, available in four sizes. Both types are made from Monax glass. The next three illustrations represent pressed Alba shades, the first a "Bell type" and the second a "Flat type," both with ribs and scalloped edges, the third a "Bell type" with plain edge. These are available in a number of sizes as shown in the table below.

TO SPECIFY

The architect should write into his own specification, the data under the following headings, "Mould No." and "Description." This will automatically assure the correct style, size and glass. Specifications should read for example "165 Monax hemisphere," "5383 Alba ribbed hemisphere."

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	Recommended wattage
175	Monax or Cremax Hemisphere	8	4		60
165	Monax or Cremax Hemisphere	10	5		100
160 A	Monax or Cremax Hemisphere	12	6		150
5307	Monax Bowl Type	6¼	4¾	2¼	40
1623A	Monax Bowl Type	7	5	2¼	50
5308	Monax Bowl Type	8	5¾	2¼	60
1358	Monax Mission Bell	4½	4⅛	2¼	25
1391	Monax Mission Bell	6	4¼	2¼	40
1460	Monax Mission Bell	7	4½	2¼	50
1461	Monax Scalloped Bottom	8	5	2¼	60
3419	Alba Scalloped Bottom	5⅛	3⅝	2¼	25
3420	Alba Scalloped Bottom	5¾	4⅜	2¼	40
3424	Alba Scalloped Bottom	7¼	4¾	2¼	50
3429	Alba Scalloped Bottom	8¼	6	2¼	60
3446	Alba Scalloped Bottom	10⅝	6¾	3¼	100
3431	Alba Flat Type	7¾	3⅛	2¼	50
3432	Alba Flat Type	9	3⅝	2¼	60
3438	Alba Flat Type	11	4⅜	2¼	100
3816	Alba Plain Bottom	6⅝	4⅛	2¼	40
3817	Alba Plain Bottom	7¼	4¼	2¼	50
3818	Alba Plain Bottom	8½	5⅜	2¼	60
3819	Alba Plain Bottom	10¼	6¾	3¼	100
3484	Alba Ribbed Hemisphere	8	4		60
5382	Alba Ribbed Hemisphere	10	5		100
5383	Alba Ribbed Hemisphere	12	6		150
5385	Alba Ribbed Hemisphere	14	7		200
3461	Alba Ribbed Hemisphere	16	8		300

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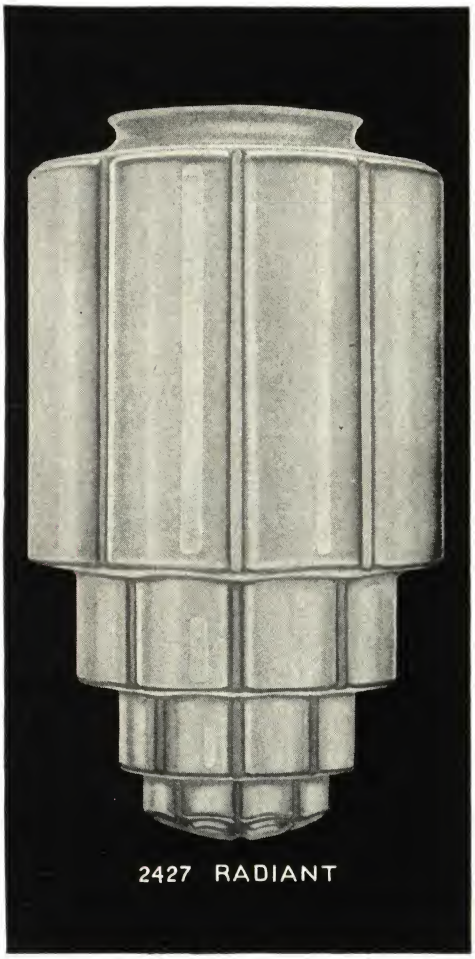
Modernistic Glassware for Public Buildings

The attractive pieces illustrated on this page typify advanced modern lighting coupled with a sane practicability in harmony with present day lighting standards.

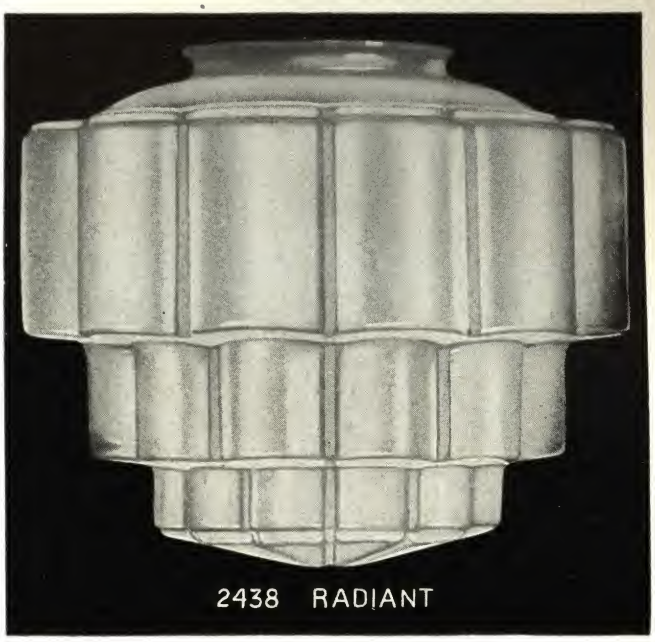
Designed by authorities in the field of lighting they possess beauty and symmetry of line.

Service

Photographs or samples with further information will be furnished upon request.



2427 RADIANT



2438 RADIANT

Installation

Any fixture manufacturer or dealer in artistic lighting equipment can install these pieces.

Description of Finishes for 2427 and 2438

Regularly furnished in:

(1) Plain Alabaster or Radiant Glass with a satin finish. (The satin finish results from depolishing the glossy surface.)

(2) Alabaster or Radiant Glass with vertical black lines.

(3) Frostell Antique Etched. Frostell Antique Etched is an unusual acid treatment simulating the effect of heavy frost on a window pane. A rich tan color slightly iridescent is permanently fired into the glass.

See our Catalogs Nos. 45 and 46.

Radiant Glass

Radiant Glass possesses a deep lustrous beauty that is transformed when lighted into a snow white light of even intensity. Glare is filtered out and the light is perfectly diffused with a minimum of absorption. Its fine texture permits rapid and easy cleaning and its heat-resisting properties minimize breakage. You will find Radiant Glass often specified for schools and public building work.

2427

Diam. in.	Depth, in.	Fitter, in.	Lamp, watts	Standard package
4½	7	3¼	40	12 pc. ctn.
6	9	4	75	6 pc. ctn.
8	12	4	150	1 pc. ctn.
10	16	6	200	1 pc. ctn.
12½	20½	8	300	1 pc. ctn.

2438

Diam., in.	Depth, in.	Fitter, in.	Lamp, watts	Standard package
9	7¾	4	75	8 pc. ctn.
10	8	4	100	4 pc. ctn.
12	10	6	150	1 pc. ctn.
14	12	6	200	1 pc. ctn.
16	14	6	300	1 pc. ctn.

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BURLINGTON, IOWA
*BUTTE, MONT.
CANTON, OHIO
CEDAR RAPIDS, IOWA
CHARLESTON, W. VA.
†*CHARLOTTE, N. C.
CHATTANOOGA, TENN.
†*CHICAGO, ILL.
†*CINCINNATI, OHIO
†*CLEVELAND, OHIO
COLUMBUS, OHIO
*DALLAS, TEX.
DAVENPORT, IOWA
DAYTON, OHIO
†*DENVER, COLO
DES MOINES, IOWA
†*DETROIT, MICH.
DULUTH, MINN.
ELMIRA, N. Y.
EMERYVILLE, CALIF.
ERIE, PA.
EVANSVILLE, IND.
†FAIRMONT, W. VA.
FERGUS FALLS, MINN.
FORT WAYNE, IND.
FORT WORTH, TEX.
GARY, IND.
*GRAND RAPIDS, MICH.
HAMMOND, IND.
†*HOUSTON, TEX.
†*HUNTINGTON, W. VA.
†INDIANAPOLIS, IND.
JACKSON, MICH.
JACKSON, MISS.
JACKSONVILLE, FLA.
†JOHNSTOWN, PA.
*JOPLIN, MO.
†*KANSAS CITY, MO.
KNOXVILLE, TENN.
†*LOS ANGELES, CALIF.
LOUISVILLE, KY.
MADISON, WIS.
MEMPHIS, TENN.
†MILWAUKEE, WIS.
†*MINNEAPOLIS, MINN.
NASHVILLE, TENN.
†*NEWARK, N. J.
NEW HAVEN, CONN.
*NEW ORLEANS, LA.
†NEW YORK, N. Y.
NIAGARA FALLS, N. Y.
*OKLAHOMA CITY, OKLA.
OMAHA, NEB.
PEORIA, ILL.
†*PHILADELPHIA, PA.
*PHOENIX, ARIZ.
PINE BLUFF, ARK.
†*PITTSBURGH, PA.
PORTLAND, ME.
*PORTLAND, ORE.
†PROVIDENCE, R. I.
PUEBLO, COLO.
QUINCY, ILL.
RALEIGH, N. C.
READING, PA.
RICHMOND, VA.
†ROCHESTER, N. Y.
ROCKFORD, ILL.
SACRAMENTO, CALIF.
†*SALT LAKE CITY, UTAH
SAN ANTONIO, TEX.
SAN DIEGO, CALIF.
†*SAN FRANCISCO, CALIF.
SCOTTS BLUFF, NEB.
†*SEATTLE, WASH.
SHREVEPORT, LA.
SIOUX CITY, IOWA
SOUTH BEND, IND.
SPOKANE, WASH.
SPRINGFIELD, ILL.
†SPRINGFIELD, MASS.
†*ST. LOUIS, MO.
SYRACUSE, N. Y.
TAMPA, FLA.
TERRE HAUTE, IND.
TEXARKANA, ARK.
†TOLEDO, OHIO
*TULSA, OKLA.
†*UTICA, N. Y.
WASHINGTON, D. C.
WATERLOO, IOWA
WICHITA, KAN.
†WILKES-BARRE, PA.
WILMINGTON, CALIF.
†WORCESTER, MASS.
YOUNGSTOWN, OHIO

†Service Shop is located also in this city. HONOLULU, T. H., The Hawaiian Electric Co., Ltd.—Agent *Warehouse is located also in this city.

WESTINGHOUSE AGENT-JOBBERS

ABILENE, KAN., Union Electric Co.
ALBANY, Westinghouse Elec. Sup. Co., Inc.
ALLENTOWN, PA., Westinghouse Electric Supply Co. of Pennsylvania
ATLANTA, GA., Gilham Electric Co.
BALTIMORE, MD., Westinghouse Electric Supply Co. of Pennsylvania
BANGOR, ME., Wetmore-Savage Elec. Sup. Co.
BINGHAMTON, N. Y., Westinghouse Electric Supply Co., Inc.
BIRMINGHAM, ALA., Moore-Handley Hardware Co.
BLUEFIELD, W. VA., Superior Supply Co.
BOSTON, Wetmore-Savage Elec. Sup. Co.
BROOKLYN, N. Y., Westinghouse Electric Supply Co., Inc.
BUFFALO, N. Y., McCarthy Bros. & Ford
BURLINGTON, VT., Wetmore-Savage Elec. Sup. Co.
BUTTE, MONT., Westinghouse Elec. Sup. Co.
CANTON, OHIO, The Moock Elec. Sup. Co.
CHARLOTTE, Westinghouse Elec. Sup. Co.
CHATTANOOGA, TENN., Mills & Lupton Supply Co.
CHICAGO, Westinghouse Elec. Supply Co., Inc.
CINCINNATI, O., The Johnson Elec. Sup. Co.
CLEVELAND, OHIO, Westinghouse Electric Supply Co.
COLUMBIA, S. C., Mann Elec. Sup. Co.
COLUMBUS, OHIO, The Hughes-Peters Electric Corp.
DALLAS, Westinghouse Elec. Sup. Co.
DENVER, The Mine & Smelter Sup. Co.
DES MOINES, IOWA, Westinghouse Electric Supply Co., Inc.
DETROIT, Westinghouse Elec. Sup. Co.
DULUTH, MINN., Westinghouse Elec. Supply Co., Inc.
ELMIRA, N. Y., Westinghouse Elec. Sup. Co.
EL PASO, The Mine & Smelter Sup. Co.
ERIE, PA., Star Electrical Co.
EVANSVILLE, IND., Westinghouse Electric Supply Co.
FARGO, N. D., Westinghouse Elec. Sup. Co., Inc.
FLINT, MICH., Westinghouse Elec. Sup. Co.
GRAND RAPIDS, MICH., Westinghouse Electric Supply Co.
GREENVILLE, S. C., Mann Elec. Sup. Co.
HARLINGEN, Westinghouse Elec. Sup. Co.
HOUSTON, Westinghouse Elec. Sup. Co.
HUNTINGTON, W. VA., Banks-Miller Supply Co.
INDIANAPOLIS, IND., Westinghouse Electric Supply Co.
JACKSONVILLE, FLA., Westinghouse Electric Supply Co.
KANSAS CITY, Columbian Electr'l Co.
KNOXVILLE, TENN., Tafel Electric Co.
LONG BEACH, CALIF., Westinghouse Electric Supply Co. of Southern California
LOS ANGELES, CALIF., Westinghouse Electric Supply Co. of Southern California
LOUISVILLE, KY., Tafel Electric Co.
MADISON, WIS., Westinghouse Electric Supply Co., Inc.
MASON CITY, IOWA, Westinghouse Electric Supply Co., Inc.
MEMPHIS, Westinghouse Elec. Sup. Co.
MIAMI, FLA., Westinghouse Elec. Sup. Co.
MILWAUKEE, WIS., Westinghouse Electric Supply Co., Inc.
MINNEAPOLIS, MINN., Westinghouse Electric Supply Co., Inc.
NASHVILLE, TENN., Tafel Electric Co.
NEWARK, N. J., Westinghouse Electric Supply Co., Inc.
NEW HAVEN, CONN., Westinghouse Electric Supply Co. of Conn.
NEW ORLEANS, LA., Electrical Supply Co.
NEW YORK, Times Appliance Co., Inc.
NEW YORK, Westinghouse Elec. Sup. Co., Inc.
NEW YORK, N. Y., Stanley & Patterson Electric Supply Co., Inc.
OAKLAND, CALIF., Westinghouse Electric Supply Co. of Northern California
OKLAHOMA CITY, OKLA., Westinghouse Electric Supply Co.
OMAHA, Westinghouse Elec. Sup. Co., Inc.
PEORIA, ILL., Westinghouse Electric Supply Co., Inc.
PHILADELPHIA, PA., Westinghouse Electric Supply Co. of Pennsylvania
PHOENIX, ARIZ., Westinghouse Electric Supply Co. of Southern California
PITTSBURGH, PA., Iron City Electric Co.
POCATELLO, IDAHO, Inter-Mountain Electric Co.
PORTLAND, ORE., Fobes Supply Co.
PROVIDENCE, Wetmore-Savage Elec. Sup. Co.
RALEIGH, Westinghouse Elec. Sup. Co., Inc.
READING, PA., Westinghouse Electric Supply Co. of Pennsylvania
RICHMOND, VA., Westinghouse Elec. Sup. Co.
ROCHESTER, Westinghouse Elec. Sup. Co.
SALT LAKE CITY, UTAH, Inter-Mountain Electric Co.
SAN ANTONIO, TEX., Westinghouse Electric Supply Co.
SAN FRANCISCO, CALIF., Westinghouse Electric Supply Co. of Northern Calif.
SCRANTON, Penn. Elec. Eng. Co.
SEATTLE, WASH., Fobes Supply Co.
SIOUX CITY, IOWA, Westinghouse Electric Supply Co., Inc.
SPOKANE, Westinghouse Elec. Sup. Co.
SPRINGFIELD, Wetmore-Savage Elec. Sup. Co.
ST. LOUIS, Westinghouse Elec. Sup. Co.
ST. PAUL, Westinghouse Elec. Sup. Co., Inc.
SYRACUSE, Westinghouse Elec. Sup. Co., Inc.
TAMPA, FLA., Westinghouse Elec. Sup. Co.
TOLEDO, O., Westinghouse Elec. Sup. Co.
TRENTON, Westinghouse Elec. Sup. Co., Inc.
TULSA, OKLA., Westinghouse Elec. Sup. Co.
UTICA, Westinghouse Elec. Sup. Co., Inc.
WASHINGTON, D. C., Westinghouse Electric Supply Co. of Pennsylvania
WATERLOO, IOWA, Westinghouse Electric Supply Co., Inc.
WICHITA, KAN., United Electric Co.
WILMINGTON, DEL., Westinghouse Electric Supply Co. of Pennsylvania
WORCESTER, MASS., Wetmore-Savage Elec. Sup. Co.
YORK, PA., Westinghouse Electric Supply Co. of Pennsylvania
YOUNGSTOWN, O., Moock Elec. Sup. Co.

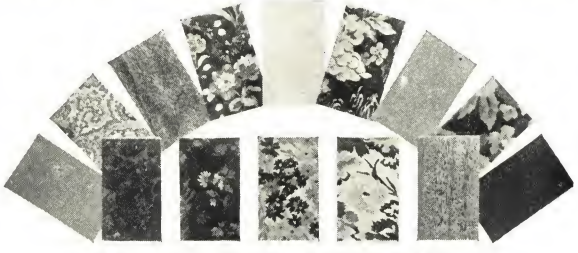
For Reference to Other Products see Index to Manufacturers

MICARTA FOR INTERIOR DECORATION

Description

This modern material consists of laminations of fabric-base material impregnated with a bond baked under intense heat and high pressure into a homogeneous product that is insoluble and permanent.

It is not affected by heat or cold, nor will it stain from liquids and alcohol, nor spot from lighted cigars and cigarettes that may be deposited on it.



A Few of the Designs Available in Micarta

Uses

Micarta is particularly well adapted for tops of dressers, tables, desks, counters and similar flat surfaces. Also of particular value for window sash and sills, door and wall panels, name and number plates, push and kick plates and other types of plates, panels, etc., as it does not warp, split or swell.

Simulations of Woods

Micarta is produced in natural simulations of choice woods, such as mahogany and walnut, in verde antique, black and gold marble figurations, in decorative tapestry and modernistic designs of four or five colors, and in exclusive patterns to meet special requirements. It is strong and wear-resistant, and requires no polishing or refinishing.

Beautiful Designs

The beautiful designs of Micarta are part of the material so that wear and use will not affect the beauty of the finish.

Sizes

Micarta is made in almost any thickness from $\frac{1}{32}$ inch upward in sheets as large as 48x96 inches, having one side highly polished, the other side in dull finish.

Information

Samples of Micarta and complete information will be furnished on request to our nearest office.

LIGHTING EQUIPMENT

The Installation of Efficient Lighting

Four qualifications of a good lighting system:

(1) Sufficient illumination on all planes is governed by the amount of light required for quick and easy vision.

(2) Uniform distribution of light requires the proper reflecting equipment, and the proper positioning of lighting fixtures or luminaires. Illumination is said to be uniform when the minimum intensity, usually midway between luminaires, is three-fourths of the maximum immediately beneath the luminaires.

(3) A well diffused light with a minimum amount of direct and reflected glare commonly caused by bare lamps, or poor lighting equipment which does not adequately shield the eyes from the lamp filament.

(4) Light of a quality and spectral character suited to the work.

Definition of Terms—The term "luminaire" is used to designate a light source together with its direct appurtenances, such as globe, reflector and support or lighting fixture.

The "mounting height" is the distance from the floor to the bottom of the luminaire.

COMMERCIAL LIGHTING

Ceiling Type Sollux with Paneled Hanger and Plain Globe

Sollux Corridor Unit with Decorated Globe

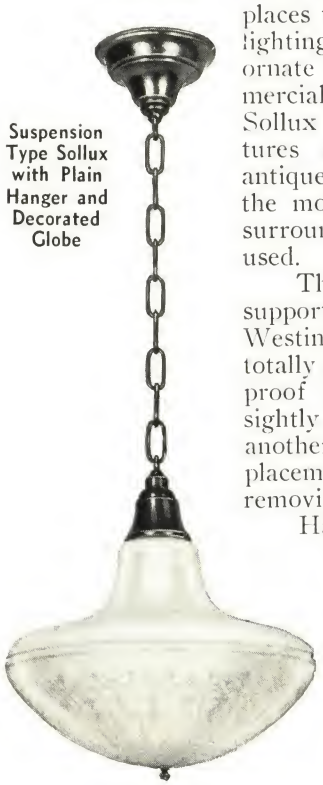
Ceiling Type Sollux with Ornamental Hanger

Ceiling Type Lunalux with Paneled Hanger and Plain Globe

Sollux Luminaires

The Sollux is the leader in Westinghouse Commercial Fixtures, the aristocrat of lighting units with exclusive features that, once understood, assure its acceptance where the best is sought.

Hangers of differing designs, all including the exclusive Sollux features, make this fixture available in a range of prices.



Suspension Type Sollux with Plain Hanger and Decorated Globe

For installations in hotel lobbies, restaurants, banks and other places where it is desirable to have lighting fixtures somewhat more ornate than the usual plain commercial fixture, the Ornamental Sollux can be supplied. These fixtures are richly finished in an antique gold that harmonizes with the more pretentious architectural surrounding in which they will be used.

The keeper ring method of supporting the globe, a distinctive Westinghouse feature, makes a totally enclosed dustproof and bugproof globe, and eliminates unsightly setscrews. The tilt-out cap, another feature, permits easy replacement of the lamp without removing globe from its holder.

Hangers may be procured in several styles, viz., ornamental with antique gold finish; paneled with statuary bronze finish; semi-rigid in statuary bronze and American bronze finish; plain hangers in American bronze finish; as well as chromium plated.

The ornamental hanger is available in suspension, ceiling and bracket types; the latter either with or without the crown. The plain or paneled hanger is supplied in suspension and ceiling types only.

Sollux Corridor Unit

For installations where a fixture somewhat more ornamental than the plain commercial fixture is required, but where the Ornamental Sollux is felt to be too decorative, this Sollux Corridor Unit should be furnished.

The hanger is made of cast bronze, with special antique gold finish having burnished high lights. As with all Sollux Hangers, it employs the keeper ring method for supporting the globe. It takes a standard Sollux globe with the tilt-out cap, either plain or decorated. The unit is furnished in ceiling type only.

Lunalux—Semi-indirect Unit

The Lunalux is a new development which embodies the desirable features of the Sollux globe and gives indirect illumination from one-piece glassware. It provides a white reflecting surface on the inner lower part of the globe, and a light density for the upper part, having high transmission qualities with only slight diffusion.

The result is a pleasing restful semi-indirect illumination without the use of coating materials which may deteriorate with use.

Wall Bracket Sollux with Ornamental Hanger

Chain Suspension Type Louverlux with Modernistic Hanger and Lunalux Globe

The Lunalux globe has the "tilt-out" cap similar to the Sollux which is designed to match the glass when the unit is lighted and unlighted. The globes can be used with Sollux paneled or plain hangers and take the same wattage lamps as the corresponding size globes. Globes are supplied plain or decorated. The decorated globe has a light tan etched decoration which leaves the surface unmarked except for the slight roughness where the design is applied. Standard decoration can be furnished in other colors at regular cost; special designs at extra cost.

Statuary bronze finish is standard for Lunalux hangers.

Louverlux—Indirect Unit

The Louverlux is an indirect lighting unit using a Lunalux globe for reflecting and diffusing light and a series of louvers to direct the remaining light toward the ceiling.

Hanger is furnished with chain or tubing for any desired length and in satin aluminum finish, which is standard. Keeper ring method of support makes the globe bugproof, eliminates setscrews and prevents globe breakage due to unequal contraction and expansion. Louvers form a separate unit which can be attached or detached without removing globe or interfering with hanger. Lunalux "tilt-out" cap or metal "tilt-out" cap can be supplied.

In the ceiling type Louverlux, the canopy and husk are one unit. As in the suspension type the globe is supported by keeper ring and the unit hung by self-adjusting bridge. Satin aluminum is standard finish for the hangers.

Can also supply a semi-rigid suspension type Louverlux by substituting ⅝-inch tubing for chain. Tubing has ball and socket joint to accommodate irregular ceilings, thus allowing unit to swing 20 degrees in any direction. Absence of rods and supports for reflector and louvers prevents ceiling streaks and striations. Due to "tilt-out" cap, relamping requires no disassembling.

Ceiling Type Sollaire with Embossed Bronze Safety Hanger and Decorative Globe (Drilled) and Tassel

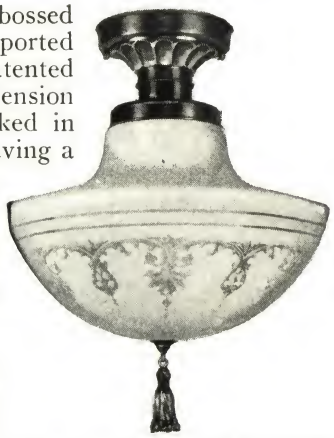
Sollaire Luminaires

The Sollaire, similar in appearance to the Sollux with practically the same efficiency of light distribution, fills a big demand at a lower price. The same quality of workmanship and of material is used in the two units. Certain Sollux features have been eliminated, such as the "tilt-out" cap and globe holder.

Semi-rigid Suspension Type Sollaire with Embossed Bronze Safety Hanger and Decorated Globe (Undrilled)

On the plain and embossed hangers, the globe is supported by the Westinghouse patented safety holder. The suspension types have the globe locked in place by a knurled ring having a triple thread which facilitates locking and unlocking. The globe for the ceiling type hangers is locked by turning the bottom half of the hanger counter-clockwise.

With these holders the globe can be removed or replaced more quickly than with the setscrew type of holder. The danger of globe breakage through setting the screws too tight also is eliminated.



Ceiling Type Lunaire with Embossed Bronze Safety Hanger, Decorated Globe (Drilled) and Tassel

The following finishes are available; ornamental hangers in antique gold finish, plain safety hangers in American bronze finish, and embossed safety hangers in satin bronze finish.

Globes are available in both plain and decorated finishes, the latter style either drilled (and with tassel) or undrilled.

Lunaire—Semi-indirect Unit

In the Lunaire, Westinghouse offers semi-indirect lighting at a moderate price. The hanger is similar to the Sollaire. The globe is similar in light distribution to the Lunalux.

The Lunaire provides the pleasing, restful illumination of semi-indirect lighting without unsightly shields and without resorting to coating or enamel on the glass which might deteriorate with age or use.

The unit is available in suspension, semi-rigid suspension and ceiling types and globes can be had in the plain and decorated styles, and also in the decorated style, drilled and with tassel.

Semi-rigid Suspension Type Lunaire with Embossed Bronze Safety Hanger and Plain Globe

Sollite Luminaires

The Sollite Luminaire offers a more angular globe in the plain, banded and art moderne styles, made of same glass as Sollux and Sollaire globes.

The globe is supported from the Sollite Hangers by means of three setscrews designed so that they will not back out under vibration and so placed that a tight closure between the globe and holder is effected. This makes a reasonably dustproof fixture of pleasing appearance.

Ceiling Type Sollite with Banded Globe

Chain Suspension Type Sollite with Art Moderne Globe

American bronze is the standard finish, but other finishes furnished on special order. The standard decoration on the banded and art moderne globes is a light tan, but other colors furnished at no extra charge on special order. Special decorative designs furnished at additional cost.

For complete information refer to Commercial Lighting Catalog 219-B.

Designing a Lighting System Using Westinghouse Sollux, Sollaire or Sollite

(1) Determine the mounting height as that distance above the floor at which luminaires can be suspended without interference with ceiling beams, etc., and also to present a pleasing appearance.

(2) Refer to Table No. 1 with the mounting height, and ascertain the proper spacing distance. If spacing obtained with the mounting height does not coincide with the building bays, a smaller spacing with a lower mounting height should be used.

(3) Select from Table No. 2 the foot-candle illumination required by the class of installation and find the nearest corresponding value under the selected spacing distance.

(4) Having arrived at the correct foot-candle intensity, read toward the left side of Table No. 1 and find the lamp size. The luminaire style number is selected according to lamp size from Commercial Lighting Catalog.

TABLE NO. 1

Use ceiling type fixtures where ceilings are 10½ ft. or less. The foot-candle values given in Table No. 2 are based on conditions involving the average size of room (width about twice ceiling height), medium color walls and ceiling, ordinary maintenance. When unfavorable conditions exist involving narrow room (width equal to ceiling height), dark walls and ceilings, poor maintenance, the next size larger lamp is recommended or a closer spacing should be used.

Approximate outlet spacing.....ft.			8½x8½	10x10	11½x11½	13x13
Area per outlet lighted.....sq. ft.			75	100	135	170
Mounting height from floor to bottom of globe.....ft.			8½	9½	10½	11½
Suspension type Style No.	Ceiling type Style No.	Semi-rigid type Style No.	Lamp, size watts	Average foot-candle illumination on plane of work			
Select Style No. for kind of unit wanted according to lamp-size from Commercial Lighting Catalog			100	4.5- 5.0	3.0- 3.5	2.0- 2.5	1.5- 2.0
			150	6.0- 9.0	4.0- 6.0	3.5- 4.5	3.0- 3.5
			200	9.0-13.0	6.0- 8.0	5.0- 6.0	4.5- 5.0
			300	.....	9.0-15.0	7.0-11.0	6.0- 9.0
			500	.....	.....	.....	11.0-17.0

Note: The distances between the wall and the first row of fixtures should be one-half the fixture spacing except when desks are close to the wall, in which case this distance should be one-third, varying according to the conditions.

TABLE NO. 2

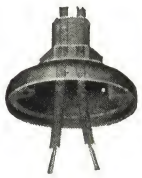
Recommended Standards of Desirable Illumination for Commercial and Public Interiors

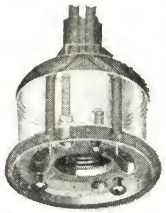
Buildings	Foot-candles		Buildings	Foot-candles	
	Good practice	Min. recom.		Good practice	Min. recom.
Armories, Public Halls	10	6	Libraries		
Auditoriums (exclusive of stage)	5	3	Reading room	12	8
Automobile Showroom	15	10	Lunch Rooms	12	8
Banks			Office Buildings, Offices		
Lobby	10	6	Close work	15	10
Cages and offices	15	10	No close work	10	8
Barber Shops	15	10	File room	6	4
Churches			Restaurants	8	5
Auditorium	3	2	Schools		
Sunday School	8	5	Assembly room, auditorium	8	5
Dance Halls	6	4	Classrooms, study rooms, office	12	8
Dental Offices	12	8	Drawing	25	15
Department stores and large specialty stores			Laboratory	12	8
Main floors	15	10	Manual training	12	8
Other floors (except furniture)	12	8	Sewing rooms	25	15
Drafting Rooms	25	15	Specialty and Small Stores		
Halls, Passageways	3	2	Automobile supply	12	8
Hospitals			Book	12	8
Lobby and reception room	6	4	Cigar	15	10
Corridors	3	2	Drug	15	10
Wards and private rooms with local illumination	5	3	Florist	12	8
With no local illumination	8	5	Haberdashery	15	10
Night illumination	2	1	Jewelry	15	10
Operating room	15	10	Shoe	15	10
Hotels			Sporting goods	12	8
Lobby	8	5	Tailor	15	10
Dining room	6	4	Tobacco	15	10
Kitchen	10	6	Telephone Buildings		
Bedrooms	8	5	Manual exchanges	8	5
			Automatic exchanges	12	8

INDUSTRIAL LIGHTING

Bayonet Heel Reflector-Socket Fixtures—"Easy to Wire" —Guaranteed Weatherproof

Fixtures consist of porcelain enamel steel reflectors which fasten securely to the porcelain body of the reflector-socket by means of screws that seat themselves in bayonet slots in the reflector heel. A fiber gasket between the reflector heel and the porcelain seat, and a copper washer within the reflector neck, make the fixture waterproof and protect the enamel.





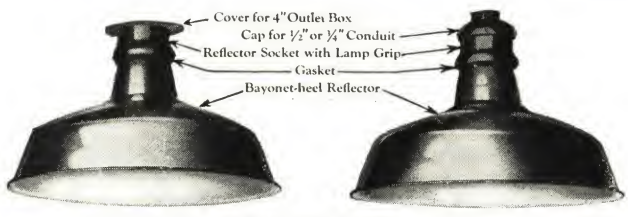
Reflector-Socket for Conduit Mounting

Reflector-Socket for Outlet-box Mounting

This design allows a compact, rigid assembly and at the same time gives the easy-to-wire features so well known to users of Westinghouse Reflector-Sockets. So few operations are necessary that one man can install a complete fixture in three minutes.

RLM Dome Reflectors

For general lighting effectiveness, the RLM Dome Reflector cannot be surpassed. Upward light, which would be wasted without reflectors, is directed down toward the working plane and thus becomes of value. When mounted properly and equipped with the correct size lamps, no glare is apparent unless one looks directly at the lamp. Westinghouse RLM Dome Reflectors are coated inside and out with porcelain enamel.

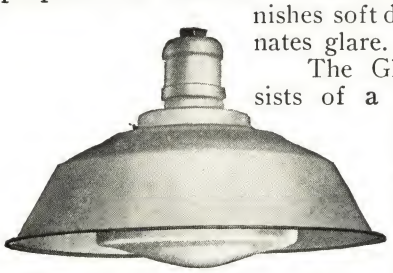


RLM Dome Type

Each reflector bears the RLM label, assuring the customer of highest quality. The RLM fixtures listed are combinations of bayonet heel reflectors and reflector-sockets.

Glassteel Diffusers

For the best illumination obtainable for industrial purposes the Glassteel Diffuser should be used. It furnishes soft diffused light and eliminates glare.

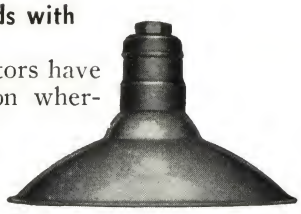


Glassteel Diffuser with Bayonet Heel Reflector-Socket

The Glassteel Diffuser consists of a diffusing glass globe and a white porcelain enameled reflector which directs most of the light downward. The reflector equipped with a bayonet heel extension for attaching to the well-known "Easy-to-Wire" Westinghouse Bayonet Heel Reflector-Socket, or with a threaded copper extension for attachment to the porcelain enameled steel hood shown above. Two sizes of glassware are used; the 10-in. size with smaller reflector, which is 18 in. in diameter, and the 12-in. size for the larger reflector, which is 21 in. in diameter.

Wemco Reflectors and Hoods with Sockets

Wemco hoods and reflectors have been designed for installation wherever industrial reflectors and sockets are used or where the lighting equipment is subjected to extraordinary service.



Wemco Reflector

The socket is attached to the hood by two screws. By loosening these screws the socket can readily be removed by turning it slightly since the porcelain is furnished with bayonet slots. RLM bowl, symmetrical angle and shallow dome reflectors are furnished with the heavy copper screw heel for all Wemco holders.

All Wemco reflectors are coated inside and out with porcelain enamel. The first coat is a binder coat after which one coat of green is applied outside and two coats of white inside. Each coat is fired separately.

The "Easy to Wire" sockets are housed in cast aluminum hoods with a green baked enamel finish or in sheet metal hoods electro-galvanized and with a green baked enamel finish. Hoods are either tapped for ½-in. conduit or are fitted with 4-in. outlet box covers.

Improved Vapor-proof Units

The improved line of vapor-proof units consists essentially of cast iron hoods, housing front-connected sockets, vapor-proof glass globes and suitable reflectors. The "easy-to-wire" features have been retained. The vapor-proof globes are threaded to fit the cast-iron hoods and seat on a special gasket which is unaffected by moisture. Hood style numbers include hood, socket and gasket. The hood is threaded for ½-in. conduit.

Disassembled View of Vapor-proof Unit

Pulley Sockets

Save time and effort in cleaning lamps and reflectors and make it possible to clean them more thoroughly. They eliminate the delay that results from the use of ladders, and provide safety from short circuits. Within this pulley socket, wiping contacts are provided of sufficient capacity to make and break the current of a 1000-watt lamp. A pull on the line disengages the reflector and socket.

Chromium-Plated Reflector—Socket Fixture

Chromium-Plated Reflectors

Chromium-plated reflectors have been designed for use in industrial interiors where more than ordinary corrosive influences are present.

The reflector is fitted with a copper screw heel, the same as used in heavy duty reflectors, and must be supported by heavy duty cast-iron or porcelain enameled steel hoods.

The chromium-plated reflecting surface has a high degree of efficiency and durability. The heat from the lamp for which the reflector is designed will not discolor the reflecting surface or cause any other change.

Because of its hardness and the chromium-plated reflecting surface, ordinary cleaning compound will not destroy its efficiency.

Automatic Cut-out Hanger

Automatic Cut-out Hangers

For use with reflector-socket fixtures on multiple circuits.

The loss of light, when reflectors are not regularly cleaned, amounts to nearly 50% of the light available when systematic cleaning is followed out. The rope for lowering an automatic cutout is carried to the nearest column or wall. A pull on the rope disconnects the fixture from the circuit. It is then lowered to the floor for cleaning or renewing lamps. The next pull on the rope raises the fixture to its original position.

FLOODLIGHTING

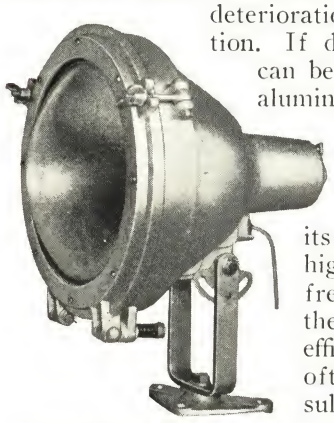
Westinghouse is able to supply equipment fitted to accomplish any prescribed lighting effect and to maintain that effect from year to year. This sustained effectiveness is essential for good lighting service and depends upon certain fundamentals and standards which are assured when recommendations of the Westinghouse Lighting Specialists are followed. Theirs is the accumulated experiences of Westinghouse achievements from the spectacular lighting of the Chicago World's Fair to the Barcelona Exposition.

Westinghouse carries a complete line of floodlighting equipment for any application, from underwater lighting in colors to strictly utilitarian lighting. Examples: Exterior of buildings and monuments, signs and advertising displays, expositions, fountains, and numerous sports such as baseball, football, golf, tennis and hockey.

Six sizes of floodlights are available having 10, 12, 14, 16, 20 and 24-in. diameters, for lamp sizes from 100 to 2000 watts.

Type SA-12 Chromilite Floodlight

The bodies of Westinghouse floodlights are of cast silicon aluminum, spun aluminum, spun copper and sheet steel, having cast door frames heavily gasketed to exclude dust, smoke, soot and moisture. Unventilated type of housing is used, except for the Type AF-20 open porcelain enameled floodlight; radiation alone being depended upon for heat dissipation. The dustproof and weatherproof construction protects the interior from deterioration and minimizes depreciation. If desired, cast bronze bodies can be furnished, duplicating the aluminum line.



Type CAG-14 Floodlight

Silvered glass and chromium plate form the reflecting surfaces of these floodlights. Each has its advantages: the former has higher initial efficiency but frequent cleaning is desirable; the latter, while slightly less efficient when first installed often gives best average results, due to its ability to better withstand extreme fluctuations in temperature, rough usage and infrequent cleaning. Can be buffed to original condition. Both are very resistant to abrasions and easily cleaned.

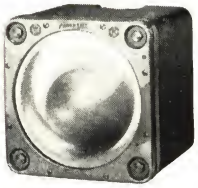
All equipment is easily accessible for servicing. The focusing is done by merely adjusting external thumb screws. Floodlights are provided with mounting brackets or bases which permit adjustment in any direction.

Aqualux or underwater floodlights possess these same features of simple design and rapid servicing.

For complete information, refer to Westinghouse Floodlighting Equipment Catalog 219-C.

Designing a Swimming Pool Lighting Installation Using the Westinghouse Aqualux Underwater Light

Good pool lighting practice requires two lamp watts per square foot of water surface. To provide uniform illumination on sides of the pool and on objects in the water, a spacing distance of 10 ft. is considered as maximum. Two rows of units are recommended for use in water 10 ft. or more deep.



Type W Aqualux Underwater Light

The example illustrates the method of determining the equipment necessary for the usual indoor swimming pool.

Problem—To illuminate an indoor swimming pool 40x70 ft. in which the depth of water varies from 3 to 10 ft.

Solution—To ascertain the quantity of underwater lights required to illuminate the above pool the following formula should be used:

$$\frac{\text{area x watts per sq. ft. (2)}}{\text{lamp size (250 watts)}} = \text{Number of underwater lights required}$$

or

$$\frac{40 \times 70 \times 2}{250} = \frac{5600}{250} = 22.4 \text{ or } 22 \text{ underwater lights required}$$

Having ascertained the number of units necessary, the next step is the arrangement of the units. Since a spacing of 10 ft. may be used the units should be arranged seven on each side spaced 10 ft. apart and 5 ft. from each end. They should be mounted so that the center of the lens is approximately 12 to 18 in. below the surface of the water.

At the deep end of the pool, 3 units should be spaced 10 ft. apart and 10 ft. from each side.

Another row of 5 lights spaced 8 ft. apart and 4 ft. from each end should be mounted 18 in. above the bottom of the pool.

The underwater light should be mounted in a recess so that the door of the unit is flush with the side of the pool.

Sufficient waterproof cable should be provided to permit the unit to be lifted to the surface, making it unnecessary to drain the pool to relamp or service the units.

Landing Field Floodlight

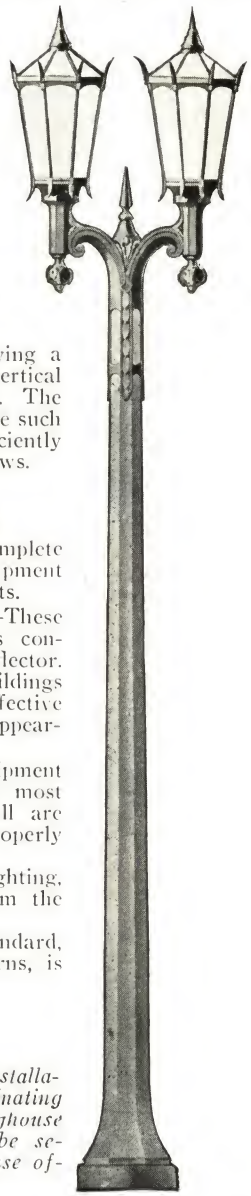
Airport Lighting

The lighting system of an airport should consist of the following:

(1) a rotating beacon to guide pilots en route; (2) boundary marker lights to indicate the limits of the landing area; (3) approach marker lights to indicate the most favorable avenues of approach to the landing area; (4) obstruction marker lights to indicate the location of obstruction on or near the airport; (5) floodlights to illuminate the landing area; (6) floodlights or standard industrial lighting fixtures to illuminate the roof and walls of the hangars to enable the pilot to judge his elevation above the ground; (7) an illuminated wind direction indicator; (8) a narrow beam projector to determine the height of the "ceiling" or overhanging clouds; (9) interior building lighting.

Landing Field Floodlight—Makes landing fields as safe by night as by day.

To adequately floodlight the landing surface of an airport it is necessary to project a sheet of light having a uniform intensity and a limited vertical height over the usable area of the field. The method of projecting the light should be such that irregular, wavy surfaces are sufficiently lighted to eliminate confusing shadows.



Outdoor Lighting Equipment

Westinghouse manufactures a complete line of ornamental and utilitarian equipment for outdoor lighting, including airports.

Duolux Floodlighting Units—These units are octagonal paneled lanterns containing a concealed parabolic reflector. When mounted reasonably near buildings or monuments they provide both effective floodlighting and an attractive appearance.

All Westinghouse Lighting Equipment is designed to distribute light in the most effective and economical manner. All are dustproof and insectproof when properly assembled.

Catalogs covering all phases of lighting, except residential, are obtainable from the nearest sales office.

A 2-light Hollowspun granite standard, with Duolux octagonal paneled lanterns, is illustrated at the right.

Service

For properly planned lighting installations submit the plans to the Illuminating Engineering Bureau of the Westinghouse Companies. This free service may be secured through the nearest Westinghouse office or agent jobber.

BENJAMIN ELECTRIC MFG. CO.

Benjamin Lighting Equipment for Commerce and Industry, Floodlighting Equipment, Electrical Specialties, Panel Boards and Signals

GENERAL OFFICES AND FACTORY
DES PLAINES (Chicago Suburb), ILL.

NEW YORK OFFICE, 230 West 17th Street CHICAGO OFFICE, 111 North Canal Street SAN FRANCISCO OFFICE, 448 Bryant Street

Products

The Benjamin line includes: PORCELAIN ENAMELED STEEL REFLECTORS and SPECIALTIES; ACIDPROOF, GASPROOF and WEATHERPROOF FIXTURES; FLOODLIGHTING EQUIPMENT; INDUSTRIAL SIGNALS.

Also Wiring Devices; Panelboards and Cabinets.

N.E.C. Standard—With a few exceptions, all Benjamin sockets and receptacles are National Electrical Code Standard.

BENJAMIN TRADE MARK

Leading electrical wholesalers in every city carry a stock of Benjamin Products and are in a position to render prompt service on inquiries and orders.

Benjamin district representatives have headquarters in strategically located cities, while divisional sales offices and warehouses are maintained at New York and San Francisco.

"Type 79" Two-piece Lighting Equipment

N.E.C. Std. Benjamin "Type 79" units are composed of two complete assemblies; a hood with an easy-to-wire terminal base and a reflector assembly which includes the reflector, lampholder and diffusing globe. With one simple movement, this complete reflector assembly can be put up or taken down as a unit for easy cleaning or re-lamping on the floor. Fixtures are porcelain enameled steel and include lampholder and bayonet attaching plate. Hoods are cadmium plated; pendent hoods tapped ½ in.; ceiling hoods fit 4-in. standard round or octagonal outlet boxes.

Glassteel Diffuser—For the very highest type of uniform glareless illumination of upright and flat surfaces. Reflector finished white inside and outside. Diffusing globe is of opal glass.

Cat. No. 7201

Lamp, watts	List price	Pendent hood fixture			Ceiling hood fixture		
		Cat. No.	Dimensions, in.		Cat. No.	Dimensions, in.	
			Diam.	Height		Diam.	Height
150, 200	$ 9.25	7201	18	13	9201	18	12½
300, 500	12.75	7202	20	15 5/16	9202	20	14 5/16
750, 1000	18.75	7203	24	18 1/16	9203	24	17 9/16

Standard package is four on 150 to 500-watt units; two on 750 to 1000-watt units. Schedule 2 discounts.

Cat. No. 7642

RLM Dome Reflector—For excellent general illumination of upright and flat surfaces. Reflector cut-off is 17½° below horizontal, protecting worker's eyes from direct lamp glare. Reflector is finished green outside, white inside.

Lamp, watts	List price	Pendent hood fixture			Ceiling hood fixture		
		Cat. No.	Dimensions, in.		Cat. No.	Dimensions, in.	
			Diam.	Height		Diam.	Height
75, 100	$3.60	7641	12	9¾	9641	12	9¼
150	3.80	7642	14	10⅞	9642	14	10⅜
200	4.60	7643	16	12	9643	16	11½
300, 500	5.70	7644	18	13¾	9644	18	13¼
750, 1000	7.60	7645	20	16⅝	9645	20	16⅛

Standard package is ten on 100 to 200-watt units; five on 300 to 1000-watt units. Schedule 2 discounts.

Cat. No. 7423

Shallow Bowl Reflector—A general purpose reflector which is often used for general illumination where eye shielding is not of first importance. Reflector is finished green outside, white inside.

Lamp, watts	List price	Pendent hood fixture			Ceiling hood fixture		
		Cat. No.	Dimensions, in.		Cat. No.	Dimensions, in.	
			Diam.	Height		Diam.	Height
50, 60	$3.60	7437	12	8⅜	9437	12	7⅞
75, 100	3.80	7421	12	9¼	9421	12	8¾
150	4.10	7423	14	10⅜	9423	14	9⅞
200	4.90	7425	16	11¼	9425	16	10¾
300, 500	6.10	7509	18	13	9509	18	12½

Standard package is ten on 50 to 200-watt units; five on 300 to 500-watt units. Schedule 2 discounts.

Shock Absorbing Lamp Holders—Lengthen lamp life by counteracting vibration ordinarily transmitted to the lamp filament. Supplied on all fixtures listed above, in place of the standard rigid type lamp holder, at a $0.10 advance in fixture list price.

"Socket-Reflectors"—One-piece Equipment

N.E.C. Std. weatherproof fixtures for either indoor or outdoor use.

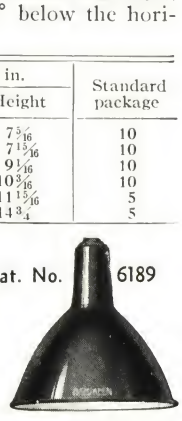
Seamless, Crysteel porcelain enameled steel reflectors, green outside and white inside; two-piece easy-to-wire porcelain socket and a heavy Benjamin "X" type separable weatherproof suspension fitting. Fitting is tapped ½ in. std.; tapped ¾ in. or bushed for drop cord, if specified, at same price.

Cat. No. 5642

RLM Dome Reflector—For good general illumination where it is designed to light both horizontal and vertical surfaces. Reflector cut-off is 17½° below the horizontal.

Lamp, watts	Cat. No.	List price	Dimensions, in.		Standard package
			Diam.	Height	
50, 60	5640	$3.20	12	7 5/16	10
75, 100	5641	3.30	12	7 15/16	10
150	5642	3.50	14	9 1/16	10
200	5643	4.30	16	10 3/16	10
300, 500	5644	5.30	18	11 15/16	5
750, 1000	5645	7.20	20	14 3/4	5

Schedule 2 discounts.



Cat. No. 6189

Bowl Reflector—Advantageous for the local lighting of machines or benches or wherever a relatively high intensity of light is desired over a comparatively small horizontal area.

Lamp, watts	Cat. No.	List price	Dimensions, in.		Standard package
			Diam.	Height	
50, 60	6166	$2.90	7	7⅜	10
75, 100	6161	3.10	8	8⅜	10
150	6189	3.30	9	9⅜	10
200	6169	3.80	10	10½	10
300, 500	6173	4.70	12	11⅞	5

Schedule two discounts.

Cat. No. 5525

Elliptical Angle Reflector—For general illumination on both horizontal and vertical surfaces where units must be mounted off to the side. Provides a wide side distribution as well as directing light to the front. 17½° angle of cut-off.

Lamp, watts	Cat. No.	List price	Dimensions, in.			Standard package
			Front to back	Lengthwise	Overall height	
75, 100	5522	$4.20	8⅞	13⅛	12⅝	10
150	5525	4.20	8⅞	13⅛	13½	10
200	5526	5.40	11⅛	16⅜	16	10
300, 500	*5537	8.70	13⅞	19⅞	19⅝	5
750, 1000	*5538	9.00	13⅞	19⅞	20¼	2

*Tapped ¾ in. standard; ½ in., if specified. Schedule 2 discounts.

Special Sockets for Socket-Reflectors—Fixtures above can be supplied with the following special sockets at an advance in list price: pull chain, medium base; self-locking, medium base; shock absorbing, medium or mogul base.

Two-piece Equipment—"Sturdox," Heavy Duty Threaded Fixtures

A sturdy, two-piece line of industrial lighting equipment for installation where both economy and durability are important factors. Sturdox reflectors are of Crysteel porcelain enameled steel, green outside, white inside. Steel hoods are green Crysteel porcelain enameled; cast hoods are green paint enameled. Pendant hoods are regularly tapped for ½-in. conduit; outlet box hoods will fit 4-in. standard round or octagonal outlet boxes.

Cast

Steel

Pendent Style Hood

Cast

Steel

Outlet Box Style Hood

Pendent style					Outlet box style				
Cat. No.	Material	Socket	Std. pkg.	List price	Cat. No.	Material	Socket	Std. pkg.	List price
9200	Cast	Med.	10	$1.30	9220	Cast	Med.	10	$1.50
9205	Cast	Mogul	5	1.80	9225	Cast	Mogul	5	2.00
9210	Steel	Med.	10	1.10	9230	Steel	Med.	10	1.10
9215	Steel	Mogul	5	1.60	9235	Steel	Mogul	5	1.60

RLM Dome Reflector

Shallow Bowl Reflector

Bowl Reflector

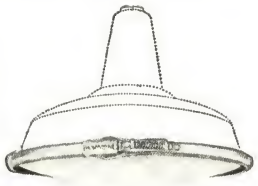
Sturdox Reflectors

Cat. No.	Diam. in.	Lamp, watts	List price	Cat. No.	Diam., in.	Lamp, watts	List price
RLM Dome				**Bowl**			
26012	12	75–100	$2.10	26108	8	75–100	$1.80
26014	14	150	2.40	26109	9	150	2.00
26016	16	200	2.80	26110	10	200	2.40
26018	18	300–500	3.80	26112	12	300–500	3.60
26020	20	750–1000	5.80				
Shallow Bowl				**Symmetrical Angle**			
26414	14	75–150	$2.15	26210	10	150–200	$2.75
26416	16	200	2.75	26212	12	300–500	4.55
26418	18	300–500	3.50	26214	14	750–1000	6.25

Standard package is ten on 75 to 200-watt units; five on 300 to 1000-watt units. Schedule 2 discounts.

Dusttight Glass Cover

A light-weight economical device that gives the reflecting surfaces of Benjamin reflectors protection against dust and dirt. Consists of steel retaining band (cadmium finished), circular felt gasket and clear glass disc.


Cat. No. 6412 (Cover Only)

Cat. No.	List price	To fit reflector, in.	Cat. No.	List price	To fit reflector, in.
6408	$3.10	8	6414	$4.25	14
6409	3.20	9	6416	5.00	16
6410	3.30	10	6418	5.75	18
6412	3.75	12	6420	9.50	20

Standard package is five. Schedule 2 discounts.

Cat. No. 1446 (Guard Only)

Dusttight Cover Guard

Made to protect dusttight covers from breakage. Easily installed. Four lugs fitting into the cover band hold guard securely. Constructed of heavy gauge steel wire with welded joints. Heavily tinned to prevent corrosion.

Cat. No.	List price	Diam. of dusttight cover, in.	Std. pkg.
1445	$ .90	12	5
1446	1.20	14	5
1447	1.60	16	5
1448	2.00	18	5

Schedule 2 discounts.

Aluminum Units for Industrial Use

Cat. No. 7174
Type 79 Pendent Unit

These units have a special aluminum oxide reflecting surface of high lighting efficiency and unusual permanency.

Spread type units provide a relatively broad distribution of light over a relatively wide area. Concentrating type units are for high, narrow bay mounting.

Socket reflectors have an "X" type separable fitting and a keyless porcelain socket. "Type 79" units have a pendent or ceiling cast iron, cadmium-plated hood and a reflector assembly including lamp holder. This assembly can be removed for cleaning by less than a quarter turn of the reflector in the hood.

"X" type fittings and pendent hoods are tapped ½-in. standard; ¾-in. if specified. Ceiling hoods fit 4-in. standard round or octagonal outlet boxes. Reflectors are green lacquer outside, aluminized inside.

Lamp, watts	Cat. No.	List price	Description	Dimensions, in.		Std. pkg.
				Diam.	Height	
Spread Type						
300, 500	4174	$11.00	Socket-Reflector type	14	13⅞	4
300, 500	7174	11.40	"Type 79" pendent hood	14	15⅞	4
300, 500	9174	11.40	"Type 79" ceiling hood	14	15¼	4
Concentrating Type						
300, 500	4166	$13.30	Socket-Reflector type	16	13¾	4
300, 500	7166	13.70	"Type 79" pendent hood	16	15¾	4
300, 500	9166	13.70	"Type 79" ceiling hood	16	15⅞	4
750, 1000	4168	18.00	Socket-Reflector type	18	19¼	4
750, 1000	7168	18.40	"Type 79" pendent hood	18	21¼	4
750, 1000	9168	18.40	"Type 79" ceiling hood	18	20⅝	4

Schedule 4 discounts.

Sign Reflector

N.E.C. Std. The new Benjamin Sign Reflector is easily installed—no conduit bends between reflector and sign. Easily wired, inconspicuous on the board and simple to clean. Shadows and scallops are eliminated along top of board due to the long straight line cut-off and the Benjamin elliptical shape. Reflector is of Crysteel porcelain enameled steel, white inside, green outside. Tapped for ½-in. conduit entrance.

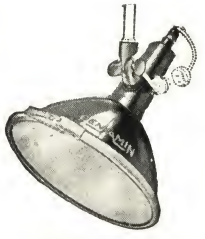
Cat. No. 5571

Lamp, watts	Cat. No.	List price	Dimensions, in.		
			Front to back	Lengthwise	Overall height
100, 150	5570	$4.20	9¼	13¼	8⅝
150, 200	5571	4.80	10	13¼	9

Standard package is nine. Schedule 2 discounts.

The Intensifier

N.E.C. Std. A supplementary lighting unit designed to illuminate small areas to higher intensities than furnished by the general illumination. The intensifier permits the closest discrimination of detail and the most accurate kind of work. Recommended for fine assembly work, close inspection work, fine machine work, for illuminating the surfaces of dies, for illuminating underneath overhanging machinery, for engraving work, shoe stitching machine work and similar operations; also recommended for illuminating interiors not readily accessible, such as core ovens and bake ovens.


Cat. No. 5604

Reflector of heavy gauge metal with steel neck containing keyless easy-to-wire socket and focusing adjustment. Dusttight cover seals interior of intensifier. Outside finish is green paint lacquered; inside is chromium plated. Fitting tapped ½ in.

Lamp, watts	Cat. No.	List price	Cover	Dimensions, in.	
				Diam.	Height
60–100	5603	$11.75	Clear	9	11¾
150, 200	5604	15.00	Etched	12	15¾
150, 200	5632	17.25	Daylight	12	15¾

Standard package is one. Schedule 4 discounts.

Heavy Duty Gas and Vapor Proof Equipment

N.E.C. Std. Recommended for use in powder mills, chemical plants, benzol plants, oil refineries and grain elevators. These heavy duty fixtures are gas, vapor and weather proof. Gaskets seal the interior against the entrance of gas or vapor. Reflectors are porcelain enameled steel finished green outside, white inside. Heavy two-piece cast hood tapped ½ in. Clear glass threaded enclosing globe and porcelain socket.

Cat. No. 6501

WITH DOME REFLECTOR

Lamp, watts	Cat. No.	List price	Dimensions, in.	
			Diam.	Overall hgt.
75, 100	6500	$ 8.00	12	11⅛
150	6501	8.25	14	11⅛
200	6502	9.00	16	11⅛
300, 500	6503	13.00	18	14¾

Standard package is ten on 75-150-watt units; five on 200-500-watt units. Schedule 4 discounts.

Cat. No. 6507

WITH BOWL REFLECTOR

Lamp, watts	Cat. No.	List price	Dimensions, in.	
			Diam.	Overall height
150	6506	$ 7.90	9	11⅛
200	6507	8.80	10	11⅛
300, 500	6508	12.60	12	14¾

Standard package is ten on 150-watt units; five on 200-500-watt units. Schedule 4 discounts.

Cat. No. 6510

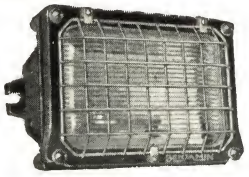
WITH SYMMETRICAL ANGLE REFLECTOR

Lamp, watts	Cat. No.	List price	Dimensions, in.	
			Diam.	Overall height
150, 200	6510	$ 9.00	10	13½
300, 500	6512	13.15	12	15¼

Standard package is five. Schedule 4 discounts.

Shock Absorbing Sockets—Shock absorbing sockets that lengthen lamp life, can be supplied at a $0.10 advance in price over the standard rigid type socket.

Pit and Viaduct Lighting Fixture



Cat. No. 5715

A gas and vapor proof unit especially suitable for correct lighting of automobile or railroad service and repair pits as well as tunnels, viaducts and passageways. Suitable for either built-in or surface installation. The efficient trough-shaped porcelain enameled steel reflector assures maximum light output, while the refracting glass cover concentrates the major portion of the light on the underside of the object over the pit. In some types of locations such as viaducts and tunnels where the lighting requirement is of a general nature, the pit light with a plain glass cover will be found more satisfactory than the refracting type.

Maintenance is extremely simple. Loosening of one screw allows wire guard to be tipped back for easy cleaning of the smooth glass cover. Removal of two cover screws and loosening of two others permits removal of complete cover, intact, for quick and easy relamping of the fixture.

Consists of heavy cast iron box and cover frame. Fixture cover is of heat resisting glass. Heavy, tinned, wire guard protects cover from breakage. Box is tapped for ½-in. conduit at both ends.

Lamp, watts	Cat. No.	List price	Glass cover	Dimensions, in.		
				Length	Width	Depth
100, 150	5715	$20.00	Refracting	12½	8⅜	6¼
100, 150	5710	20.00	Plain	12½	8⅜	6¼
200	5720	22.00	Refracting	13¾	8⅜	7⅜
200	5717	22.00	Plain	13¾	8⅜	7⅜

Standard package is one. Schedule 2 discounts.

"1500 Series" Gas and Vapor Proof Equipment

N.E.C. Std. A new line of one-piece seamless gas and vapor proof reflector units, with "X" type separable weatherproof fitting, porcelain socket and heavy screw type, clear glass enclosing globe. Asbestos gasket seals joint between reflector neck and globe. Reflectors are of acid-resisting Crysteel, porcelain enameled steel, finished green outside, white inside. Tapped for ½-in. conduit; ¾-in. if specified.

WITH DOME REFLECTOR

Lamp, watts	Cat. No.	List price	Dimensions, in.	
			Diam.	Overall hgt.
60, 100	1582	$ 6.00	12	10⅝
150	1584	6.75	14	10⅞
200	1587	8.25	16	12⅞
300, 500	1588	10.75	18	14⅝

Standard package is ten on 100-150-watt units; five on 200 to 500-watt units. Schedule 4 discounts.

Cat. No. 1584

WITH BOWL REFLECTOR

Lamp, watts	Cat. No.	List price	Dimensions, in.	
			Diam.	Overall hgt.
150, 200	1590	$7.00	10	11

Standard package is five. Schedule 4 discounts.

Cat. No. 1590

WITH SYMMETRICAL ANGLE REFLECTOR

Lamp, watts	Cat. No.	List price	Dimensions, in.	
			Diam.	Overall hgt.
150, 200	1592	$ 7.25	10	12¾
300, 500	1593	10.00	14	16

Standard package is five. Schedule 4 discounts.

Cat. No. 1592

Shock Absorbing Sockets—Shock absorbing sockets, that lengthen lamp life, can be supplied at a $0.10 advance in price over the standard rigid type socket.

Vaporproof Projectolite

Cat. No. 5613

N.E.C. Std. For uniform lighting of straight and rounded surfaces from a grazing angle. A special lens broadens and flattens the beam to assure uniform illumination over rounded surfaces. Thoroughly vaporproof with all wiring enclosed and sealed cover. No. 5613 has a copper reflector with a chromium-plated reflecting surface. It is supplied as shown with an adjustable ball fitting, tapped ½ in., and 10 ft. of wire leads. Outside finish is green. No. 5627 is for railroad roundhouse and like uses. It is similar to No. 5613 except that aluminum is used for the reflector neck, reflector body and the cover band. The reflecting surface is highly polished aluminum. Supplied with a water tight connector, tapped ½ in., which is wired to the socket.

Lamp, watts	Cat. No.	List price	Description	Diameter of reflector, in.
300	5613	$20.00	With 10-ft. wire leads	12½
300,500	5627	25.00	With water tight connector	12½

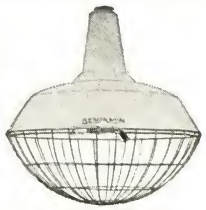
Standard package is one. Schedule 4 discounts.

Locking Lamp Guards

Easily and quickly attached to any Benjamin reflector with a circular opening and a beaded edge. Heavy steel wire guard with welded joints and steel clamp. Padlock with two keys furnished at an advance of $0.65 list.

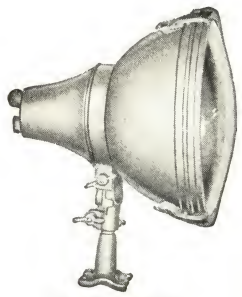
Cat. No.	List price	Diam of reflector the guard fits, in.	Depth of guard, in.
1386	$2.00	12	3¾
1388	2.15	14	5
1390	2.50	15	6¾
1392	2.70	16	4¾
1394	3.00	18	6¼
1396	3.50	20	4

Standard package is ten. Schedule 2 discounts.



Cat. No. 1394

Benjamin Floodlighting Projectors



Cat. No. 5850

These new projectors offer many outstanding advantages for the lighting of exteriors of office, manufacturing, commercial and public buildings, railroad yards, construction areas, stadia, baseball parks, golf driving ranges and other recreational areas.

Housings are of an all-aluminum construction, assuring greatest resistance to corrosion and strength with light weight. Reflectors are of glass, silver plated with a special high temperature copper protective backing.

Each projector has a wide range of beam divergence, reducing the number of different types of projectors to be considered in planning an installation.

The design of the housing makes ventilation unnecessary and the interior is sealed against the passage of dust and moisture. A single gasket seals heat-resisting cover glass to cover frame and frame to housing. Without disturbing the setting, the housing of the unit can be rotated for most convenient hinge placement. The beam spread is controlled by a rugged focusing mechanism.

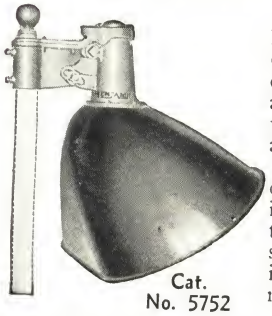
Wiring connections are made to a weatherproof terminal block at the back of the housing. The stuffing gland in the terminal block of Models RD11 and RD14 accommodates No. 14 rubber covered portable cord; Model RD18 accommodates No. 12.

Optional Equipment—Supplied at additional cost when specified: Color discs for obtaining color effects; louvers for controlling spill light; visors; horizontal and vertical adjustable stops. See Benjamin Floodlighting Bulletin for a listing of accessories.

Cat. No.	List price	Style of cover	Outside dimensions, in. Diam.	*Overall height	Depth front to back
Model RD11—With 11-in. Diam. Reflector For 250-watt floodlighting lamps					
5825	$32.00	Plain	13	17	11¾
5826	32.00	Stippled	13	17	11¾
5827	32.00	Ribbed	13	17	11¾
Model RD14—With 14¼-in. Diam. Universal Service Reflector For 300, 500-watt general service, 500-watt floodlighting lamps					
5850	$50.00	Plain	16¼	21¾	17½
5851	50.00	Stippled	16¼	21¾	17½
5852	50.00	Ribbed	16¼	21¾	17½
Model RD18—With 18-in. Diam. Universal Service Reflector For 750 to 1500-watt general service and 1000 and 1500-watt floodlighting lamps					
5875	$80.00	Plain	20¼	26½	21
5876	80.00	Stippled	20¼	26½	21
5877	80.00	Ribbed	20¼	26½	21

Schedule 7 discounts. *With lamp in horizontal position.

Benjamin Play-Area Floodlight



Cat. No. 5752

The Benjamin Play-Area Floodlight is an open type, wide angle, diffusing floodlight for use in outdoor recreational areas. It combines a porcelain enameled steel reflector with an inner reflector of oxidized aluminum.

This fixture meets the modern outdoor lighting requirements by providing a uniform, strong illumination on the ground area to the front and sides of the unit as well as improving illumination in the upper areas necessary for football and baseball.

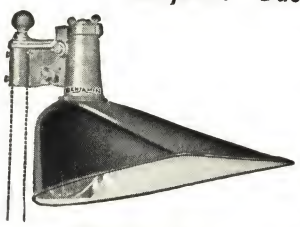
A wide range of adjustment, both horizontally and vertically, is provided by the rugged mounting bracket.

Floodlight is finished in porcelain enamel that is easily cleaned and never needs painting or refinishing; green outside, white inside. Inner reflector is non-corrosive aluminum oxide. All metal fittings are cadmium plated to resist corrosion. Bracket mounts over 1½-in. pipe.

Cat. No.	Lamp, watts	List price	Overall fixture height, in.	Dimensions, reflector only, in. Front to back	Length
5752	750–1500	$32.50	24	16	28¼

Standard package is one. Schedule 17 discounts.

Benjamin "Duo-Service" Floodlight



Cat. No. 5763

For lighting gasoline service stations, used car lots, parking areas and similar locations.

The new Benjamin Duo-Service Floodlight combines a wide coverage diffusing reflector with an intensive beam floodlighting projector. This unit is designed to provide uniform illumination of the surrounding ground area with the simultaneous high intensity floodlighting of an upright or flat surface within, close to, or at some distance from the area of general illumination, its focus depending upon the simple adjusting arm and screw. The unit is easily installed by simply slipping the bracket arm over a 1½-in. pipe standard.

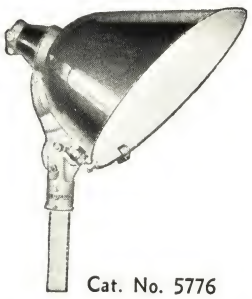
Reflector is porcelain enameled steel finished green outside, white inside. All metal fittings, not cast aluminum, are cadmium plated to prevent corrosion.

Spread Beam Type—Where the regular Duo-Service cannot be mounted back a sufficient distance from the building or object to be floodlighted to permit efficient utilization of the high candle power concentrated beam, the Spread Beam Duo-Service is recommended. It is identical to No. 5763 except that an aluminum spread type inner reflector is provided in place of the chromium projector.

Lamp, watts	Cat. No.	List price	Description	Dimensions, reflector only, in. Front to back	Lengthwise
750–1500	5763	$42.50	With chromium projector	22¼	25
750–1500	5764	37.50	With aluminum reflector	22¼	25

Standard package is one. Schedule 17 discounts.

Benjamin "Big-Ben" Floodlight



Cat. No. 5776

This new floodlight is a long range, open type, diffusing floodlight of a size and power to provide the largest possible quantity of illumination. It is ideal for lighting large outdoor sport and recreational areas.

High efficiency and improved control are achieved by combining two types of reflecting surfaces—special diffused porcelain enamel and oxidized aluminum—in one fixture. The inner aluminum reflector directs a portion of the light further forward from the unit, increasing the range and improving upper area illumination.

The fixture is fully adjustable and may be raised or lowered vertically through a 60° angle. The large reflector is of porcelain enamel; green outside, white inside. The inner reflector is of oxidized aluminum. All metal parts are cadmium plated.

Wiring of the Benjamin "Big-Ben" Floodlight is materially simplified by the removable hood cap which carries the porcelain socket as a unit. Simply removing the cap, by loosening three screws at the back, makes the socket instantly accessible for easy wiring.

The insulated wire entrance bushing at the bottom of the hood cap provides a weatherproof means of bringing the leads through the cap to the socket. From the bushing, drip loops can be formed to the two porcelain knobs on the sides of the cap, thus assuring a weatherproof and workmanlike wiring installation.

The joint between the hood cap and the fixture is adequately protected by gaskets against seepage.

No. 5776 has a slip fitter base for attachment to 2½-in. iron pipe. No. 5778 includes a cross arm base for mounting on cross arms or horizontal surfaces; No. 5780 includes a wall bracket support.

Lamp, watts	Cat. No.	List price	Description	Dimensions, in. Depth, front to back	Reflector length
750–1500	5776	$75.00	With slip fitter base	32	40
750–1500	5778	77.50	With cross arm base	32	40
750–1500	5780	82.50	With wall bracket support	32	40

Standard package is one. Schedule 17 discounts.
Prices do not include wires or lamps.

Aluminum Units for Outdoor Area Lighting

Cat. No. 4176 with Visor, Cat. No. 126

Spread Type—Ideal for Tennis Court Lighting.

The distinctive distribution of this reflector makes it particularly suitable for tennis court lighting.

The reflecting surface is of aluminum oxide, chemically formed, which results in an unusually high reflecting efficiency and also assures lasting durability when exposed to the deteriorating influences of the weather.

In order to increase the output of these fixtures, a baffle plate is inserted at the neck of the lamp to utilize the light rays which otherwise would be lost in the reflector neck. The light weight of these fixtures allows direct attachment to the conduit stem or outlet box, making unnecessary any special mounting provisions.

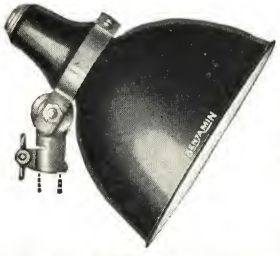
Socket-Reflector units have a standard keyless socket and Benjamin "X" type separable fitting. "79" units consist of a pendent or outlet box type of hood and a reflector assembly including lamp holder. The hood and reflector assembly are effectively locked together by a simple 60° turn.

Pendent hoods and "X" type fittings are tapped ½ in. standard; outlet box hoods fit 4-in. standard octagonal or round boxes. Reflectors are green lacquer outside.

Aluminum Visor Cat. No. 126 is for use with this reflector. It can be easily attached.

Lamp, watts	Cat. No.	List price	Description	Dimensions, in.	
				Diam.	Height
750-1500	4176	$14.50	Socket-reflector	16	17⅛
750-1500	7176	14.90	"79" pendent hood	16	19⅛
750-1500	9176	14.90	"79" out. box hood	16	18½
	126	4.50	Visor for 16-in. reflector	16	9¼

Standard package is four. Schedule 4 discounts.



Cat. No. 4166 Socket-Reflector with Bracket Cat. No. 120 Attached

Concentrating Type—For Use as a Floodlight.

Concentrating type units in combination with the Benjamin Universal Adjusting Bracket, Cat. No. 120 make effective wide angle open type floodlights. This bracket is easily attachable at any time to any Benjamin aluminum reflector.

All reflectors have an aluminum oxide reflecting surface and are supplied in either Socket-Reflector or "79" construction as explained above. The outside reflector finish is green lacquer. The opening in the adjusting bracket fits 1-in. iron pipe. Aluminum visors are also available.

Lamp, watts	Cat. No.	List price	Description	Dimensions, in.	
				Diam.	Height
300, 500	4166	$13.30	Socket-reflector type	16	13¾
300, 500	7166	13.70	"Type 79" pendent hood	16	15¾
	126	4.50	Visor for 16-in. reflector	16	9½
750, 1000	4168	18.00	Socket-reflector type	18	19¼
750, 1000	7168	18.40	"Type 79" pendent hood	18	21¼
	128	5.00	Visor for 18-in. reflector	18	
	120	3.00	Adj. bracket for all reflectors		

Standard package is four. Schedule 4 discounts.

Watertight Switches

Double-pole toggle switch—N.E.C. Std. 30 amps., 125 volts—20 amps., 250 volts.

Double-pole toggle switch with standard watertight junction box. Sturdily constructed with plunger key control.

Standard 4½-in. watertight outlet box supplied in either brass or iron. Cover is of brass furnished with watertight stuffing box and plunger key. Furnished not tapped unless specified. Specify tapping on order.

Cat. No. 6877

Cat. No.	List price	Kind of box	Description
6878	$6.40	Brass	Complete with box
6877	5.70	Iron	Complete with box
6876	5.00	Brass	Cover, with switch only

Schedule 10 discounts.

"Benco" Metalclad Weatherproof Sockets

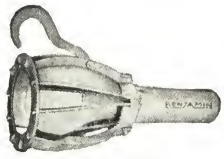
N.E.C. Std. Highly insulated; sturdy interior and strong metal casings. Medium base. Keyless, 660 watts, 600 volts; pull chain, 660 watts, 250 volts. Accommodates Benjamin Type S reflectors and holders.

Keyless Sockets

Pull-Chain Sockets

Cat. No.	List price	Tapping, in.	Finish
Keyless Sockets			
4200	$0.70	½	Pol. aluminum
4202	.85	½	Brush. brass
4204	.70	½	Nat. copper
4201	.70	⅜	Pol. aluminum
4203	.85	⅜	Brush. brass
4205	.70	⅜	Nat. copper
Pull-Chain Sockets			
4225	1.40	½	Pol. aluminum
4207	1.40	½	Brush. brass
4236	1.40	½	Nat. copper
4226	1.40	⅜	Pol. aluminum
4208	1.40	⅜	Brush. brass
4237	1.40	⅜	Nat. copper

Standard package ten. Schedule 3 discounts.



Cat. No. 158

Fibre Hand Portable

N.E.C. Std. A non-conductive, 8-oz. shockproof, fibre portable light with adjustable hook. Socket floats on four flexible springs.

Cat. No.	List Price	Lamp, watts	Description
158	$2.30	25–60	Keyless
160	2.40	25–60	Key

Standard package is five. Schedule 6 discounts.

45-Degree Ball Fixture Aligner

Outlet box cover type. No. 3380 Aligner offers a means of hanging fixtures plumb, even where the slope is as great as 45°. A suspension that will give under mechanical jars and shocks, thereby protecting fixture.

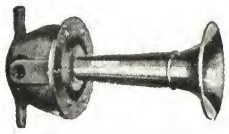
Cat. No. 3380

Cat. No.	List price	Description
3380	$0.30	For standard 3¼ and 4-in. boxes—tapped ½ in.

Schedule 4 discounts.

A-C. Weatherproof Howler

An industrial signal with a strong penetrating pitch which is easily audible above the average industrial noises. May be operated on series or multiple circuits. Standard voltage—110 volts, 60 cycles. Other voltages are special.



Cat. No. 8346-H

Cat. No.	List price	Description
8346-H	$12.50	Inclosed wiring—tapped ½-in. conduit

Schedule 10 discounts.

Motor Driven Howler

Cat. No. 8175

Weatherproof signals of remarkable carrying and penetrating power. For use in such locations as steel mills, railroad shops, on cranes, foundries, cotton mills and machine shops, where a signal system must compete for attention with excessively loud manufacturing noises. Standard voltage—110 volts, 60 cycles, a-c., or 110 volts d-c. Other voltages are special.

Cat. No.	List price	Type	
8175	$35.00	Single projector a.c. motor driven signal	Tapped ½-in. conduit supplied wired with 14-in. leads
8176	35.00	Single projector d.c. motor driven signal	
8180	38.75	Double projector a.c. motor driven signal	
8181	38.75	Double projector d.c. motor driven signal	

Schedule 10 discounts.

DAY-BRITE REFLECTOR COMPANY

GENERAL OFFICE AND FACTORY
3825 Laclede Avenue, ST. LOUIS, MO.

DISTRICT OFFICES

ALBUQUERQUE, N. M.
ATLANTA, GA.
BALTIMORE, MD.
BOSTON, MASS.
BUFFALO, N. Y.
CHICAGO, ILL.
CINCINNATI, OHIO
CLEVELAND, OHIO
DENVER, COLO.
DETROIT, MICH.
FORT WORTH, TEX.
INDIANAPOLIS, IND.
LOS ANGELES, CAL.
MEMPHIS, TENN.
MIAMI, FLA.
MILWAUKEE, WIS.
NEW ORLEANS, LA.
NEW YORK, N. Y.
OMAHA, NEB.
PHILADELPHIA, PA.
PITTSBURGH, PA.
PORTLAND, ORE.
ST. PAUL, MINN.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
WASHINGTON, D. C.
TORONTO, ONT., CAN.
VANCOUVER, B. C., CAN.
WINNIPEG, MAN., CAN.

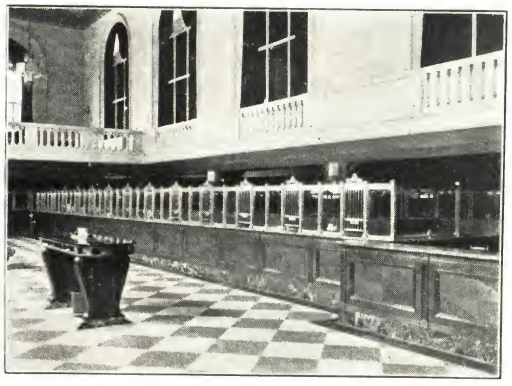
FOREWORD

The DAY-BRITE REFLECTOR COMPANY takes pride in manufacturing quality merchandise at reasonable prices, using at all times the finest grades of raw materials, and employing in their fabrication skilled mechanics trained to make only high grade merchandise.

The following few pages will list generally some of the items of our line. However, we are in a position to design, recommend or manufacture any type of commercial lighting equipment, and we invite you to avail yourself of the services of our Engineering Department when equipment of this type is desired.

We are glad at all times to make recommendations and suggestions without obligation, and shall be glad to furnish general catalogues of our line at any time.

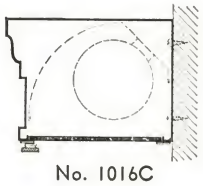
BANK LIGHTING



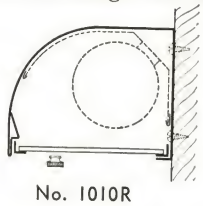
Capitol National Bank, Lansing, Mich.

Below are illustrated three types of continuous bank cage lighting fixtures that are popular in present day bank screen construction. A variety of sizes and designs are listed in catalogue No. 9.

Figure 1 illustrates a combination cage light and illuminated teller sign and numeral. The accompanying illustration is of an installation of this type in the Capitol National Bank at Lansing, Michigan.



No. 1016C



No. 1010R

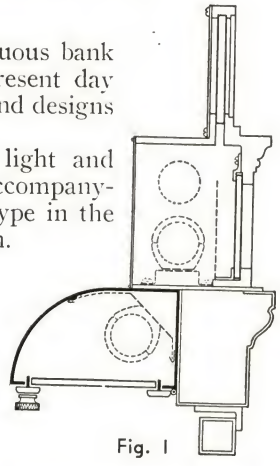


Fig. 1

No. 1016C is one of several drawn bronze moulding designed fixtures for cage lighting purposes. Height, 4 ins., width 5 ins., length continuous.

No. 1010R is made of either bronze or steel, as desired.

Height, 4 ins., width 5 ins., length continuous.

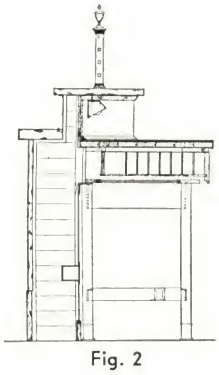
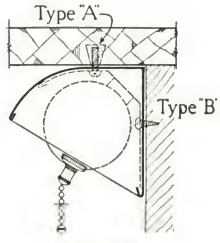


Fig. 2

Deal plate lighting equipment, as illustrated in Fig. 2, is accomplished with Fixture No. 1081 or a continuous trough unit of the tubular lamp size, as illustrated in Fig. 3. No. 1081 will accommodate either the tubular or standard Type A lamp, while fixture in Fig. 3 is for the standard or intermediate base tubular lamps only.

No. 1081—height 3½ ins., width 3¾ ins., length, continuous.

For Fixture Fig. 3, See Continuous Showcase Trough, Catalogue, No. 9.



No. 1081

CHECK DESK LIGHTING

No. 1052

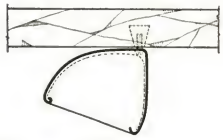
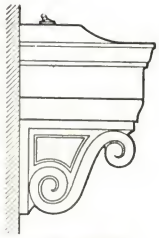


Fig. 3



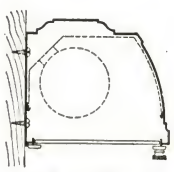
No. 1055

No. 1052—Wall check desk fixture constructed of drawn bronze moulding for standard lamps to 40 watts. Height 4 ins., width 5¾ ins., length 20 ins. at bottom.

No. 1055—Wall check desk fixture with cast ornamental supporting brackets, similar to fixture No. 1052. Height without brackets 4 ins.; with brackets 8 ins., width 5¾ ins., length 24 ins. at bottom. Brackets 2 ins. wide.

No. 1056—Check desk fixture constructed of ornamental drawn bronze or steel moulding, for standard lamps to 60 watt. Height 5 ins., width 5½ ins., length 24 ins. at bottom.

Longer lengths of these fixtures can be furnished on order.



No. 1056

CHECK DESK LIGHTING

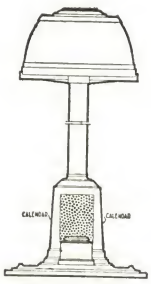
Because of the variety of tastes, and the many conditions present in banking room lighting, we are listing below fixtures of a standard design that will meet most general conditions. However, it is recommended that specifications on this particular type of equipment be furnished to us, and proper recommendations will be made.

Catalogue No. 9 will list in detail this type of equipment, and a copy of same will be gladly furnished on request.

No. 1612

Check desk lighting for banking room, work desks, bookkeepers' tables or library reading tables. These fixtures are available in any desired lengths, in both bronze or steel, with a variety of standards, as illustrated below.

No. 1612, illustrated, is equipped with calendar rack base, Sengbusch inkwells and pen trays.



No. 1612
Cross Section

Type A

Type B

The four accompanying cross sections illustrate various styles of standards available for check desk lighting fixtures. This selection of standards makes it possible for you to choose a fixture that will be in harmony with the motive of construction in the banking room.

Type C

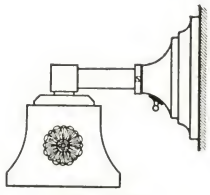
Type D

BRACKET REFLECTORS

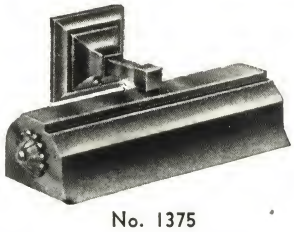
Below are illustrated several types of brackets for check desks, coupon booths, filing cabinets, etc. A more complete listing of these fixtures will be found in Catalogue No. 9.

No. 1352

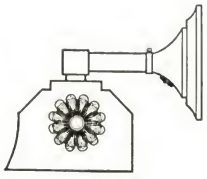
Filing cabinet reflector with movable arm so that light can be moved in a semicircle in order to concentrate light in desired areas. For one standard lamp to 50 watt.



No. 1373

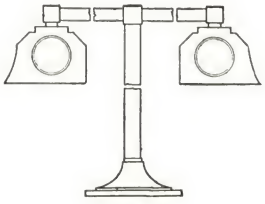


No. 1375



No. 1375
Cross Section

Above are illustrated two standard coupon booth bracket reflectors. All these units are constructed of bronze, and furnished wired complete with control switches in canopy.
No. 1373. Height without fittings, 3⅜ ins.; width 4 ins.; length 10 ins.
No. 1375. Height without fittings, 3½ ins.; width 5 ins.; length 10 ins.

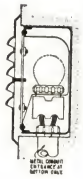


Style N

Two-light bracket arrangement of standard bracket fixtures Nos. 1373-1375.

AISLE AND SIGNAL LIGHTS

Aisle light No. 5050 for corridors of schools, hospitals, public buildings, etc. Over-all cover size is 5¾ ins. square. Box $4\frac{11}{16}$ in. square by 2⅛ in. deep. For S-11 lamps. A specially designed alignment strip provides for easy squaring up of cover plate upon installation. Further details furnished on request.



No. 5050

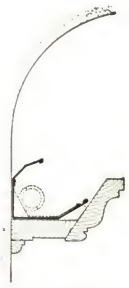
No. 5055 signal light for hospital corridors and over doors of hospital rooms, is constructed similar to No. 5050 aisle light, except that cover is equipped with 3¾-in. glass roundel which is available in various colors. Cover plates available in plated, sprayed or porcelain enameled finish.

No. 5055

All Day-Brite fixtures are equipped with steel porcelain enameled reflectors. This type of reflecting surface will not crack, chip, tarnish or peel from age, heat or atmospheric conditions, and is easily cleaned. This fact not only makes its use practical, but likewise economical from the up-keep standpoint.

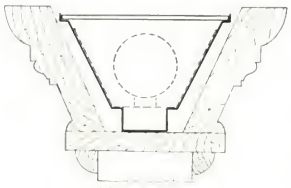
COVE LIGHTING

In considering cove lighting, such conditions as contour of ceiling, size of room, texture of wall, etc., should be considered, and it is advisable, when considering this type of lighting, to allow our Engineering Department to make recommendations for construction of cove, and recommend the proper type of fixture to be used.



No. 1246

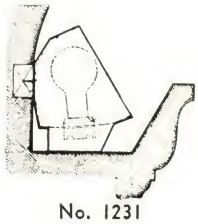
No. 1246. A small continuous trough reflector for low ceilings and where small space is available for cove. For 25-watt, T-6½ intermediate base tubular lamp. Height, 2½ ins.; width, 3½ ins.; length, continuous.



No. 1245

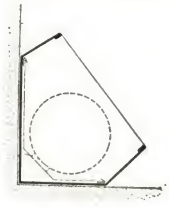
No. 1245. Indirect lighting fixture for standard lamps to 100 watts. Height, 5⅜ ins.; width, 8 ins.; length, continuous.

No. 1231. For vertical lamp mounting for standard lamps to 60 watts. Height, 7⅛ ins.; width, 5¾ ins.; length, continuous.



No. 1231

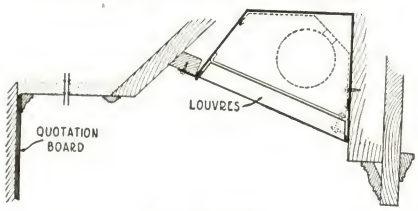
Chancel Reflectors



No. 1276

Chancel arch reflector for standard lamps to 100 watts. Available in single lengths up to 10 ft., with provisions for joining additional units. Height, 5⅜ ins.; width, 4½ ins.; length, continuous. Also available with diffusing glass frames.

STOCK BOARD LIGHTING



No. 3000

Stock board reflector for illuminating brokers stock boards without any glaring light or bright spots. Fixture is constructed with louvre frames so an even distribution of light is accomplished, and will accommodate standard lamps to 150 watts. Height, 6⅞ in.; width, 9¼ in.; length, continuous.

Panel Lighting

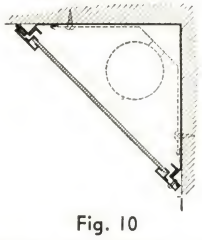
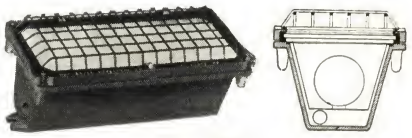


Fig. 10

Modern panel lighting, such as used in new modernistic and futuristic designed building construction. Built to conform with interior design, and constructed to provide the desired amount of illumination. Recommendations will be made if details of the contemplated interior design are furnished.

PIT REFLECTOR

At right is shown a pit reflector for grease pits, washracks, garages, subway tunnels, etc. This unit is constructed of a heavy cast iron shell and frame, equipped with steel, porcelain enameled reflector; pyrex heat resisting glass, mounted in a rubber gasket, which makes the unit entirely vaporproof and waterproof. Will accommodate two standard lamps to 100 watts, each. Height, including guard, 7 ins.; width, 7⅝ ins. at top; length, 17 ins.



No. 5000

INTERIOR ELECTRIC SIGNS

Interior electric signs are available in standard sizes 5x16 and 7x28 ins., exclusive of mouldings. Signs are constructed of drawn bronze moulding and available in thin model with clear plate glass with lettering etched on reverse side, or wide model with opal or tinted glass with raised letters and background finished to match color of frame.

Cross section Fig. A is ⅛ actual size showing the difference between thin and wide model signs.

No. 2600 Thin Model, size 5x16.
No. 2700. Wide Model, size 5x16.

To fit requirements of job with necessary provision for making electrical connections.

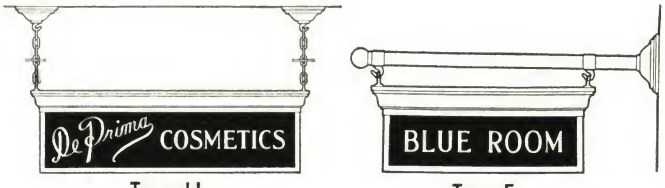
No. 2800

Exit sign. Constructed of 16-gauge steel or bronze, with rigid frame for holding glass. Available with letters ranging from 3 to 8 ins.

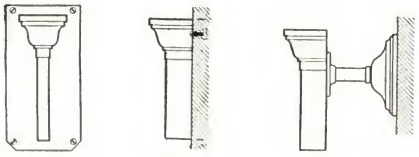
No. 2600-2700 Fig. A

No. 2920

Exit sign. Made of 16-gauge steel or bronze with hinged frames for easy relamping of fixture. Available in sizes to accommodate letters ranging from 3 to 8 ins.



Type H Type E



Type B Type A Type C

Cross sections of various types of mounting arrangements available on standard interior electric signs of the No. 2600 and 2700 series.

No. 2760

Merely an idea of construction of this item. These signs are constructed of extruded bronze mouldings for bank and public building corridors, and sizes vary in accordance with detail and construction of building. Information should be furnished, and sketches of recommended signs will be made.

CENTURY LIGHTING EQUIPMENT, INC.

Manufacturers of Lighting Equipment for Theatres, Motion Pictures, Hotels, Universities, Schools and Churches

TELEPHONE
COlumbus 5-3421

351 West 52nd Street
NEW YORK, N. Y.

CABLE ADDRESS
"Lekolite"

Service

Century offers detailed blue prints of all listed items and will, upon request, furnish them without charge.

Borderlights

Available in many designs. Sizes range from 25 to 500 watts per outlet. Units vary in reflecting surfaces from non-fade white paint to individual reflectors of porcelain, matt aluminum or chromium. Features include correct ventilation, rigid construction and complete accessories. *All instruments constructed to conform with Underwriters' rulings.*

No. 400

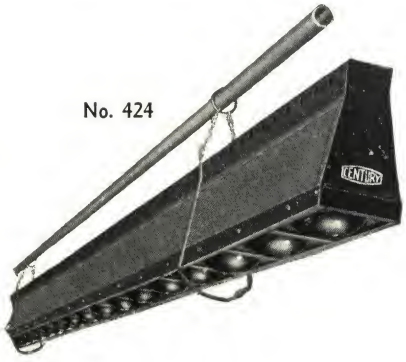
No. 406

Non-fade White Paint Reflecting Surface Types—*Century Semi-open Trough Single Row Unit*—Wired on receptacle centers and circuits as specified, to receive from 25 to 100 watts per outlet. Chain hangers; band iron reinforcements; splice box for feed cables.

***Century Compartment Type Single Row Units*—**Wired on receptacle centers and circuits as specified, to receive from 200 to 500 watts per outlet. Chain hangers; scenery guards; gelatine medium holders; splice box for feed cables.

No.	Type	Watts	Centers, in.
400	Semi-open trough	25 to 100	3, 4, 6
406	Compartment	100 to 200	10, 12
407	Compartment	300 to 500	12, 14

Individual Reflector Types—Can be furnished with either steel-back porcelain enameled, matt aluminum, or copper-back chromium plated reflectors. Units vary from small 100-watt size to large 500-watt. Wired on receptacle centers as specified.


No. 424

Each reflector equipped with heat-resisting glass roundel and positive locking holder to receive either glass roundel or gelatine medium. Chain hangers; scenery guards; splice box for feed cables.

STEEL-BACK BAKED PORCELAIN ENAMELED REFLECTORS

No.	Type	Watts	Centers, in.
428	Compartment	50 to 100	6
419	Compartment	100 to 200	8, 10, 12
420	Compartment	300 to 500	12, 14

MATT FINISH ALUMINUM SPUN REFLECTORS

No.	Type	Watts	Centers, in.
411	Compartment	50 to 100	6
413	Compartment	100 to 200	8, 10, 12
414	Compartment	300 to 500	12, 14

COPPER-BACK CHROME-PLATED REFLECTORS

No.	Type	Watts	Centers, in.
423	Compartment	50 to 100	6
424	Compartment	100 to 200	8, 10, 12
425	Compartment	300 to 500	12, 14

(Special designs made to order upon application.)

Footlights

Sturdily built and correctly designed to meet all stage requirements. Types include semi-open trough; concealed; compartment; indirect; and concentrated units; with individual reflectors of either non-fade white paint, matt aluminum, or copper-back chrome plate. Colored heat-resisting glass roundels or medium frames furnished. *All instruments built to conform with Underwriters' rulings.*

Non-fade White Paint Reflecting Surface Types—*Century Semi-open Trough Single Row (or Double Row) Units*—Wired on receptacle centers and circuits as specified, to receive from 25 to 100 watts (colored lamps) per outlet. Metal housing and wiring channel is Standard 20-gauge galvanized iron, painted dull black on outside. Splice box for feed cables.

No. 800

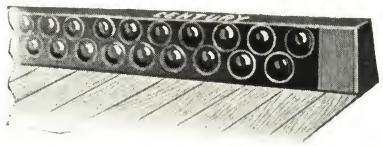
No. 806

***Century Compartment Type Single Row Units*—**Wired on 6-in. centers to receive up to 150 watts per outlet. Color circuits wired to specifications. Grooved arrangement for metal color frames to receive gelatin mediums. Splice box for feed cables.

No.	Type	Watts	Centers, in.
800	Single row, semi-open trough	25 to 100	3, 4, 6
801	Double row, semi-open trough	25 to 100	3, 4
806	Compartment	50 to 100	6

Individual Reflector Types—Obtainable with either matt finish aluminum spun or copper-back chromium plated reflectors. Units vary in design and sizes, from single row direct light to double row concealed type and indirect light. Wired on receptacle centers and circuits as specified, varying from 25 to 150 watts and from 2 to 4-color circuits. Heat-resisting glass roundels with holders; splice box for feed cables.

No. 827



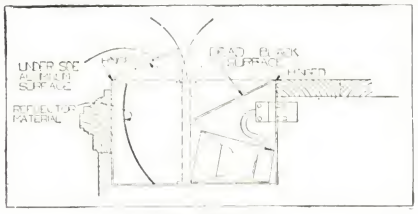
MATT FINISH ALUMINUM SPUN REFLECTORS—DIRECT LIGHT

No.	Type	Watts	Centers, in.
808	Single row, glass roundels	50 to 100	6
823	Double row, glass roundels	50 to 150	5, 6

COPPER-BACK CHROMIUM-PLATED REFLECTORS—DIRECT LIGHT

No.	Type	Watts	Centers, in.
809	Single row, glass roundels	50 to 150	6
823	Double row, glass roundels	50 to 150	5, 6

No. 810 Satin Finish Aluminum Surface Reflector—Indirect Light—Wired on 4-in. centers with individual aluminum spun reflectors for each receptacle to take from 50 to 100 watts per outlet. Satin finish aluminum surface indirectly reflects light to stage. Soft, well-blended tonal light is obtained. Definite shadows caused by overhead lighting are thereby eliminated. Single row, heat-resisting glass roundels with rings; splice box for feed cables.



No. 810

Concealed Disappearing Types—Available in various designs. Rigid, compact, flexible. Units are standard lengths of 5 ft., with wood frame and covers of kiln dry oak (or maple). Automatic on-and-off switch; splice box for feed cables.

SINGLE ROW

No.	Type	Outlets	Watts
811	White paint reflecting surface	15	60 to 100
820	Matt finish aluminum spun reflectors and glass roundels	9	150
826	Matt finish aluminum spun reflectors and glass roundels	12	60 to 100
821	Chromium plated reflectors and glass roundels	9	150
822	Chromium plated reflectors and glass roundels	12	60 to 100

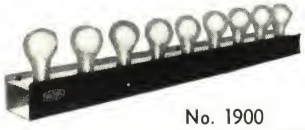
DOUBLE ROW

827	Matt finish aluminum reflectors and glass roundels	24	60 to 100
828	Chromium plated reflectors and glass roundels	24	60 to 100

All footlights with the exception of Concealed Disappearing Types can be constructed either straight or curved.

Covelighting

Century Covelights are innumerable in design and construction. Wiring channels and reflectors are narrowed to a minimum without affecting efficiency. Straight or curved strips are constructed to permit concealment.



No. 1900

No. 1905

No.	Description
1900	Cove Strip with no reflector.
1902	Cove Strip with aluminum reflector and glass roundel.
1905	Cove Strip with chrome-plated reflector and glass roundel.

Aisle, Chair and Step Lights

Constructed to permit concealment. Louvered to prevent spill of light. Step light boxes, of No. 12 gauge galvanized iron, have fronts of aluminum casting with horizontal or vertical line construction louvre. Aisle and chair lights are of cast aluminum, with stippled glass lens at bottom to obtain soft, well-directed light.

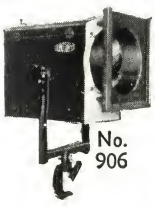
No. 2300

No. 2302

No.	Description	Watts
2300	Horizontal Step Light, medium base receptacle	25 to 40
2301	Vertical Step Light, medium base receptacle	15 to 40
2302	Aisle and Chair Light, medium base receptacle	15 to 50

Balcony Spotlights

Especially designed for this purpose. Units receive from 500 to 2000-watt lamps; set on mogul prefocus base, backed by non-tarnishing 5-in. chromium plated reflector; properly yoked to insure ease in operation and angling. Sufficient ventilation adds to life of color mediums. Height adjustment provided for accuracy in angling. Top door opening allows immediate access to lamp without disturbing position of spotlight. Special screw-feed focal adjustment on top of hood eliminates difficulty in adjusting lights from balcony—an exclusive feature of Century Balcony Spotlights.



No. 906

No. 1008

No.	Description	Lens, in.
906	500 to 2000-watt concentrated lamp	6
1008	500 to 2000-watt concentrated lamp	8

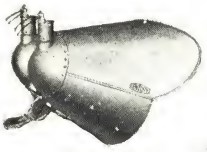
(Mountings on base, or with clamp, optional.)

Outdoor Spot Projectors and Floodlights

Units are designed to project beams of light for long range work or diffused rays for wide spread.

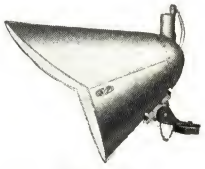
Projectors—Constructed to withstand severe weather and have 14-in. mirror-glass reflector treated against tarnish; curved to emit maximum light. Outside adjustment for focusing lamps. Colored heat-resisting glass fronts furnished at additional cost.

Floodlights—Made to receive either 1, 2 or 3 lamps, in capacities from 500 to 1500 watts per receptacle. Constructed of sheet aluminum with aluminum rustproof castings. Chemically treated, the reflecting surface emits a well-diffused, non-glaring light over wide area.



No. 1500

No. 1501



No. 1550

No.	Description
1500	1-outlet Floodlight for 500 to 1500-watt PS lamp.
1550	2-outlet Floodlight for two 500 to 1500-watt PS lamps.
1551	3-outlet Floodlight for three 500 to 1500-watt PS lamps.
1501	Projector for 500 to 1000-watt G-40 lamp.

Illuminated Exit and Directional Signs

Century manufactures these signs in every conceivable design and size.

Frames—Range in material construction from galvanized iron mouldings to architectural bronze castings.

Backings—Furnish in red, green, or black glass with white etched letters; leaded glass with red or green letters; or with non-inflammable, non-breaking composition of any color.

Designs—Include single or double faced lettering for: surface or flush wall mounting; ceiling or suspension type; sidewall bracket mounting; globular design for ceiling or wall mounting.

Finish—Boxes attractively painted in gold, architectural bronze, or in shades to conform to general color scheme of location.

Stage Floor and Wall Pockets

Widely utilized for making heavy wiring connections for temporary use. *Strict adherence to Underwriters' approval and code rulings.*

STAGE-FLOOR POCKETS (250 VOLTS, 50 AMPERES)

No.	Type	Inches A	B	C	D	E
3091	1-outlet with stage plug	11⅛	6⅛	9⅛	9 5/16	5⅛
3092	2-outlet with stage plugs	11⅛	9	9⅞	9 5/16	7
3093	3-outlet with stage plugs	11⅛	12	9⅞	9 5/16	10½
3094	4-outlet with stage plugs	11⅛	14½	9⅞	9 5/16	13 3/16

Wall pockets, flush type (250 volts, 50 amperes), available in all sizes.

ERIKSON ELECTRIC COMPANY

Specialized Lighting Equipment

6 Power House Street, BOSTON, MASS.

ATLANTA, GA.
CHICAGO, ILL.
CINCINNATI, OHIO
CLEVELAND, OHIO
COLUMBUS, OHIO
DALLAS, TEX.
DETROIT, MICH.
LOS ANGELES, CAL.
NEW ORLEANS, LA.
NEW YORK, N. Y.
PHILADELPHIA, PA.
PITTSBURGH, PA.
PORTLAND, ORE.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
ST. LOUIS, MO.
ST. PAUL, MINN.
TOLEDO, OHIO
WASHINGTON, D. C.

Cove Reflectors

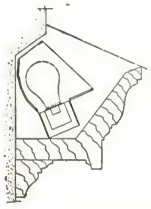
ERIKSON REFLECTORS

The Erikson Electric Company manufactures a complete line of concealed cove lighting equipment for all types of work. The equipment is specially designed and manufactured for each installation.

A Typical Example of Modern Concealed Lighting

Chromium Lined Cove Reflectors

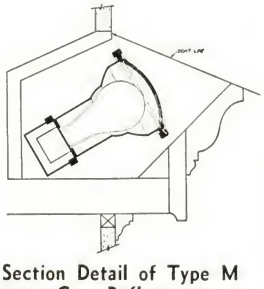
Erikson chromium lined cove reflectors are of the continuous type and afford an economical type of reflector which is both efficient and permanent.



Section Retail No. 816 Cove Reflector

A Typical Erikson Chromium Lined Cove Reflector

Individual Reflectors with Glass Roundels for Cove Lighting



Section Detail of Type M Cove Reflector

Typical Erikson Type M Cove Lighting Equipment

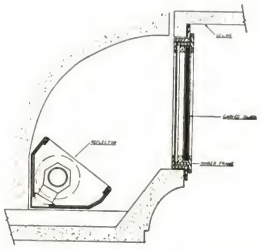
This equipment consists of individual chromium plated reflectors equipped with color glass roundels and is recommended for high grade installations and for unusually difficult conditions.

Flush Panel Lighting

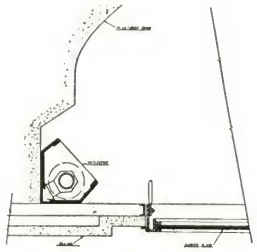
Erikson flush panel lighting equipment is designed to meet the requirements of individual installations. Erikson continuous chromium lined reflector equipment for the illumination of either wall or ceiling panels assures uniform results.

Typical Installation of Flush Panel Lighting

Owing to the unlimited possibilities afforded by the use of flush panel lighting, details of each installation must be worked out individually. This company will be pleased to submit complete designs, including structural details for any given project.



Typical Detail for Vertical Panel Lighting



Typical Detail for Horizontal Diffusing Panel Lighting

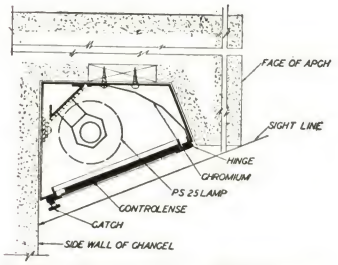
Concealed Chancel Illumination

This company manufactures a complete line of both the continuous open type and the closed lens type chancel arch reflector equipment. This method of illumination assures correct intensity and uniform lighting results without glare.

The lens type chancel arch reflectors accurately distribute the light as desired.

Typical Installation of Concealed Chancel Arch Reflectors

Type K Chancel Arch Reflector, Equipped with Controlenses, Mounted Flush with Finished Wall



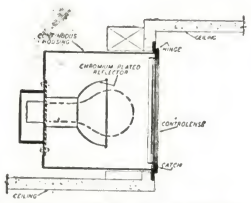
Section Detail of Type K50 Chancel Reflector

Architectural Lighting

The Erikson Kirbylite Type of flush equipment, which employs prismatic Controlenses, is particularly adapted to so-called architectural lighting in which the equipment forms a part of the architectural decoration, and at the same time provides working illumination.

Typical Example of Architectural Lighting with Built-in Equipment

As shown in the section detail at the right, the Erikson Kirbylite equipment is usually built in flush with the finished surface. The Controlens prevents glare from the reflector or lamps.

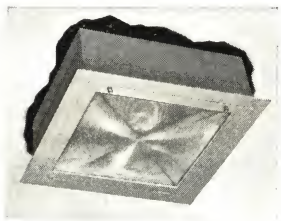


Section Detail of Kirbylite Equipment

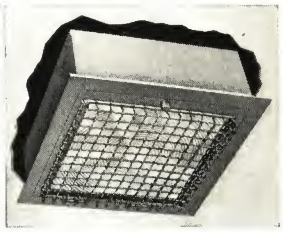
Flush Type Lighting Units

This company manufactures a complete line of flush lighting units employing Controlenses for all types of installations. Units are made, using a single lens or in a combination of four lenses.

Typical Installation of Erikson Flush Lighting Units



Single Lens Unit No. K90-U12-H20 without Guard



Single Lens Unit No. K90-U12-H20 with Guard

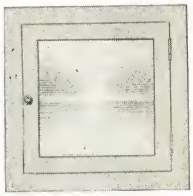
Standard ceiling lens units are manufactured in the following over-all dimensions of trim:

9¼ ins. square; 11⅞ ins. square; 15⅞ ins. square.

The four-lens type is 26 ins. square when installed without hinged door and 28½ ins. square when equipped with door. These units are designed in capacities from 15 to 1200 watts as required by the individual installation.

Hospital Lighting Units

Type K80-50 Night Light—This unit is designed to mount approximately 18 ins. above the floor in private rooms, wards and corridors, and is equipped with a Controlens for directing the light to the floor.

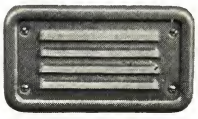


Type K80-50 Night Light

H80-U25 Bed Light—This unit is designed to mount over the bedside table to provide either a subdued table illumination when used in the position shown at the right or for subdued general illumination when visor is dropped to the lower part of the plate.

Type H80-U25 Bed Light

L80-U15 Night Light—This unit is designed to be installed 18 ins. above the floor to provide night illumination in rooms or corridors. All of the above units are constructed with 14-gauge cadmium plated steel front finished in a permanent light ivory color.



Type L80-U15 Night Light

ESTABLISHED 1898

GARCY REFLECTORS

A DIVISION OF GARDEN CITY PLATING & MFG. CO.

1430 South Talman Avenue, CHICAGO, ILL.

NEW YORK OFFICE and WAREHOUSE, 133 Wooster Street

REPRESENTATIVES IN PRINCIPAL CITIES

For our pages on Ornamental Metal Work, Adjustable Shelving Hardware and Garment Carriers, see Manufacturers' Index

"Garcy" Lighting Reflectors

Listed by National Board of Fire Underwriters.

Used in stores, banks, theatres, art galleries and public buildings throughout the country.

Made any size or shape, in straight or curved continuous troughs of any length, or short units for one or two lights.

GARCY
TRADE MARK REG.

Materials and Finish

Outer Shells—Made of steel, brass, or bronze, in any standard or special finish.

Linings—Usually made of highly polished chromium.

If desired, porcelain or ripple chromium can be furnished.

Literature

Write for Reflector Catalog showing greater detail and additional designs for reflectors.

Show Case and Wall Case Lighting

Reflectors are furnished complete with hanging clips for wood frame or all-glass show case as required.

Tilting Sockets—Makes changing of lamps easy. Avoids breakage. Facilitates cleaning.

CONTINUOUS REFLECTORS

No.	Face, in.	Height, in.	Sockets	For lamps
3301	1½	1⅛	Intermediate	T6½-25 watt
3196	2	1½	Standard	T10-25 watt or T8-40 watt

Have elbow fitting for ⅜-in. rigid tubing and sufficient wire for connection at one end. Sockets spaced about 18 in. on center unless otherwise ordered.

Reflectors with Hinged Doors

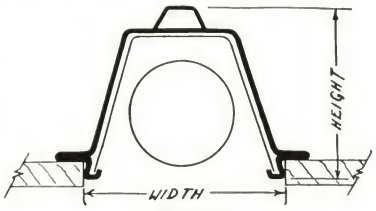
Any "Garcy" reflector can be equipped with decorative diffusing, refracting or colored glass of any type in hinged frames, either attached to or separate from the reflector.

Diffusing Glass—Where diffusion is desired and to avoid glare or specular reflection, frosted glass is generally used. Pressed lens or prism design glass can also be furnished for the same purpose. For decorative effects, as in luminous panels, opal glass is often used. Any type of glass, plain or decorative, can be furnished.

Directo-lenses—These are flat prismatic lens plates, which break up the light by refraction, producing a higher intensity of illumination with a low surface brilliancy—powerful but glareless. These plates can also be furnished with decorative geometrical patterns.

Miscellaneous Reflectors

The illustrations below show a few of the many items shown in the new Garcy reflector catalog, a copy of which will be sent on request.



No. 6108

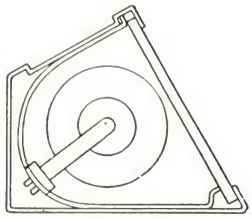
Wall Case Reflectors

Many shapes and sizes are shown in the new reflector catalog.

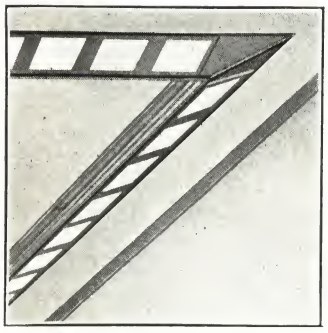
No. 3112

Window Reflectors

Overhead, footlight, panel type, etc., for every size and type of display window.



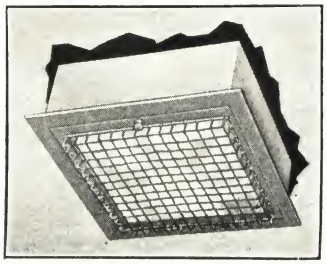
No. 3096



Overhead Reflectors

For art galleries, stock quotation boards, blackboards, maps, rug racks, etc.

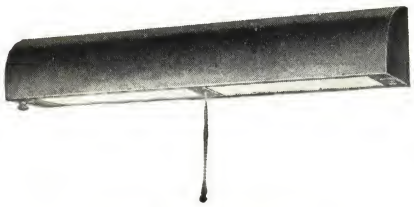
Built in or suspended from wall or ceiling. A variety of reflectors are available for this type of lighting.



Gymnasium Lighting

Flush Mounting Fixture with wire guard. Made with lenses or diffusing glass in hinged frame. Wire guards are hinged to facilitate cleaning of glass.

Bank Counter Screen Reflectors



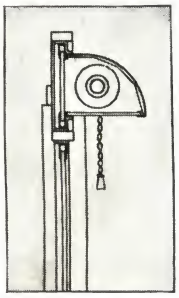
Bank Screen Reflector

To attach to wicket or cornice.

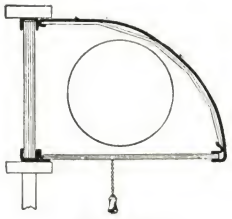
Usually made in 18-in. units with twin socket and removable diffusing glass. Also furnished in continuous lengths with lamps usually spaced 18 in. on centers.

No.	Width, in.	Height, in.	Lamp capacity, watts
3142	4	3¾	60
3143	5	4½	100

Other sizes and designs can be furnished.



Section Through Counter Screen Showing Reflector and Illuminated Sign



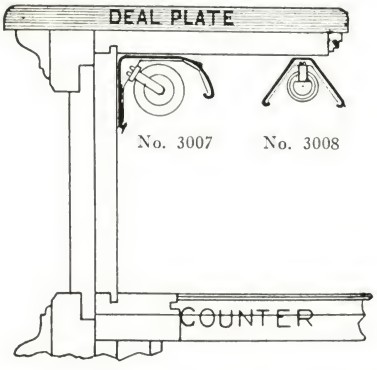
No. 3072
Wicket Reflector with Illuminated Sign

Letters are sandblasted on opal glass with dark background.

Any lettering.

Signs are removable to permit changing of lamps.

Sign is 3 in. high; reflector, 4 in. wide with diffusing glass bottom. Usually made 18 in. long with twin socket for 60-watt lamps and pull chain switch.



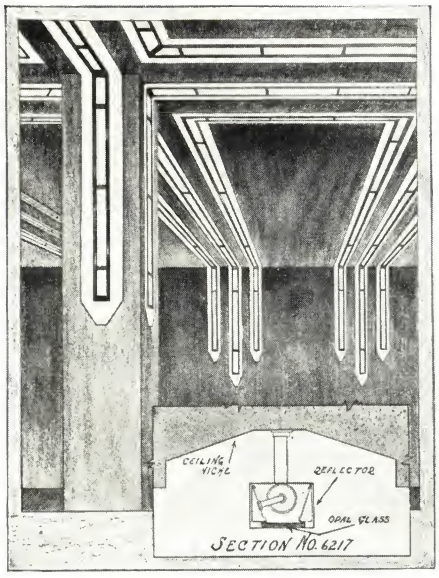
No. 3007 No. 3008

TO ATTACH UNDER DEAL PLATES OR DEAL SHELF

No.	Face, in.	Height, in.	Lamp capacity, watts
3007	5	3	60 watt
3008	3½	2	T10 Tubular

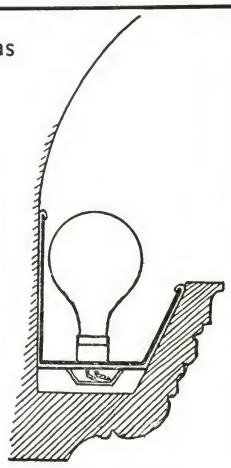
Other sizes and designs can be furnished.

Indirect Lighting Systems

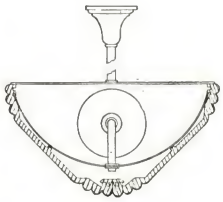


Reflectors for Niche Lighting
In this illustration our designing department suggests not only an efficient method of illumination but an effective and novel architectural treatment fully in keeping with the modern trend

Engineering Service—Our Engineering and Designing Department will gladly submit reflector designs suitable for any particular condition—or furnish any information that may be required.

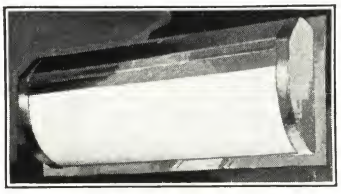


No. 3035
Cove Lighting Reflector
Made any shape or size to suit conditions

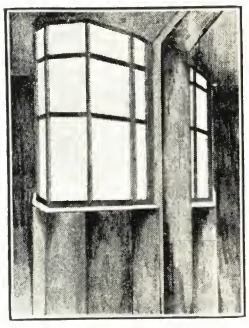


No. 6601
To Illuminate Ceiling
Made of extruded brass or bronze. Reflector is 9⅛ in. wide, 4⅝ in. high, for lamps up to 200 watts.
Other designs can be furnished

Decorative Lighting Fixtures

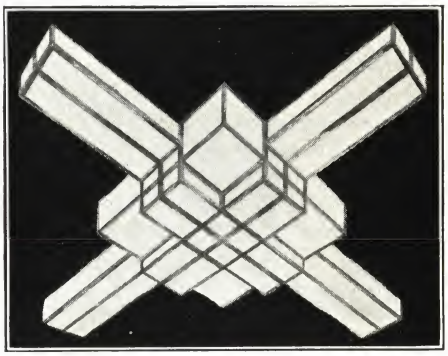


No. 6605
Wall or Column Fixture



No. 6611
Making the Column a Source of Light

No. 6607
Wall or Column Fixture



No. 6616
"Light Box" Type of Ceiling Luminaire
This or other designs can be furnished

ESTABLISHED 1912

REFLECTOR & ILLUMINATING CO.

Manufacturers and Engineers; Makers of Sterling Reflectors and Other Scientifically Designed Lighting Products

1431-1435 West Austin Avenue, CHICAGO, ILL., U. S. A.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Lamp Sizes, 250 to 1500 Watts

Complete range of correctly designed, highly efficient units for exterior flood lighting, made from the finest materials to stand long, hard wear

Merchandise Service

Reflectors for show window, showcase and wallcase lighting. Floodlights for all forms of interior and exterior display lighting. Complete service for cove lighting, footlighting, general interior and industrial lighting.

Engineering Service

Architects are invited to avail themselves of the wide experience and helpfulness which our illuminating engineers are able to give on lighting problems of every kind. This service is absolutely free and incurs no obligation.

Lamp Sizes, 25 to 500 Watts

Silvered glass, enduring lustre reflectors to meet requirements for the various types of efficient direct and indirect lighting

Sterling Reflectors

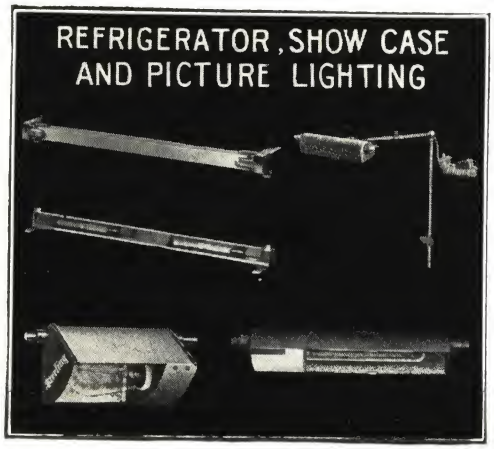
Sterling reflectors are guaranteed for *"A Lifetime of Service."*

Complete Catalogues

Complete (pocket size) catalogue of Sterling products mailed on request.

Modern Illumination

Our wide range of equipment for show window and display lighting includes scientifically designed reflectors, floodlights, and "Ready-2-Install" wiring channel that meet all requirements for modern, efficient illumination regardless of the size or shape of the windows. The various reflectors cover a range of lamp sizes from 25 to 500 watts.



Plans and Information

When your requirements are for refrigerator, showcase, or picture lighting you can depend upon Sterling units to do the job correctly, satisfactorily, and economically with assurance of quality and performance that will please. We invite your inquiries for plans and information covering this type of lighting.

Permaflectors

The silver-plated glass reflectors with the PERMANENT reflecting surface

MADE ONLY BY

Edison Building, Philadelphia
Permaflector Floodlighting
in Changing Colors

Pittsburgh Reflector Co.

304 ROSS STREET - PITTSBURGH, PA.

New York City: General Motors Building
Chicago: Merchandise Mart

SALES OFFICES

Atlanta:
Bona Allen Bldg.

Baltimore:
105 E. Franklin St.

Boston:
101 Milk St.

Buffalo
350 S. Elmwood Ave.

Chicago:
Merchandise Mart.

Cincinnati:
622 Broadway.

Cleveland:
202 Chester-Twelfth Bldg.

Dallas:
2205 Leonard St.

Denver:
7th and Lawrence Sts.

Detroit:
141 E. Elizabeth St.

Indianapolis:
202 Indiana Termina Warehouse,
31 E. Georgia St.

Kansas City:
1320 Main St.

Los Angeles:
310 Transportation Bldg.,
122 East 7th St.

Louisville:
314 Keller Building.

Miami:
1221 Biscayne Bldg.

Milwaukee:
1134 N. Forty-Sixth St.

New York City:
1775 Broadway.

New Orleans:
918 Union St.

Philadelphia:
235 S. 8th St.

Salt Lake City:
318 Dooly Block.

San Francisco:
1149 Howard St.

Seattle:
240 Securities Building.

St. Louis:
2647 Washington Blvd.

Crystal Glass, made in our own factory that we may control every step of the process. Result—clear, sparkling, uniform.

Pure silver, double plated—the surface that reflects light with least loss by absorption.

Copper envelope—seals the silver between glass on the one side and copper on the other. Like a copper roof it is a lifetime protection.

Silver colored satin finish—distinctive, handsome, harmonizes with all backgrounds.

OUTSTANDING DISTINCTIVE FEATURES OF PITTSBURGH PERMAFLECTORS

The complete Permaflector—the glassware as well as the application of the reflecting surface and protective finish—is made in the Pittsburgh Reflector Company's own plant under the closest supervision and inspection. Permaflectors are unconditionally guaranteed for ten (10) years. The illustrations above show clearly the four major steps in the process of manufacture.

1. **The Glassware**—Permaflector glassware is of the highest quality of tough, accurately-blown, clear crystal glass.

2. **The Reflecting Surface**—Silver-plating on the outside of the glass—for commercial uses, the most efficient reflecting surface yet produced—when protected by the Pittsburgh method it retains permanently its original bright luster.

3. **The Copper Protecting Coat**—Over the silver-plated reflecting surface is applied, by an exclusive secret process, a thin tough sheet of copper. This permanently seals the silver and protects it from absorbing and positively prevents tarnishing, discoloration, checking and peeling.

4. **The Satin Silver Finish**—Over the copper protective surface is applied a satin silver finish, attractive and distinctive—a finish of neutral tone which harmonizes admirably with all surrounding materials and fitments.

PERMAFLECTOR LIGHTING

THERE IS A PERMAFLECTOR FOR "Pittsburgh" Permaflector PRACTICALLY EVERY LIGHTING NEED

MADE EXCLUSIVELY BY

PITTSBURGH REFLECTOR COMPANY

304 ROSS STREET, PITTSBURGH, PA.

More than 70 Different Designs

The Permaflector line of silvered glass reflectors includes more than 70 different designs—a correctly shaped unit for practically every need in the lighting of show windows, cove lighting, direct and indirect lighting, floodlighting and color lighting. There is scarcely any lighting problem which Permaflectors will not help solve.

Engineering Service

For more than two decades we have specialized in the lighting of show windows and in other fields of special illumination. During this varied experience we have accumulated a fund of information valuable in the solution of illumination problems. This information is available, without obligation, for the solution of all problems relating to the lighting of show windows, color lighting, spot lighting, foot lighting, indirect cove lighting for theaters, churches, libraries, courtrooms and other public buildings as well as homes, direct and indirect lighting, industrial lighting, lighting through skylights, outdoor floodlighting, etc.

Our experienced corps of illuminating engineers is constantly available to the architect.

The Sixteen Year Record

That "Pittsburgh" Permaflectors invariably stay bright is proven by the history of the past 16 years. Although the heat of the Type "C" lamp places great stress and strain upon the reflecting surface and the reflector backing, Permaflectors have successfully passed every test—the heat test in the laboratory, the heat test in the baking ovens after the finish is applied (350 degrees for four hours) and last, but by no means least, the practical test in scores of thousands of installations throughout the world.

Not even 1/1000 of 1 per cent—not even one in 100,000 of all the "Pittsburgh" reflectors made since August 1st, 1916—has ever been reported as having the backing crack, check or peel or the silver reflecting surface tarnish or darken.

Guarantee

We unconditionally guarantee that the backing of "Pittsburgh" Permaflector Silvered Glass Reflectors will not crack, check or peel and that the silver reflecting surface will not tarnish for a period of 10 years from the date of purchase.

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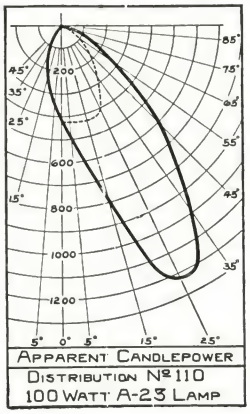
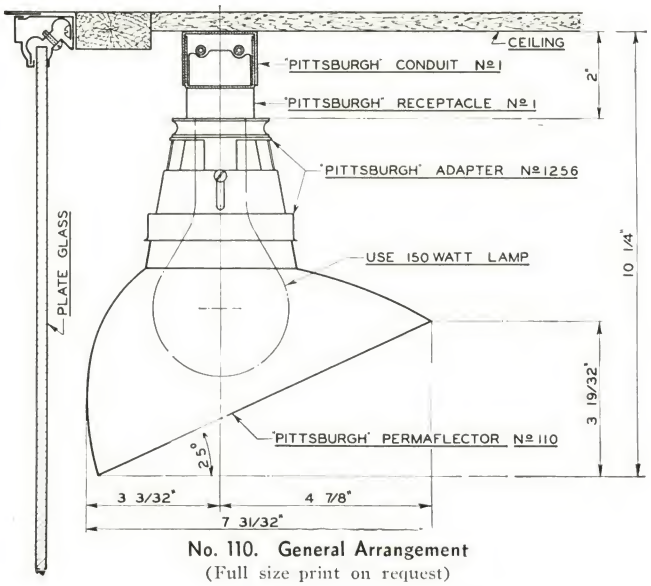
PERMAFLECTOR NO. 110





No. 110. General Arrangement
(Full size print on request)

Permaflector No. 110

Application—For low, deep show windows, 4 to 9 ft. high, in which trim is carried up to the level of the reflectors. In the plane perpendicular to the plate glass, it illuminates to 95 degrees above nadir on trim side.

Also for wall cases, interior bulletin boards, paintings, cove lighting in theaters, churches, etc.

Spacing—Usually spaced 12 in. on center; may be spaced as closely as 9 in. When so spaced, good distribution may still be had with every other unit burning, a condition possible when windows are wired with alternate outlets on separate circuits.

Receptacles—Should be 5½ in. to center, from plate glass—minimum, 3½ in.

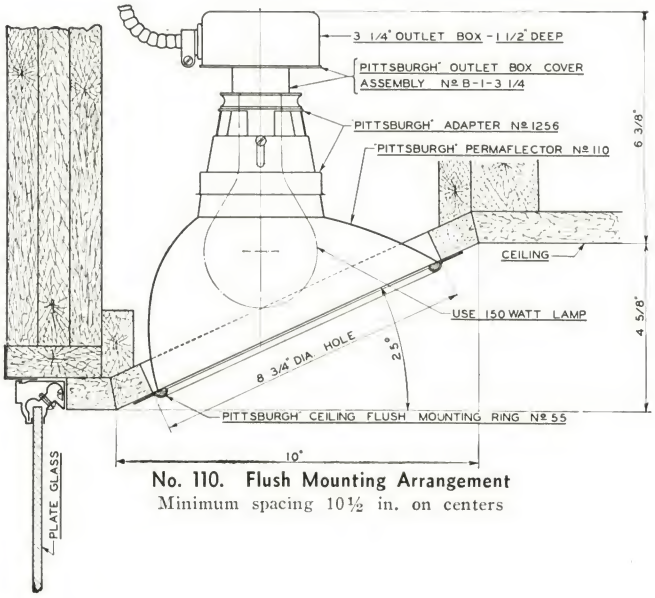
Flush Mounting Ring—No. 55 (page 16).

Color-Lite—Color-Lite No. 5 or 6 (page 17).

Lamps—100-watt, A-23 and 150-watt, PS-25. Change from one size lamp to another requires merely adjustment of the adapter.

Holder—2¼ in. Form "O" (page 16). No holder required when used with "Easy-to-Install" Conduit or Box Cover Assemblies (see pages 18 and 19).

Bottom Opening Circular—Diameter, 8½ in.

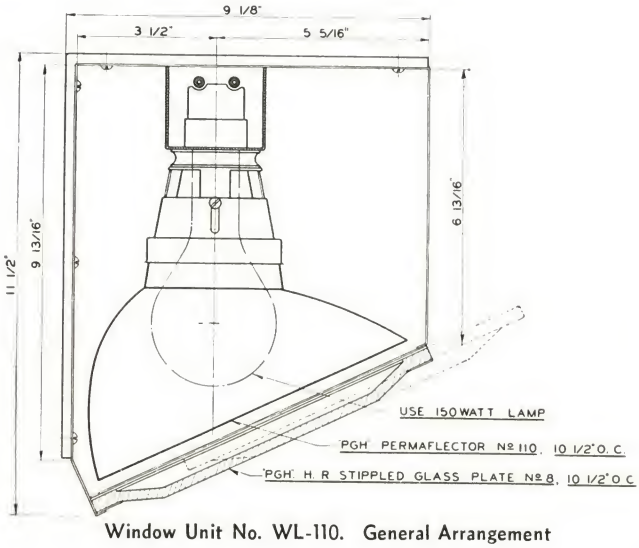


No. 110. Flush Mounting Arrangement
Minimum spacing 10½ in. on centers

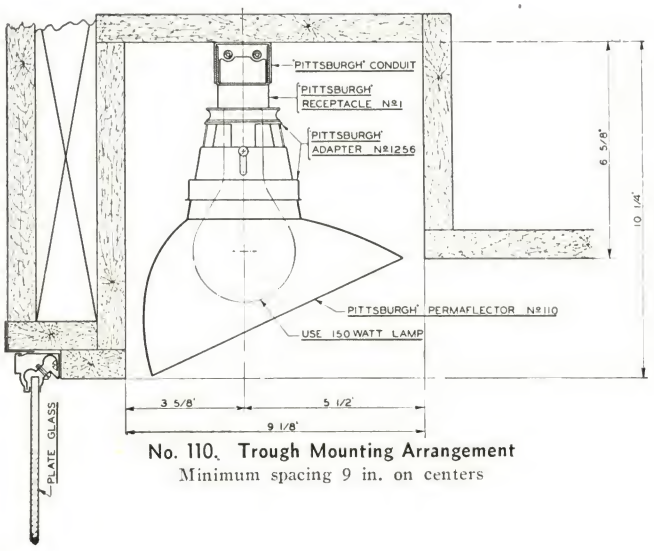
Enclosed Window Unit No. WL-110

Consists of Permaflector No. 110 enclosed in 20-gauge galvanized steel troughing with individual inside stippled glass plates covering bottom opening of Permaflector. Plates available in uncolored or colored (red, amber, green, blue) heat resisting glass (see page 8). Glass plates slide out, as shown by dotted lines in diagram below, to provide access to lamps and Permaflectors.

The glass plates conceal the lamp effectively without materially affecting the light distribution.

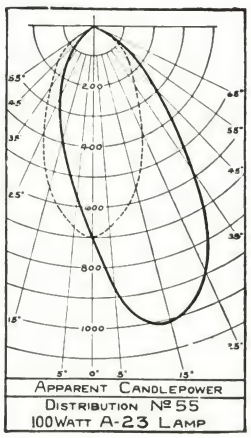


Window Unit No. WL-110. General Arrangement



No. 110. Trough Mounting Arrangement
Minimum spacing 9 in. on centers

PERMAFLECTOR NO. 55



Permaflector No. 55

Application—For medium size shallow windows, 4 to 9 ft. high; medium trim; island windows; or windows with upper part of background of glass. Concentrating; light cuts off between 65 and 70 degrees.

Exceptional concentration in the 5 to 35 degree angle, insuring effective illumination on the floor of the shallow window for which this reflector is intended.

Also for borders and strips on theater stages, indirect side wall urns and coves, side walls of galleries when placed over skylights.

Spacing—Usually 12 in. on center; may be spaced as closely as 9 in.

Receptacles—Should be 5½ in. to center, from plate glass—minimum, 3½ in.

Flush Mounting Ring—No. 55 (page 16).

Color-Lite—Color-Lite No. 5 or 6 (page 17).

Lamps—100-watt, A-23 and 150-watt, PS-25. Change from one size lamp to another requires merely adjustment of the adapter.

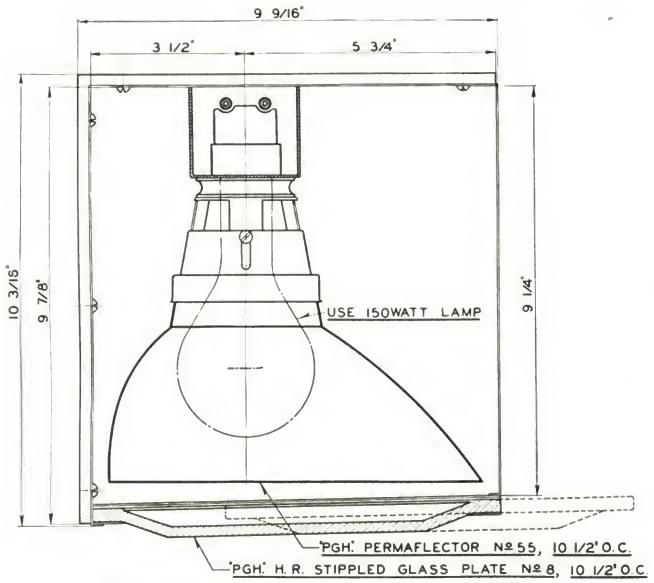
Holder—2¼ in. Form "O" (page 16). No holder required when used with "Easy-to-Install" Conduit or Box Cover Assemblies (see pages 18 and 19).

Bottom Opening Circular—Diameter, 8½ in.

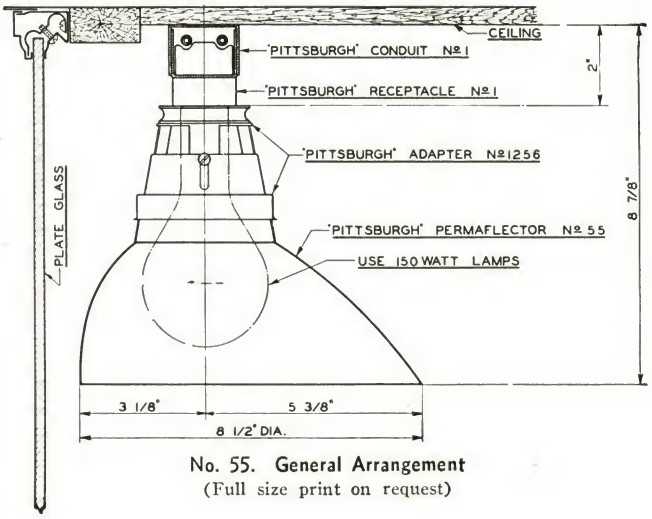
Enclosed Window Unit No. WL-55

Consists of Permaflector No. 55 enclosed in 20-gauge galvanized steel troughing with individual inside stippled glass plates covering bottom opening of Permaflector. Plates available in uncolored or colored (red, amber, green, blue) heat resisting glass (see page 8). Glass plates slide out, as shown by dotted lines in diagram below, to provide access to lamps and Permaflectors.

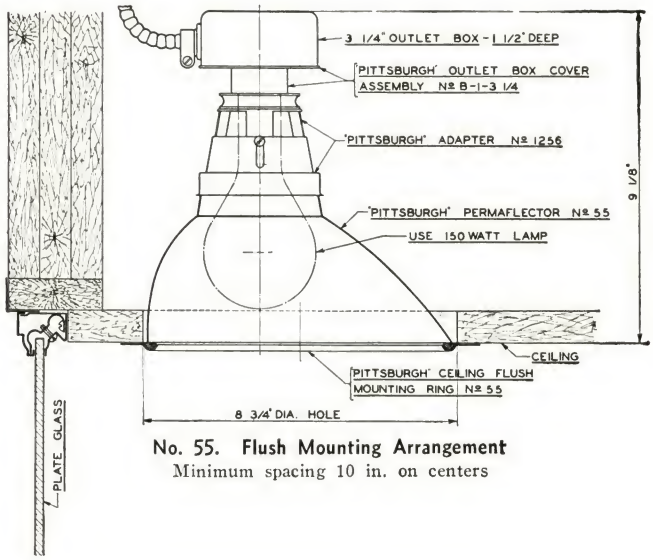
The glass plates conceal the lamp effectively without materially affecting the light distribution.



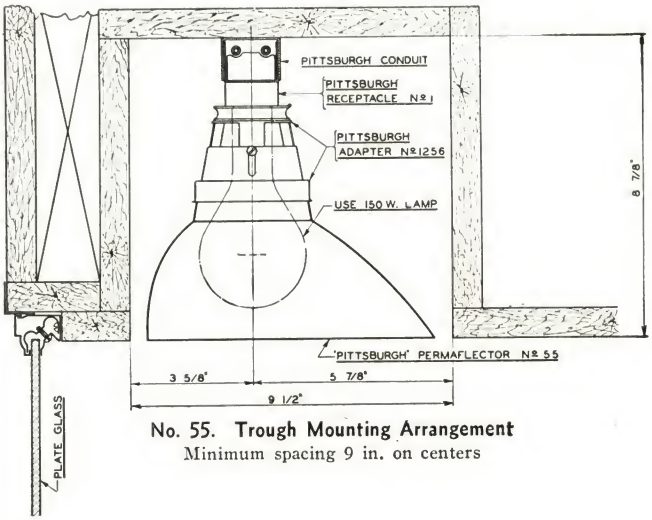
Window Unit No. WL-55. General Arrangement



No. 55. General Arrangement
(Full size print on request)

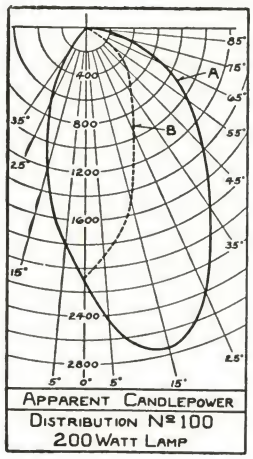


No. 55. Flush Mounting Arrangement
Minimum spacing 10 in. on centers



No. 55. Trough Mounting Arrangement
Minimum spacing 9 in. on centers

PERMAFLECTOR NO. 100



Permaflector No. 100

Application—For windows 7 to 10 ft. high, having a depth (plate glass to background) ranging from one-half to three-fourths of the distance from floor to reflector. Light flux 0 to 90 degrees. Strong concentration of light between 5 and 25 degrees gives high floor illumination near the plate glass, the area most distant from the reflector. Ideal for windows in which the trim is carried high. Also useful for lighting of rug racks, interior bulletin boards, interior sales displays, paintings, indirect lighting from coves, for theater and proscenium lights.

Spacing—For uniform distribution of light over the trim, should be 12 in. on centers; may be as close as 10½ in. When so spaced good light distribution may still be had when every other unit only is on, a condition possible when windows are wired with alternate outlets on separate circuits.

Receptacles—Should be 5½ in. to center from plate glass; minimum, 3¾ in.

Flush Mounting Ring—No. 100 (page 16).

Color-Lite—Color-Lite No. 1 or 2 (page 17).

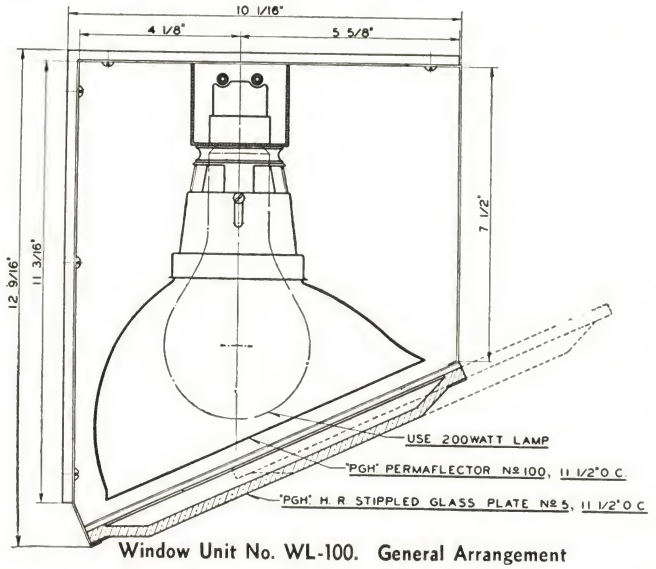
Lamps—150-watt, PS-25 and 200-watt, PS-30. Change from one size lamp to another requires merely adjustment of the adapter.

Holder—2¼ in. Form "O." No holder required when used with "Easy-to-Install" Conduit or Box Cover Assemblies (see pages 18 and 19).

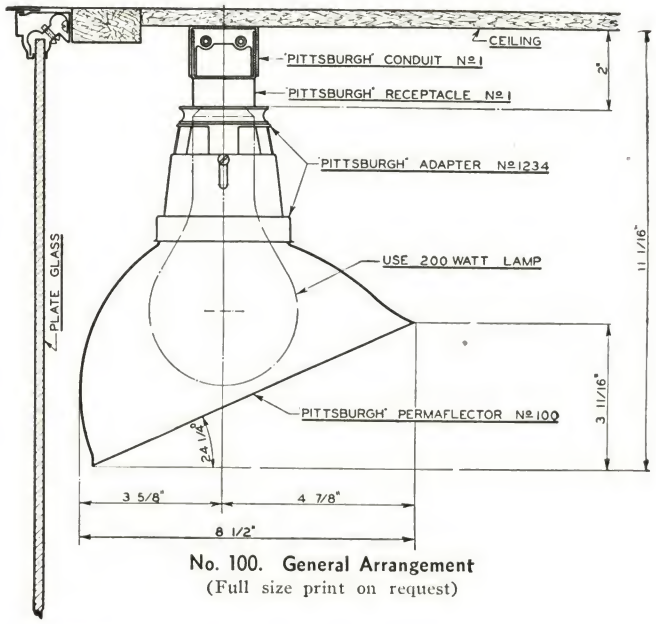
Enclosed Window Unit No. WL-100

Consists of Permaflector No. 100 enclosed in 20-gauge galvanized steel troughing with individual inside stippled glass plates covering bottom opening of Permaflector. Plates available in uncolored or colored (red, amber, green, blue) heat resisting glass (see page 8). Glass plates slide out, as shown by dotted lines in diagram below, to provide access to lamps and Permaflectors.

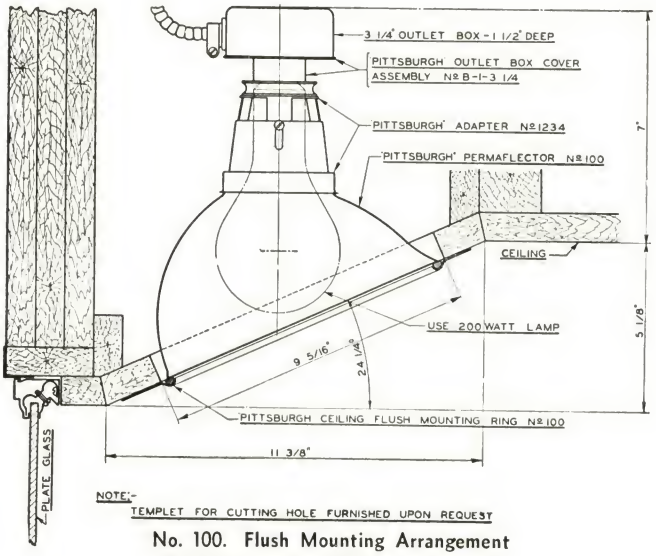
The glass plates conceal the lamp effectively without materially affecting the light distribution.



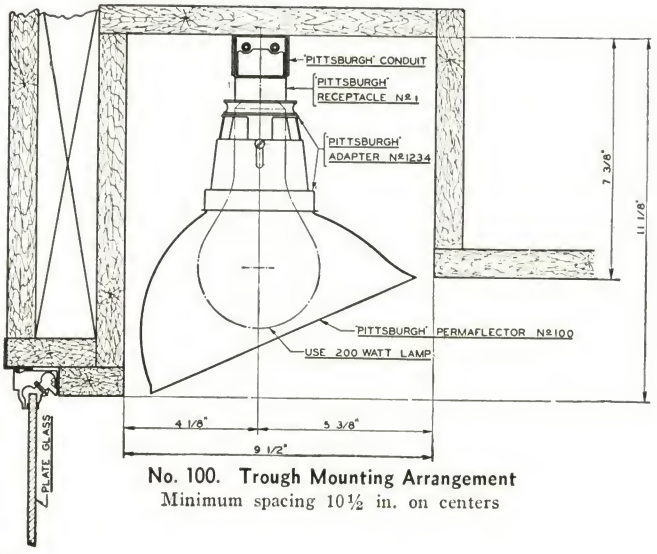
Window Unit No. WL-100. General Arrangement



No. 100. General Arrangement
(Full size print on request)

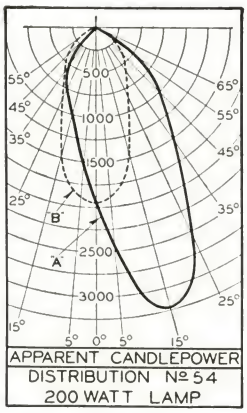


No. 100. Flush Mounting Arrangement
Minimum spacing 10½ in. on centers



No. 100. Trough Mounting Arrangement
Minimum spacing 10½ in. on centers

PERMAFLECTOR NO. 54



APPARENT CANDLEPOWER
DISTRIBUTION Nº 54
200 WATT LAMP

Permaflector No. 54

Application—For shallow windows 7 to 10 ft. high; medium trim; island windows or windows with upper part of background of glass. Also useful for lighting automobile show rooms.

Spacing—For uniform distribution of light over the trim, should usually be spaced 12 in. on center; may be spaced as closely as 10½ in. When so spaced good light distribution may still be had when every other unit only is on, a condition possible when windows are wired with alternate outlets on separate circuits.

Receptacles—Should be 5½ in. to center from plate glass; minimum, 3¾ in.

Flush Mounting Ring—No. 54 (page 16).

Color-Lite—Color-Lite No. 1 or 2 (page 17).

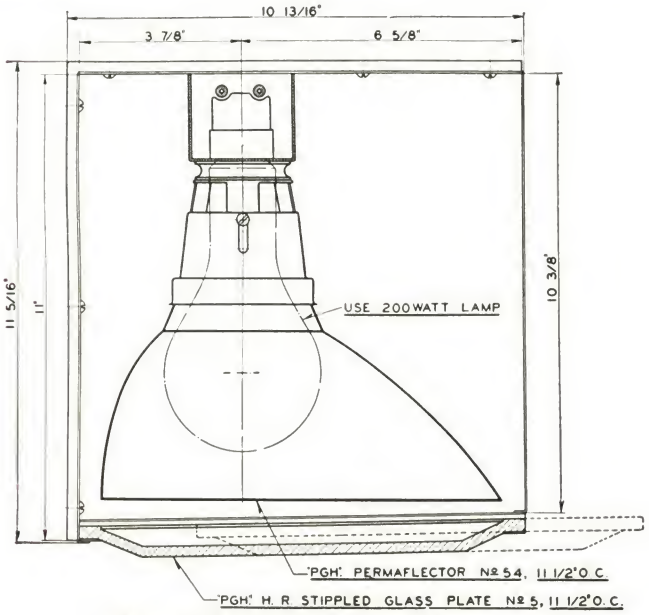
Lamps—150-watt, PS-25 and 200-watt, PS-30. Change from one size lamp to another requires merely adjustment of the adapter.

Holder—2¼ in. Form "O." No holder required when used with "Easy-to-Install" Conduit or Box Cover Assemblies (see pages 18 and 19).

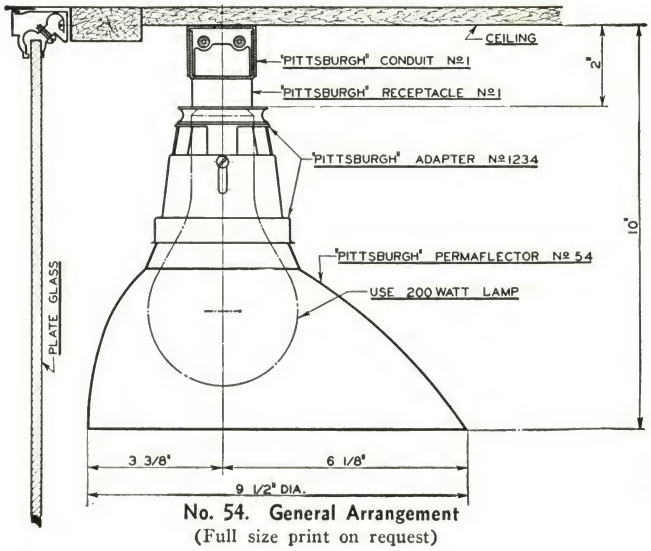
Enclosed Window Unit No. WL-54

Consists of Permaflector No. 54 enclosed in 20-gauge galvanized steel troughing with individual inside stippled glass plates covering bottom opening of Permaflector. Plates available in uncolored or colored (red, amber, green, blue) heat resisting glass (see page 8). Glass plates slide out, as shown by dotted lines in diagram below, to provide access to lamps and Permaflectors.

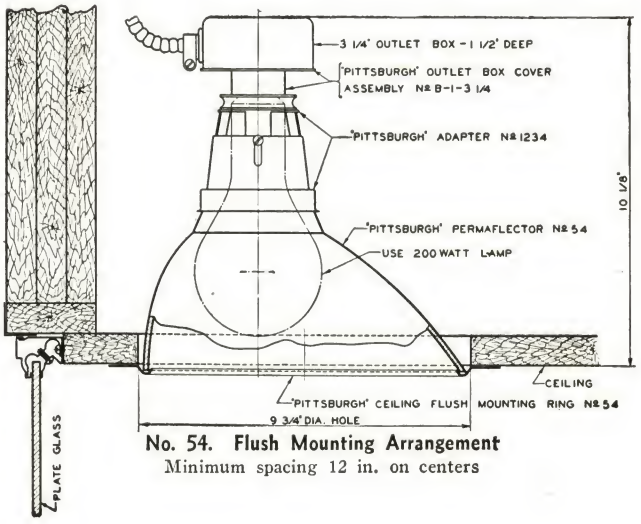
The glass plates conceal the lamp effectively without materially affecting the light distribution.



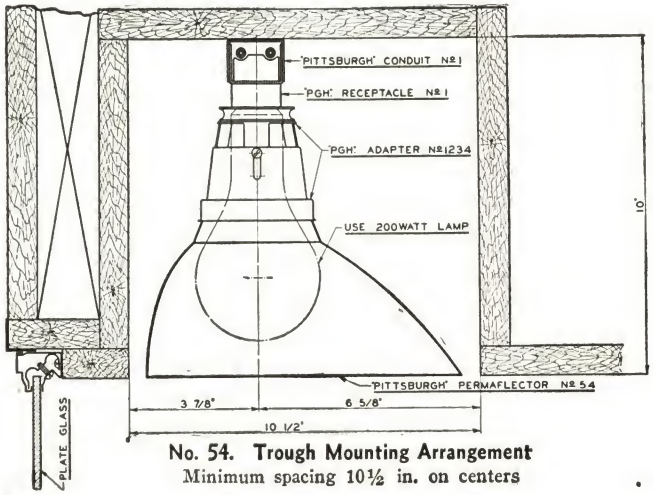
Window Unit No. WL-54. General Arrangement



No. 54. General Arrangement
(Full size print on request)



No. 54. Flush Mounting Arrangement
Minimum spacing 12 in. on centers



No. 54. Trough Mounting Arrangement
Minimum spacing 10½ in. on centers

PERMAFLECTOR NO. 300

Permaflector No. 300

Application—For shallow windows 7 to 12 ft. high; medium high trim; island windows or windows with upper part of background of glass. Concentrating; light cuts off at 60 degrees.

Exceptional concentration of light in the 5-degree to 25-degree angle, insures effective illumination on the floor of the high and shallow windows for which this Permaflector is intended.

Spacing—For uniform distribution of light over the trim, we recommend these Permaflectors be spaced 12 in. on center; when so spaced good light distribution may still be had when every other unit only is turned on, permitting the wiring of window with alternate outlets on separate circuits.

Receptacles—Should be spaced 6 in. on center from plate glass; minimum 4½ in.

Lamp—300-watt, PS-35.

Mogul receptacle, 4-in. round box cover and No. 12 Adapter furnished with Permaflector.

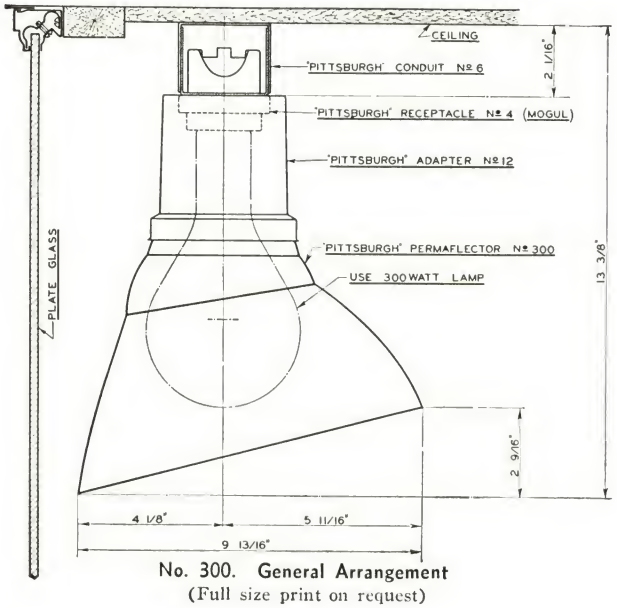
Attaches directly to standard outlet box.

(When used on Conduit No. 6, discard box cover and attach receptacle and adapter to conduit which is shipped punched ready to receive them.)

Enclosed Window Unit No. WL-300

Consists of Permaflector No. 300 enclosed in 20-gauge galvanized steel troughing with individual inside stippled glass plates covering bottom opening of Permaflector. Plates available in uncolored or colored (red, amber, green, blue) heat resisting glass. Glass plates slide out, as shown by dotted lines in diagram below, to provide access to lamps and Permaflectors.

The glass plates conceal the lamp effectively without materially affecting the light distribution.



No. 300. General Arrangement
(Full size print on request)

Herewith is a list of the square convex heat-resisting glass plates available:

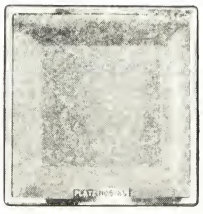
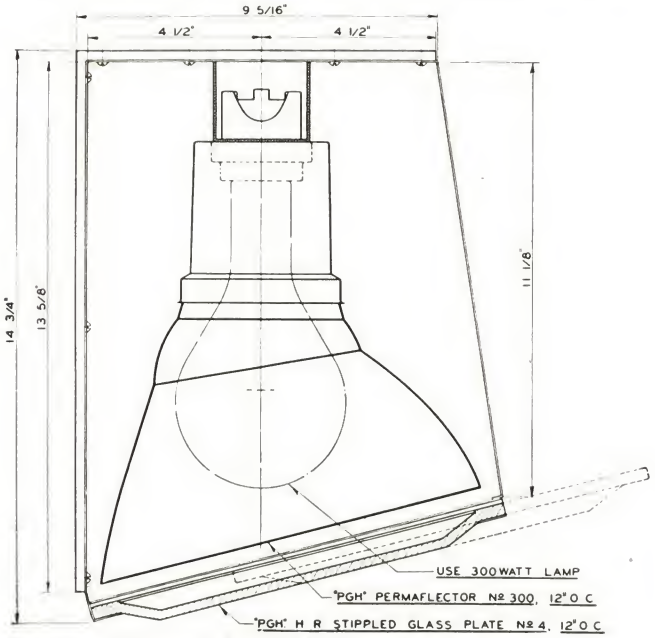
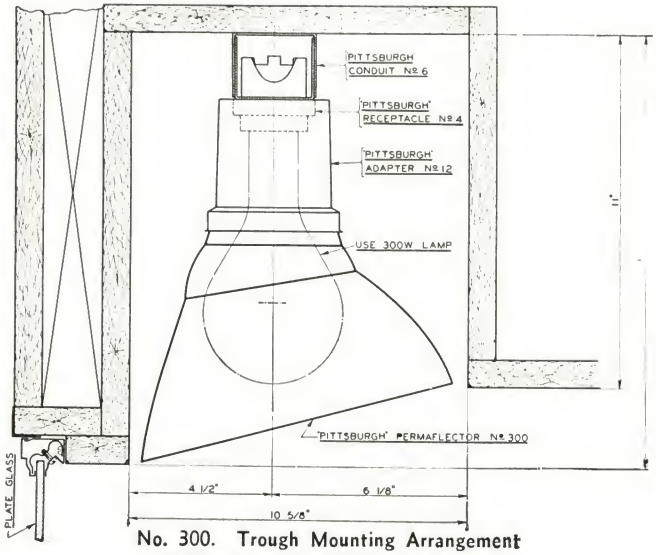


Plate No.	Size in inches	Description
1	13⅝ square	Stippled inside
2	13⅝ square	60° spread ribbed inside
3	17⅞ square	Stippled inside
4	11 square	Stippled inside
5	10½ square	Stippled inside
6	8½ square	Stippled inside
7	7 square	Stippled inside
8	9¼ square	Stippled inside

Plates Nos. 1, 4, 5 and 8 can be furnished on special order in red, green, blue and amber.

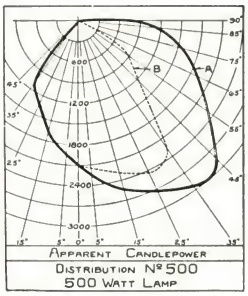


Window Unit WL-300. General Arrangement



No. 300. Trough Mounting Arrangement
Minimum spacing 10½ in. on centers

PERMAFLECTOR NO. 500



Permaflector No. 500

Application—For large deep windows in which the trim is carried up high. Since it is designed for use with the 300 and 500-watt lamp, it will find its principal use in exceptionally large windows where high intensity lighting is necessary as combating daylight reflections. Not recommended for windows less than 8 ft. high. Distribution wide spreading.

Spacing—Should be installed 15 in. on center, which will permit burning each alternate unit without making distribution of light uneven when it is desirable to cut light in half.

Receptacles—Should be spaced 7½ in. to center from plate glass; minimum, 5½ in.

Flush Mounting Ring—No. 500 (page 16).

Color-Lite—No. 7 or 8 (page 17).

Lamps—300-watt, PS-35 and 500-watt, PS-40.

Mogul receptacle, 4-in. round box cover and Form M holder furnished with Permaflector.

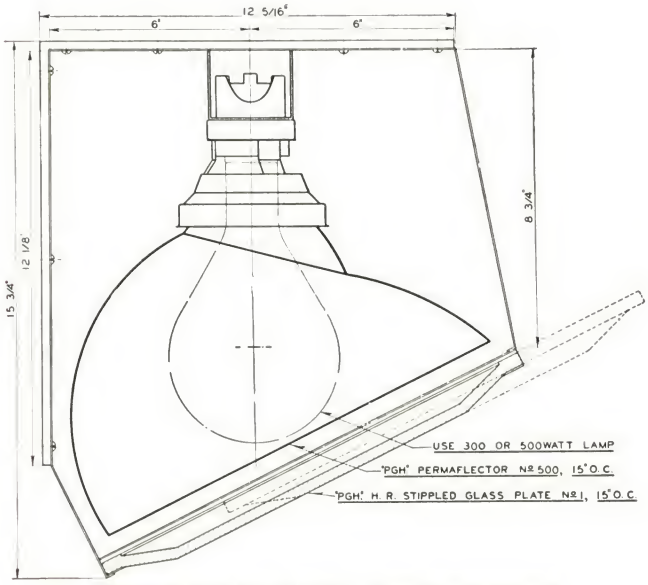
Attaches directly to standard outlet box.

When used on Conduit No. 6, discard box cover and attach receptacle and holder to conduit (page 18).

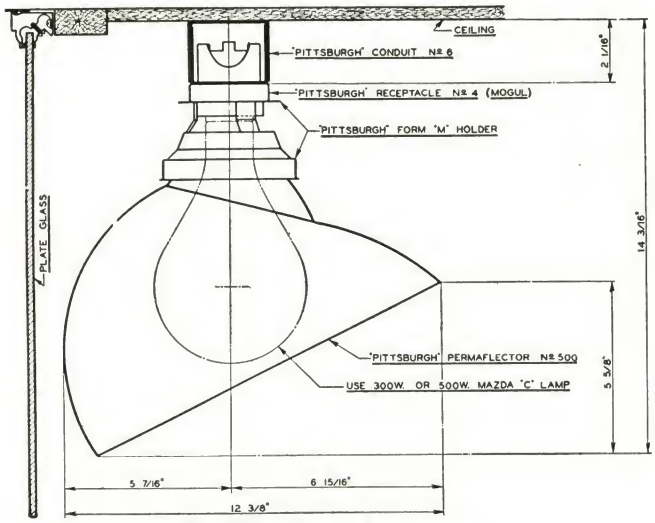
Enclosed Window Unit No. WL-500

Consists of Permaflector No. 500 enclosed in 20-gauge galvanized steel troughing with individual inside stippled glass plates covering bottom opening of Permaflector. Plates available in uncolored or colored (red, amber, green, blue) heat resisting glass (see page 8). Glass plates slide out, as shown by dotted lines in diagram below, to provide access to lamps and Permaflectors.

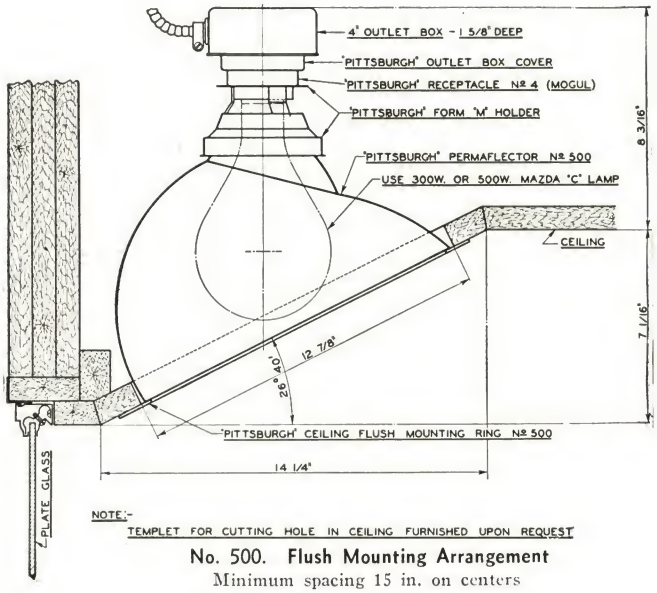
The glass plates conceal the lamp effectively without materially affecting the light distribution.



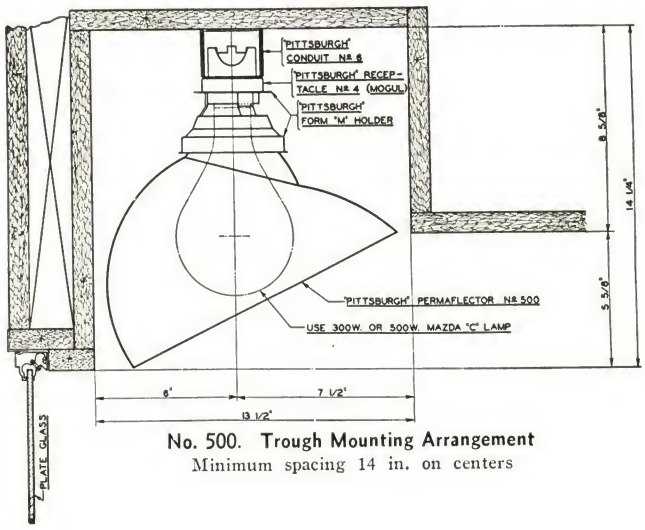
Window Unit No. WL-500. General Arrangement



No. 500. General Arrangement
(Full size print on request)

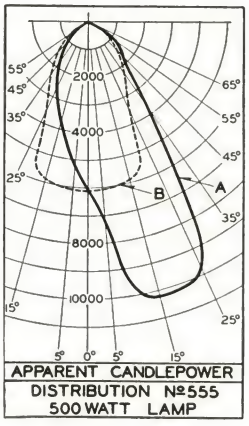


No. 500. Flush Mounting Arrangement
Minimum spacing 15 in. on centers



No. 500. Trough Mounting Arrangement
Minimum spacing 14 in. on centers

PERMAFLECTOR NO. 555



Permaflector No. 555

Application—For high shallow windows; medium trim; island windows or windows with upper part of background of glass. Not recommended for windows less than 8 ft. high.

Intended primarily for flush mounting service; bottom of reflector is level and, although having asymmetric distribution, the mouth of the reflector is circular.

From the distribution curve, it will be noted that there is an exceptional concentration of light in the five-degree to twenty-five-degree angles, which insures effective illumination on the floor of the high and shallow windows for which the reflector is intended.

Spacing—Should be installed 15 in. on centers, which will permit burning each alternate unit without making the distribution of light uneven when it is is desirable to cut light in half.

Receptacles—Should be spaced 7½ in. to center from plate glass—minimum, 5½ in.

Flush Mounting Ring—No. 555 (page 16).

Color-Lite—No. 7 or 8 (page 17).

Lamps—300-watt, PS-35 and 500-watt, PS-40.

Mogul receptacle, 4 in. round box cover and Form M holder furnished with Permaflector. Attaches directly to standard outlet box.

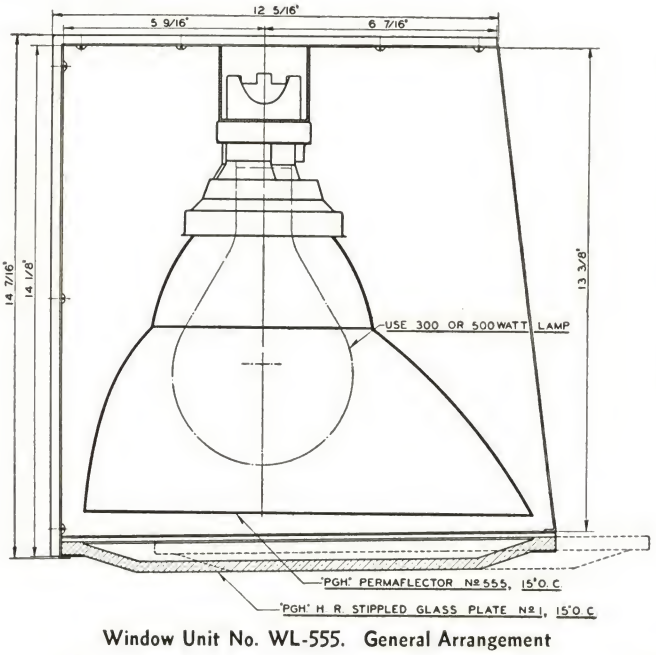
Opening Circular Diameter—12½ in.

When used on conduit No. 6, discard box cover and attach receptacle and holder to conduit which is shipped punched ready to receive them (page 18).

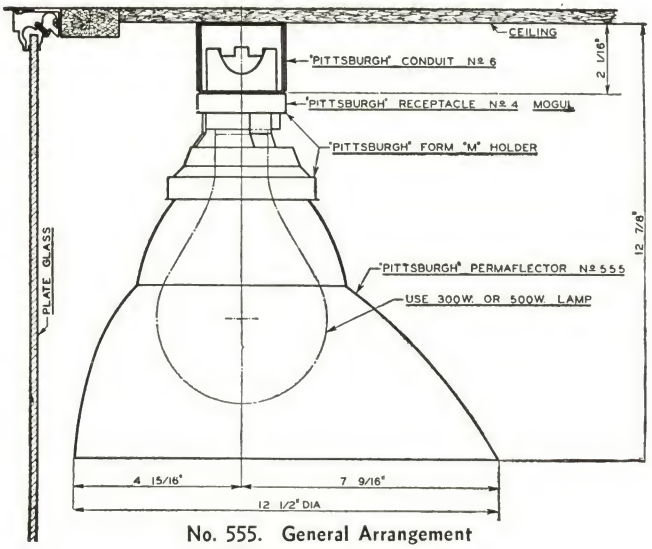
Enclosed Window Unit No. WL-555

Consists of Permaflector No. 555 enclosed in 20-gauge galvanized steel troughing with individual inside stippled glass plates covering bottom opening of Permaflector. Plates available in uncolored or colored (red, amber, green, blue) heat resisting glass (see page 8). Glass plates slide out, as shown by dotted lines in diagram below, to provide access to lamps and Permaflectors.

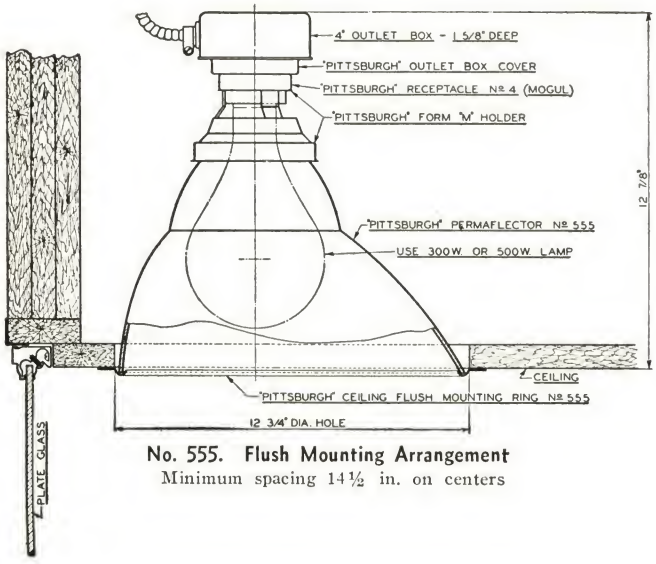
The glass plates conceal the lamp effectively without materially affecting the light distribution.



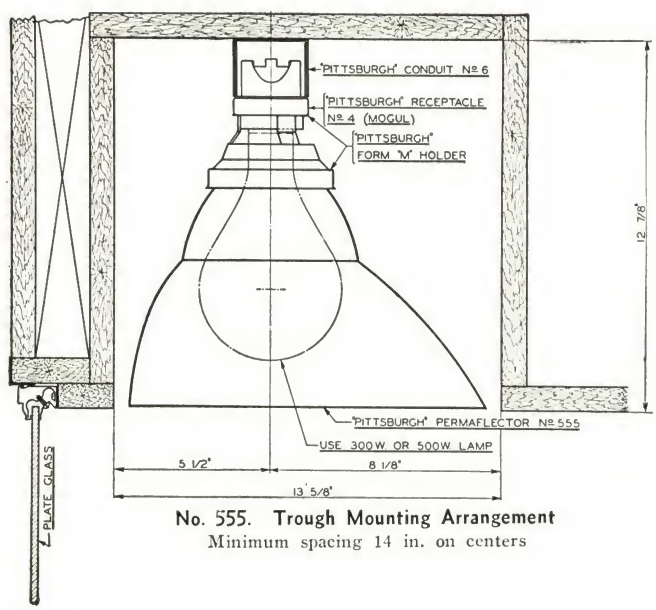
Window Unit No. WL-555. General Arrangement



No. 555. General Arrangement
(Full size print on request)



No. 555. Flush Mounting Arrangement
Minimum spacing 14½ in. on centers



No. 555. Trough Mounting Arrangement
Minimum spacing 14 in. on centers

PERMAFLECTOR NOS. C-100 AND C-201

No. C-100

Permaflector No. C-100

A spot type of reflector useful in very shallow windows. Also a local lighting unit for intensifying the illumination of particular areas. (This reflector is used in Windo-Spot No. 100.)

Lamp—100-watt A-23 or 150-watt PS-25.

Holder—2¼ in. Form "H" or our 2¼ in. Form "L" on Conduit No. 1, for A-23, 100-watt; Form "LC" for 150-watt.

Color-Lite—Color-Lite No. 5 or No. 6 (see page 17).

Dimensions—Height .....5 in.
Diameter .....8⅛ in.

Flush Mounting Ring—No. C-100 (see page 16).

Permaflector No. C-201

Also a spot type of reflector useful in high and extremely shallow windows. (This reflector is used in Windo-Spot No. 200.)

Lamp—200-watt, PS-30.

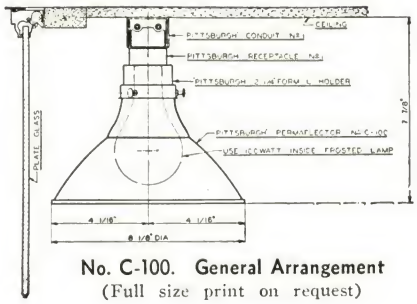
Holder—2¼ in. Form "O."

Color-Lite—Color-Lite No. 1 or No. 2 (see page 17).

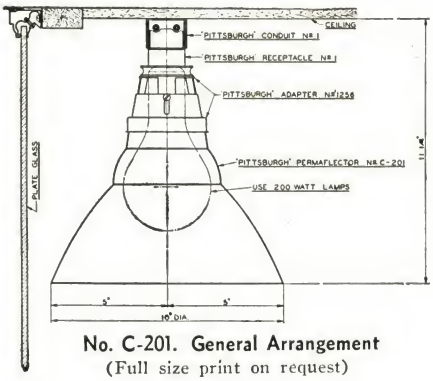
Dimensions—Height (including No. 1256 Adapter).. 9¼ in.
Diameter .....10 in.

Flush Mounting Ring—No. C-201 (see page 16).

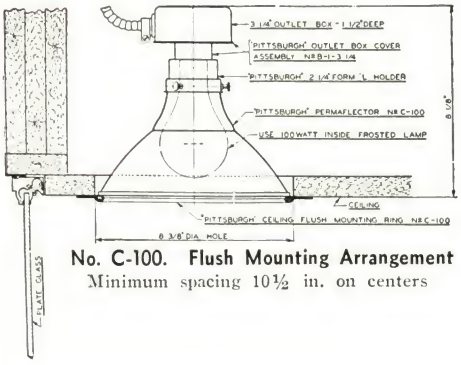
No. C-201



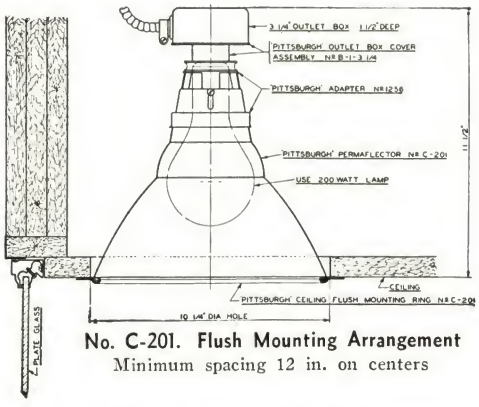
No. C-100. General Arrangement
(Full size print on request)



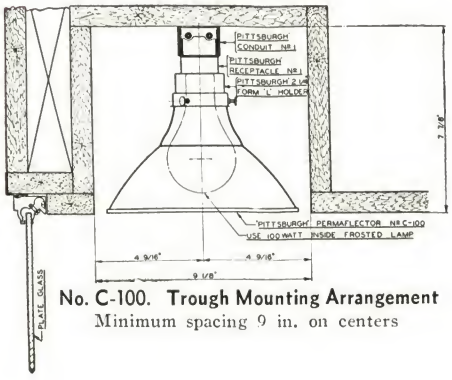
No. C-201. General Arrangement
(Full size print on request)



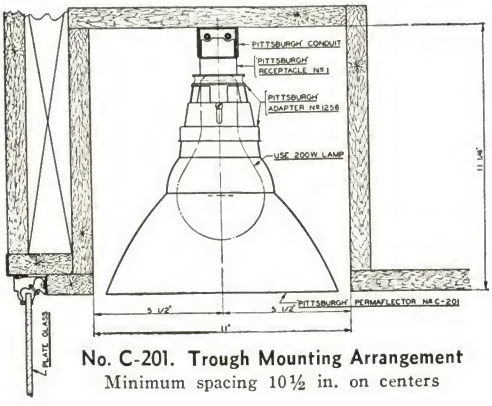
No. C-100. Flush Mounting Arrangement
Minimum spacing 10½ in. on centers



No. C-201. Flush Mounting Arrangement
Minimum spacing 12 in. on centers



No. C-100. Trough Mounting Arrangement
Minimum spacing 9 in. on centers



No. C-201. Trough Mounting Arrangement
Minimum spacing 10½ in. on centers

CHART FOR SELECTING PROPER "PERMAFLECTOR" FOR SHOW WINDOW LIGHTING

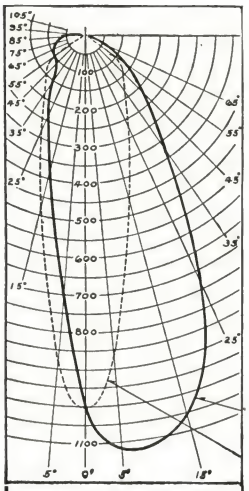
HEIGHT—FLOOR TO PERMAFLECTOR—FEET	DEPTH—GLASS TO BACKGROUND—FEET	HEIGHT OF SOLID BACKGROUND — FEET												
		1	2	3	4	5	6	7	8	9	10	12	14	16
4	1	C-100	C-100	55	110									
4	2	55	55	110	110									
4	3	55	55	110	110									
4	4	55	110	110	110									
5	1	C-100	C-100	55	55	110								
5	2	C-100	55	55	110	110								
5	3	55	55	55	110	110								
5	4	55	55	110	110	110								
5	5	55	55	110	110	110								
6	1	C-100	C-100	C-100	55	55	110							
6	2	C-100	C-100	55	55	110	110							
6	3	C-100	55	55	55	110	110							
6	4	55	55	55	110	110	110							
6	5	55	55	55	110	110	110							
6	6	55	55	110	110	110	110							
7	1	C-100	C-100	C-100	54-55	54-55	54-55	100-110						
7	2	C-100	C-100	54-55	54-55	54-55	100-110	100-110						
7	3	C-100	54-55	54-55	54-55	54-55	100-110	100-110						
7	5	54-55	54-55	54-55	54-55	54-55	100-110	100-110						
7	7	54-55	54-55	100-110	100-110	100-110	100-110	100-110						
8	1	C-100	C-100	C-100	C-100	54-55	54-55	54-55	100-110					
8	2	C-100	C-100	C-100	54-55	54-55	54-55	100-110	100-110					
8	4	54-55	54-55	54-55	54-55	54-55	100-110	100-110	100-110					
8	6	54-55	54-55	54-55	54-55	100-110	100-110	100-110	100-110					
8	8	54-55	54-55	54-55	100-110	100-110	100-110	100-110	100-110					
9	1	C-100	C-100	C-100	C-100	54-55	54-55	54-55	54-55	100-110				
9	2	C-100	C-100	C-100	54-55	54-55	54-55	54-55	54-55	100-110				
9	3	C-100	C-100	54-55	54-55	54-55	54-55	54-55	100-110	100-110				
9	5	54-55	54-55	54-55	54-55	54-55	54-55	100-110	100-110	100-110				
9	7	54-55	54-55	54-55	54-55	100-110	100-110	100-110	100-110	100-110				
9	9	54-55	54-55	54-55	100-110	100-110	100-110	100-110	100-110	100-110				
10	1	C-201	C-201	C-201	C-201	54	54	54	54	54	100			
10	2	C-201	C-201	C-201	54	54	54	54	54	100	100			
10	4	C-201	C-201	54	54	54	54	54	100	100	100			
10	6	54	54	54	54	54	54	100	100	100	100			
10	8	54	54	54	54	54	100	100	100	100	100			
10	10	54	54	54	100	100	100	100	100	100	100			
12	4			300-555	300-555	300-555	300-555	300-555	300-555	300-555	500	500		
12	6			300-555	300-555	300-555	300-555	300-555	300-555	500	500	500		
12	8			300-555	300-555	300-555	300-555	300-555	500	500	500	500		
12	10			300-555	300-555	300-555	300-555	500	500	500	500	500		
12	12			300-555	300-555	300-555	500	500	500	500	500	500		
14	4				300-555	300-555	300-555	300-555	300-555	300-555	300-555	300-555	500	
14	6				300-555	300-555	300-555	300-555	300-555	300-555	300-555	500	500	
14	8				300-555	300-555	300-555	300-555	300-555	300-555	500	500	500	
14	10				300-555	300-555	300-555	300-555	300-555	500	500	500	500	
14	12				300-555	300-555	300-555	300-555	500	500	500	500	500	
14	14				300-555	300-555	500	500	500	500	500	500	500	
16	6					300-555	300-555	300-555	300-555	300-555	300-555	300-555	500	500
16	8					300-555	300-555	300-555	300-555	300-555	300-555	500	500	500
16	10					300-555	300-555	300-555	300-555	300-555	300-555	500	500	500
16	12					300-555	300-555	300-555	300-555	500	500	500	500	500
16	14					300-555	300-555	500	500	500	500	500	500	500
16	16					300-555	300-555	500	500	500	500	500	500	500

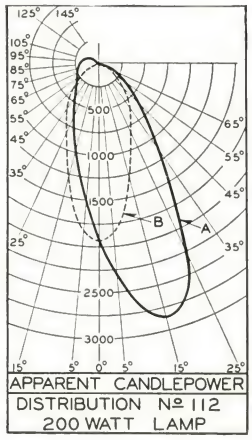
Example—Assume a window 8 ft. high (floor to Permaflectors), 6 ft. deep (glass to background), solid background 8 ft. high.

Referring to first column, find 8 ft. height and 6 ft. depth; then run across horizontally to column corresponding to 8 ft. solid background; either the 100 or the No. 110 Permaflector may be used. In general, for a window of these dimensions it would be preferable to use No. 100 Permaflectors as this permits the use of the 200-watt lamp. For selection of adapter required see page 16.

Space Permaflectors 10½ to 14-in. centers up to 200 watts; 10½ to 18 in. for 300 watts; 14 to 18 in. for 500 watts.

PERMAFLECTOR NOS. 102 AND 112





Permaflector No. 102

Application—For dual service—lighting of both transparent sign and the window display. Certain stores, particularly drug and cigar stores, use signs painted along the top edge of the plate glass. Where it is possible to install with bottom of reflectors above top of sign, regular window Permaflectors will effectively light both signs and display. But where top of sign is at level where reflectors must be mounted, it has not been possible heretofore to effectively light both.

Spacing—For even lighting of transparent sign or valance, with receptacles on which reflectors are mounted approximately level with top of sign, use following:

SPACING FOR DUAL SERVICE

With maximum depth of sign, in.	Receptacles should be distant from the glass, in.	Maximum spacing between reflectors, in.
12	6	12
13	7	14
14	8	16
15	9	18
16	10	20
17	11	22
18	12	24

Lamp—100-watt, A-23; and 150-watt, PS-25 with Adapter No. 1256.
150-watt, PS-25 and 200-watt, PS-30 with Adapter No. 1234. Unless otherwise ordered, furnished with Adapter No. 1256.
Holder—2¼ in. Form "O." No holder required when used with "Easy-to-Install" Conduit or Box Cover Assemblies (see pages 18 and 19).

Ordinarily spacing between reflectors should not exceed 12 in.

Diagram to left shows Adapter No. 1256, 150-watt position.

For 100-watt A-23 lamp same adapter in compressed position should be used.

For 200-watt lamp use Adapter No. 1234 extended as in diagram to right.

Permaflector No. 112

No. 112 is a companion to Permaflector No. 102, designed especially for windows which have no background, or have transparent glass in the upper part of the background.

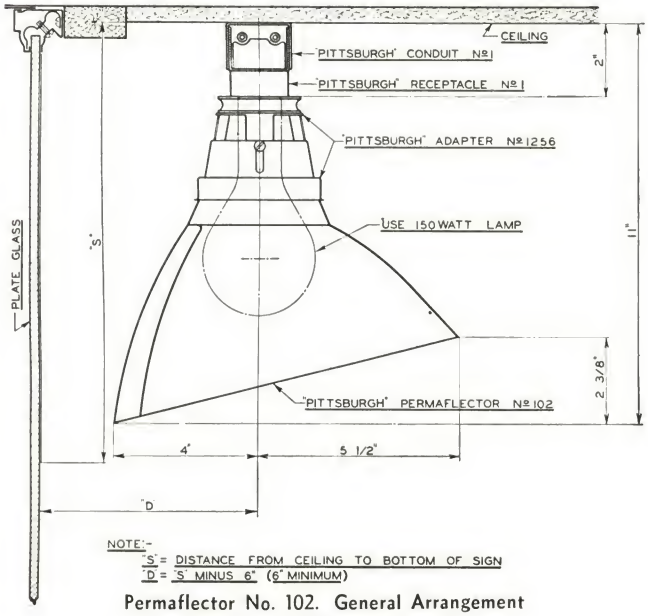
For such windows, No. 112 is better, because it completely conceals the lamp from view from within the store.

Obviously it does not light up as high on the background as No. 102; hence 102 will be the preferred one for use in totally enclosed windows where it is necessary to light the background from floor to ceiling.

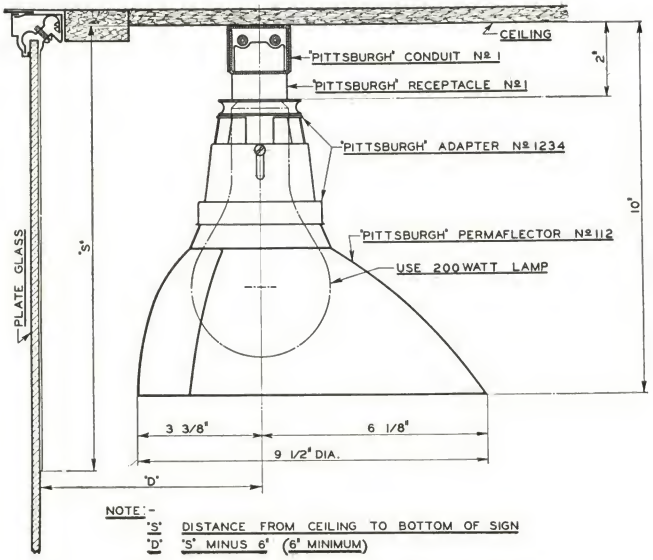
Ordinary transparent or translucent glass reflectors installed in a show window will waste light in the entire upper hemisphere in order to illuminate a small patch of sign. Permaflectors No. 102 and 112, through the medium of a transparent glass panel on the rear section of the reflector, efficiently illuminate the sign but do not waste light in the upper directions other than the sign.

The distribution curves, herewith, show how the sign lighting is accomplished without appreciable loss of "punch" in the main beam.

The spacing, lamp sizes and holders, are same as for No. 102.



Permaflector No. 102. General Arrangement
(Full size print on request)



Permaflector No. 112. General Arrangement
(Full size print on request)

PERMAFLECTOR WINDO-SPOTS

Permaflector Windo-Spots are window lighting equipment consisting of an adjustable bracket with base, which may be attached to the ceiling, transom bar, or other surfaces of the window; spot type of Permaflector with exceedingly concentrating distribution, as will be noted from the distribution curves herewith; socket and husk. Furnished complete as illustrated, without lamp, and including three feet of cord and attachment plug.

They provide an effective method of high-lighting, with clear or colored light, any portion of the window display to which the display man desires to focus the attention of the customers. From this it will be noted Windo-Spots are auxiliary window lighting equipment and are not intended as the sole source of illumination in a show window.

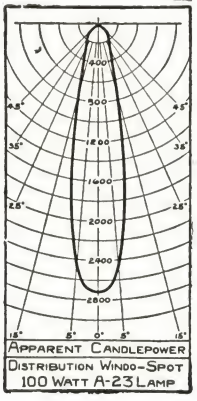
Other Uses—Another use for Windo-Spots is in the matter of reducing daylight reflections in a show window. They are also serviceable for special lighting applications on stages, in automobile show rooms, where it is desired to silhouette a car against a light background, dance halls for so-called "moonlight" dances, for the lighting of walls of art galleries and churches, skylights and church art glass windows; and any other purpose where exceedingly concentrated illumination is desired over a limited area.

Color Lighting—Color-Lites are available for use with each size of Permaflector Windo-Spot.

Spacing—The number installed in a show window depends largely upon the psychological effect at which the display man is aiming.

In general, it is well to provide two in each show window as an auxiliary to the regular show window lighting. Extra convenience receptacles should be provided in each window, in order to properly serve these units.

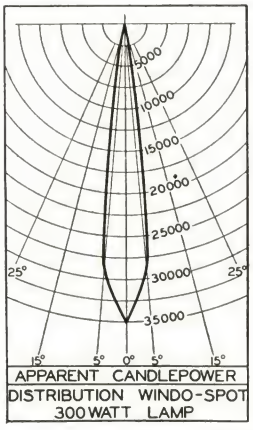
Windo-spot No. 100

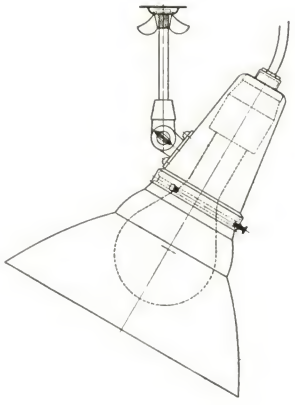


Dimensions—
Height overall including bracket.....11 in.
Diameter of Reflector..... 8⅛ in.

Lamp—100 watt A-23 must be used.

Color-Lite—No. 5 or 6 (page 17).





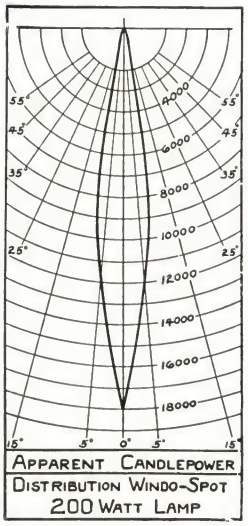
Windo-spot No. 300

Dimensions—
Height overall including bracket.....13¾ in.
Diameter of Reflector.....11½ in.

Lamp—300 watt PS-35.

Color-Lite—No. 10 (page 17).

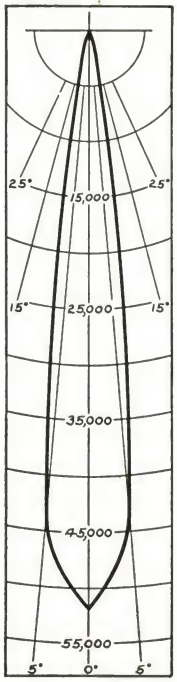
Windo-spot No. 200



Dimensions—
Height overall including bracket .....13½ in.
Diameter of Reflector.....10 in.

Lamp—200 watt PS-30 must be used.

Color-Lite—No. 1 or 2 (page 17).



Windo-spot No. 500

Dimensions—
Height overall including bracked .....18 in.
Diameter of Reflector.....13½ in.

Lamp—300 watt PS-35 or 500 watt PS-40.

Color-Lite—No. 7 or 8 (page 17).

PERMAFLECTOR WINDO-FLOODS

Permaflector Windo-Floods are similar in construction to Windo-Spots, excepting they employ a flood type of Permaflector the distribution of which is less concentrating than in the case of the Windo-Spot Permaflectors.

Furnished complete as illustrated, without lamp and including three feet of cord and attachment plug.

The use of Windo-Floods parallels the use of Windo-Spots but will be preferred where a somewhat broader beam of light with less intense beam center is desired.

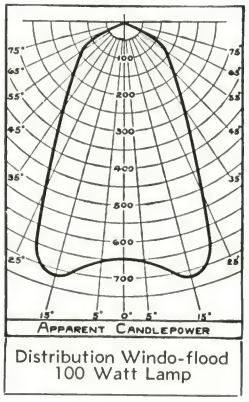
Other Uses—Windo-Floods are also favored for supplementary illumination of automobile show rooms, where it is desired to flood the entire show room with a strong light from the front, in addition to the regular interior lighting and window lighting; and for night lighting and emergency lighting service. A single Windo-Flood, placed at the front of a small store, usually over the entrance, will serve to flood the entire interior during the night as a protection against burglary.

Color Lighting—Color-Lites are available for use with each size of Permaflector Windo-Flood.

Spacing—The number of Windo-Floods to be installed in a window, the same as in the case of Windo-Spots, depends upon the psychological effect at which the display man is aiming. Usually two floods or spots should be provided in each window as an auxiliary to the window lighting. Extra convenience outlets should be provided in each window in order to properly serve these units.

For the other special uses for Windo-Floods, each lighting problem will require its own solution and we suggest that you consult our Engineering Department, when you have a specific problem for solution.

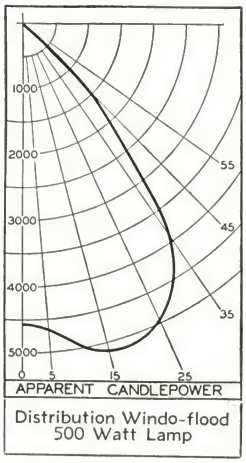
Windo-flood No. 100



Distribution Windo-flood 100 Watt Lamp

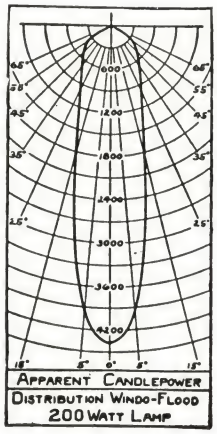
Dimensions—
Height overall including bracket.....10½ in.
Diameter of Reflector..... 6¾ in.
Lamp—100-watt, A-23.
Color-Lite—No. 4-A (page 17).

Windo-flood No. 500



Distribution Windo-flood 500 Watt Lamp

Dimensions—
Height overall including bracket.....18 in.
Diameter of Reflector.....11⅞ in.
Lamp—300-watt, PS-35 or 500-watt, PS-40.



Windo-flood No. 200

Dimensions—
Height overall including bracket.....11¼ in.
Diameter of Reflector..... 9⅞ in.
Lamp—200-watt, PS-30.
Color-Lite—No. 1 or 2 (page 17).

Portable Base

For use with Windo-Spots No. 100, No. 200, and No. 300 or Windo-Floods No. 100 and No. 200. Made of cast iron, 8 in. diameter. Bases of Spots and Floods attach to same by means of three machine screws furnished.

PERMAFLECTOR ADAPTERS AND HOLDERS

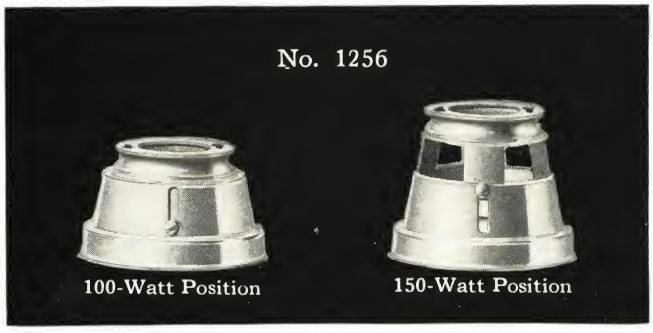
Adapters

The Permaflector Adapters (illustrated) are designed to be supported from 2¼-in. Form "O" Holders or attached to Permaflector "Easy-to-Install" Conduit No. 1.

(Screws for attaching adapters to conduit are furnished with the conduit.)

For 100-watt A-23 Lamp—Permaflectors No. 55, No. 110, No. 102 and No. 112 will be furnished with Adapter No. 1256.

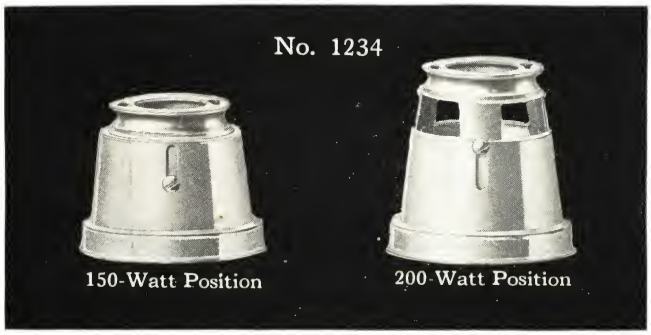
If Adapter No. 1234 is wanted with Permaflector No. 102, or No. 112 it must be specified.



For 150-watt, No. PS-25 and 200-watt, PS-30 Lamp—Permaflectors Nos. 100 and 54 will be furnished with Adapter No. 1234.

If any of these Permaflectors are desired equipped with Adapter No. 1256, the order must so specify.

The use of the wrong adapter changes the position of the focal center of the lamp in its relation to the Permaflector, hence alters the distribution of the lighting and greatly lessens the lighting effectiveness.



No. 500

No. 55

FLUSH MOUNTING RINGS

For Permaflector No.	Flush Ring No.	Templet
100	100	Cardboard templet free on request
500	500	Blueprint free on request shows exact size to cut hole in ceiling
555	555	*Hole in ceiling to be circular, 12¾-in. diam.
28, E-26	28	*Hole in ceiling to be circular, 5¾-in. diam.
110, 55, E-100, I-75	55	*Hole in ceiling to be circular, 8¾-in. diam.
I-25, E-25	I-25	Hole in ceiling to be circular, 4⅝-in. diam.
29, 73, I-60, E-75	I-60	Hole in ceiling to be circular, 7 -in. diam.
T-1, C-100	C-100	Hole in ceiling to be circular, 8⅜-in. diam.
I-100, I-201, C-201	I-201	Hole in ceiling to be circular, 10⅛-in. diam.
	C-201	Hole in ceiling to be circular, 10¼-in. diam.
E-200, E-225	54	*Hole in ceiling to be circular, 9¾-in. diam.

*Blueprint free on request, showing how to locate centers.

Holders

Form "O" and Form "H" Holders are common to the trade and may be had at any electrical store or jobber. These holders are not a part of the Pittsburgh line, but we supply them as a matter of accommodation.

No. OB

Form "O" (Low) Holder, 2¼ in.

The Uno Holder for brass shell, threaded sockets "No. OB."

No. OP

Weatherproof for porcelain sockets with holder grooves "No. OP."

No. S

For Sockets Nos. 1 or 3 or Assemblies Nos. B-1 or B-2 "No. S."

Form "O" (Low) Holder, 3¼ in.

Form "S-3¼." Similar to Form "S."

No. HB

Form "H" (High) Holder, 2¼ in.

The Uno Holder, for brass shell, threaded sockets "No. HB."

No. HP

Weatherproof, for porcelain sockets with holder grooves "No. HP."

No. L

For Sockets Nos. 1 or 3, Assemblies Nos. B-1 or B-2, "No. L"; (or "No. LC" which is the same as "No. L," excepting it is longer).

No. 10

Holder No. 10

For use with No. B-508 on B-3 Assembly or No. 6 Conduit.

No. M

Form "M" Holder

Form "M" Holder is a four-inch safety holder for use with Mogul Socket No. 4 and Permaflectors No. 500, 555, C-500, E-500, I-505, and B-1001.

No 12

Holder No. 12

For use with No. 300 and C-300 on B-3 Assembly or No. 6 Conduit.

Flush Mounting

For convenience in making flush mounting installations, Pittsburgh Outlet Box Cover Assemblies, to which the Adapters of holders of the Permaflectors are directly attached, are used. It will be noted that Permaflectors No. 100, No. 110 and No. 500 are cut off at an oblique angle. To successfully set these Permaflectors flush, it is necessary to construct the ceiling with a dip towards the plate glass at the same angle.

When flush mounting Permaflectors it is necessary that the opening in the ceiling be cut to the proper size. Upon request a templet or drawing for cutting the opening will be supplied.

For high wattages in confined spaces it may be desirable to provide ventilation to prevent abnormal temperatures.

PERMAFLECTOR COLOR-LITES

(Glass Color-Lites are available in red, amber, green and blue; glass is smooth on both sides)

Color-Lite No. 1 (Gelatin)

Consists of retainer frame with spiral springs, inner retainer and four gelatin sheets, one each of red, blue, green and amber. The gelatin is held in place between the two steel rings, each of which have retainer wires stretched across the opening. To attach merely hook the springs in holes of the adapter; to remove unhook. Neither lamp nor Permaflector need be removed.

Color-Lite No. 1

For Permaflectors No. 54, No. 100, No. I-100, I-201, E-200, E-225, C-201, Windo-Spot No. 200 and Windo-Flood No. 200.

Color-Lite No. 2 (Glass)

Consists of retainer frame with coiled springs and 9 7/16-in. pressed glass roundel. The color will not fade, glass is heat resisting and will not break due to heat of lamp; does not shrink or wrinkle; not affected by moisture.

Color-Lite No. 2

For Permaflectors No. 54, No. 100, No. I-100, I-201, E-200, E-225, C-201, Windo-Spot No. 200 and Windo-Flood No. 200.

Color-Lite No. 4-A

An improved design of Color-Lite. For use with Permaflectors 29, 73, P-75-A, P-151, P-101, I-60, Windo-Flood No. 100.

Color-Lite No. 4-A

It consists of a split ring which closely fits around the rim of Permaflector. The colored glass roundel sets in a frame hinged to the aforementioned split ring. A spring clasp holds the cover closed.

Colored roundel is fastened in cover ring by a split wire ring which fits in a groove in the cover rim.

Color-Lite No. 5 (Gelatin)

For Permaflectors Nos. 110 and 55, E-100, I-75 and Windo-Spot No. 100; Similar to Color-Lite No. 1, but of smaller diameter.

Color-Lite No. 6

This is a glass Color-Lite for Permaflectors Nos. 110, 55, E-100, I-75, C-100, Windo-Spot No. 100; similar to Color-Lite No. 2 but equipped with 8-in. pressed glass roundel.

Color-Lite No. 7

This is a gelatin Color-Lite for Permaflectors Nos. 500, 555, C-500, and Windo-Spot No. 500; similar to Color-Lite No. 1 but of larger diameter.

Color-Lite No. 8

This is a glass Color-Lite for Permaflectors Nos. 500, 555, C-500 and Windo-Spot No. 500; similar to Color-Lite No. 2 but equipped with 13-in. pressed glass roundel.

Color-Lite No. 10

This is a glass Color-Lite for Windo-Spot No. 300; similar to No. 2, but equipped with 10¾-in. pressed glass roundel.

Color-Lite F-1

For use with Floodlight FLC-250. Consists of pressed glass roundel, 10⅜ in. in diameter. Snaps over mouth of Permaflector, being held in place by three spring clips. Installed inside of unit under protection of heat resisting glass cover.

Roundel

Color-Lite F-2

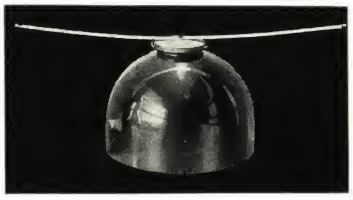
8-in. pressed glass roundel, for use with Floodlight No. FLC-100 and Color-Lite No. 6.

Color-Lite F-3

Consists of blown glass cap, 8 in. in diameter, ventilated metal cap at top and clamping spring steel strap.

Cap rests on offset in reflector contour. Color-Lite is clamped in place by spring steel strap, provided with notches at end which clamp under knurled head screws and with hole in center for centering over fillister head screw, binding the ventilated cap to the color cap.

The ventilated metal cap is in two parts, clamped into opening at top of glass cap. Cooling air circulates past lamp bulb and through ventilated metal cap so arranged as to permit the air to pass but allows no escape of white light.


Color-Lite F-3

Color-Lite F-3 places no pressure on lamp bulb, being supported entirely independent of lamp. In combination with the Permaflectors used in Floodlights FLC-501, FLC-1001 and FLC-1002, it provides a ventilated lamp chamber and means of producing colored floodlighting heretofore not available.

Can be used only with Nos. FLC-501, FLC-1001 and FLC-1002.

Color-Lite F-4

A 9 7/16-in. pressed glass roundel, for use with Floodlights FLC-103, FLC-104, and Color-Lite No. 2.

Color-Lite F-5

A 12-in. pressed glass roundel, for use with Floodlights FLC-300, FL-301 and FL-302.

Hinged Ceiling Roundels

No. 1—Diameter 10 in. Includes stippled glass roundel. For use with Permaflectors Nos. 55, 110, E-100 and I-75.

The E-100, when used with Ceiling Roundel No. 1 may be used with 200-watt lamp if attached to LC holder. (Page 16.)

Hinged Ceiling Roundel

No. 2—Diameter 15 in. Includes stippled glass roundel. For use with Permaflector No. E-500.

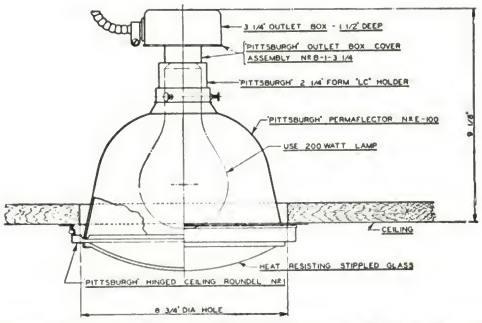
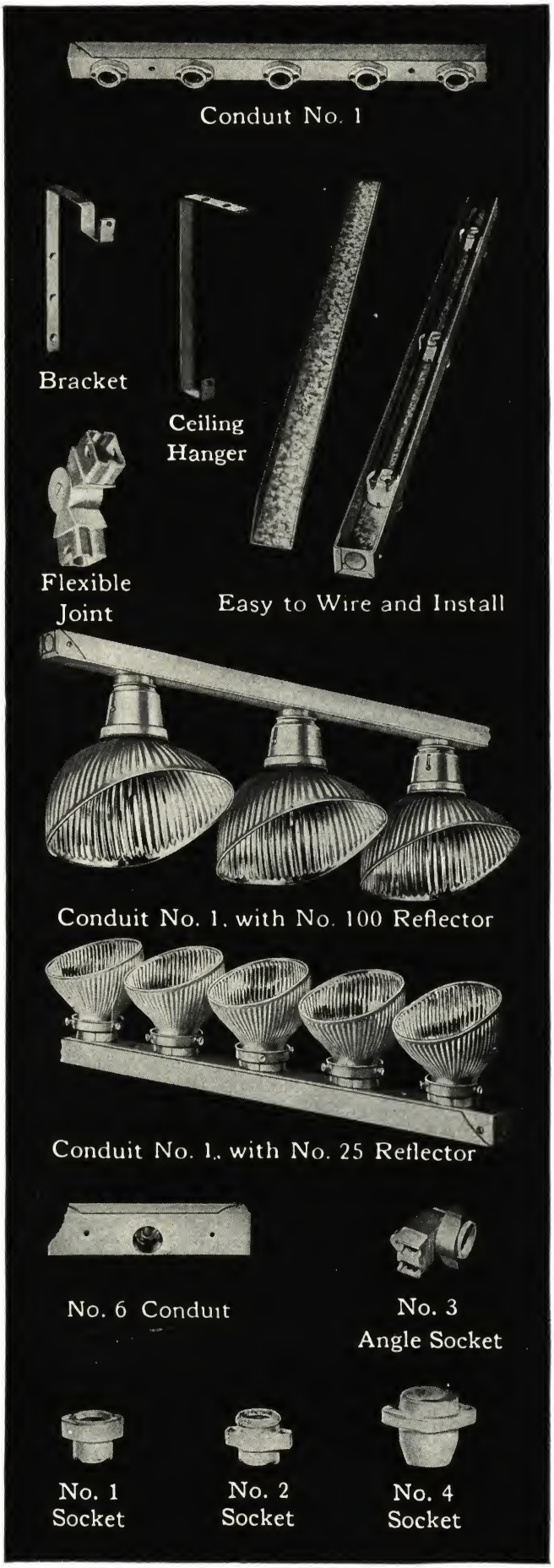


Diagram Showing No. E-100 with Hinged Ceiling Roundel



"EASY-TO-INSTALL" CONDUIT

"Easy-to-Install" Conduit in combination with Permaflectors constitutes "a window lighting system." Conduit, receptacles, holders and Permaflectors, all harmonize in silver colored satin finish.

The conduit provides a time and money-saving method of installing lamps in show windows, especially when close centering of the lamps is needed. Quickly installed, being fastened to ceiling by screws going through conduit or supported on brackets.

"Easy-to-Install" Conduit avoids necessity of cutting through ceiling or wall for each receptacle and makes it possible to space lamps properly to get even light distribution. Made to order to fit each job.

Conduit No. 1

Consists of 20-gauge galvanized steel channel fitted with the necessary porcelain receptacles not wired and with or without holders for Permaflectors.

Wiring is very simple; the back member being lifted off, the binding screws in the receptacles are exposed; can then be quickly wired.

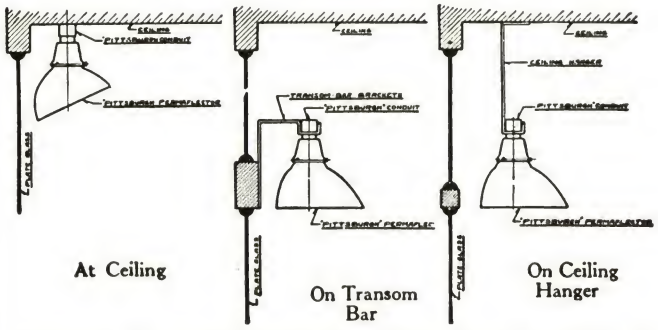
Any window, case or industrial type Permaflector of 200-watt lamp capacity or less may be used with Conduit No. 1.

Conduit No. 1 is also used in cove lighting with Reflectors Nos. 100, 54, 73, 55, 110, 25, 26, 28 and 29.

Size—1⅜ in. high, 1¾ in. wide. Accommodates six No. 12 wires. Knockout ends furnished.

Transom Bar Brackets and Ceiling Hangers

When ordering transom bar brackets or ceiling hangers, length must be given.



Transom bar bracket standard size has vertical members 10 in. long and holds conduit 5½ in. from face of transom bar to center line of conduit.

Ceiling hangers made in standard lengths of 6, 8, 10, 12, 14, 16, 18 and 20 in. Special lengths available made to order.

Porcelain Sockets

No. 1, for medium screw base (as shown).

No. 2, for medium screw base (as shown).

No. 3, for medium screw base, angle socket (as shown).

No. 4, for mogul base, for use with No. 6 conduit or B-3 assembly.

Conduit No. 6

Consists of 20-gauge galvanized steel channel, punched to accommodate mogul socket No. 4, not wired. For use with Permaflectors Nos. 300, 500, 555, C-500, I-505 and E-500, mogul sockets and holders of which attach directly to the conduit. Will accommodate about 6 circuits, or 12 No. 12 wires.

Blank ends, with ½-in. knockout.

Size—2⅝ in. wide, 2 1/16 in. high.

"EASY-TO-INSTALL" CONDUIT—CONTD.

Conduit No. 2

Similar to Conduit No. 1. Size, however, is but $\frac{13}{16}$ by $1\frac{3}{16}$ in., for use only with "Pittsburgh" Angle Sockets, with Permaflectors No. P-40, No. P-75-A, No. P-76, No. P-101 and No. P-151.

"Pittsburgh" angle sockets make it possible to rotate Permaflectors on their axes after installation is completed and burning, thus assuring best light distribution.

½-in. knock-out at face or back as required.

Furnished with Pittsburgh Angle Receptacle and Holder "S" or "L" (see page 16) as required.

Excepting where the small size of No. 2 conduit is a real advantage, Conduit No. 2-A should be used.

Conduit No. 2-A

Same as No. 2, excepting size is 1⅜ in. high by 1¾ in. wide. Has the advantage of accommodating more wires and can be furnished with flexible joints.

Outlet Box Assemblies
Series B-1

For ordinary conduit wiring in coves, with such Permaflectors as Nos. 25, 26, 28, 29, 73, 54 and 100. Consists of a 3¼-in. or 4-in. outlet box cover, equipped with "Pittsburgh" Porcelain Socket No. 1 arranged to accommodate "Pittsburgh" Adapters (see page 16).

OUTLET BOX ASSEMBLIES, SERIES B-1

Cat. No.	Consists of	
B-1-3¼	Socket and 3¼-in. outlet box cover...	For full information regarding Holders, see page 16
B-1-3¼-S	As above, plus 2¼-in. "S" holder.....	
B-1-3¼-L	As above, plus 2¼-in. "L" holder.....	
B-1-3¼-LC	As above, plus 2¼-in. "LC" holder.....	
B-1-4	Socket and 4-in. outlet box cover.....	
B-1-4-S	As above, plus 2¼-in. "S" holder.....	
B-1-4-L	As above, plus 2¼-in. "L" holder.....	
B-1-4-LC	As above, plus 2¼-in. "LC" holder.....	

Note: Adapters Nos. 1234 and 1256 attach to B-1-3¼ or B-1-4.

Series B-2

For jobs where the cove is a circle or ellipse with short radius; in such coves it is not practicable to use "Pittsburgh" Conduit because of the curvature.

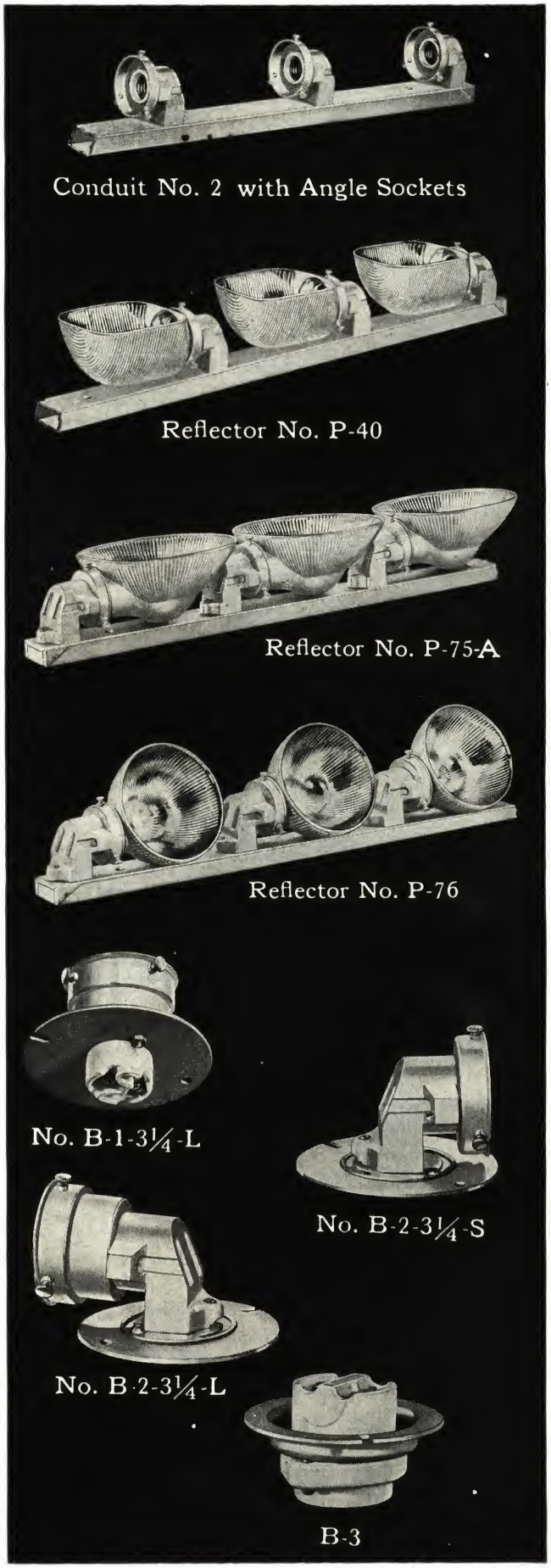
The assembly No. B-2-3¼-S and B-2-3¼-L of outlet box cover, angle socket and shade holder illustrated herewith makes it convenient to use the Permaflectors No. P-40, No. P-75-A, No. P-76, No. P-101, No. P-151 and No. P-200 in cove lighting work. It does not matter in what position the outlet box is installed, since by means of the slotted center piece the socket may be rotated into alignment with the cove.

OUTLET BOX ASSEMBLIES, SERIES B-2

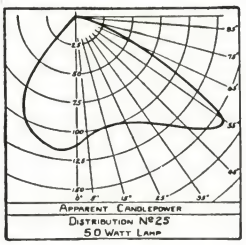
Cat. No.	Consists of	
B-2-3¼	Angle socket and 3¼-in. outlet box cover	For full information regarding Holders, see page 16
B-2-3¼-S	As above, plus 2¼-in. "S" holder.....	
B-2-3¼-L	As above, plus 2¼-in. "L" holder.....	
B-2-3¼-LC	As above, plus 2¼-in. "LC" holder.....	
B-2-4	Angle socket and 4-in. outlet box cover.	
B-2-4-S	As above, plus 2¼-in. "S" holder.....	
B-2-4-L	As above, plus 2¼-in. "L" holder.....	
B-2-4-LC	As above, plus 2¼-in. "LC" holder.....	

Series B-3

No. B-3 consists of Pittsburgh Mogul Socket No. 4, with 4-in. outlet box cover, raised cover.



PERMAFLECTORS NOS. 25, 26, 28, 29 AND 73



Permaflector No. 25

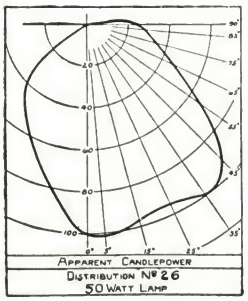
A very useful cove lighting reflector; lighting distribution throws out a maximum at 55° below the zenith, which permits placing cove close to ceiling.

Lamp—25-watt A-19 or 50-watt mill type used with 2¼-in. Form "O" Holder. 50-60-watt A-21 used with 2¼-in. Form "H" Holder.

Dimensions—

Height ..... 4¼ in.
Width ..... 4¼ in.
Front to back ..... 4⅞ in.
Center to back ..... 2⅛ in.
Minimum spacing ..... 4½ in. on centers

May be used with Conduit No. 1 or Assemblies, Series B-1.



Permaflector No. 26

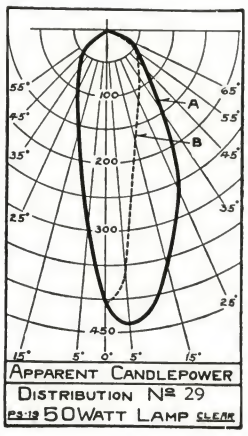
A show case reflector. Also for use in small coves, as in residences.

Lamp—25-watt A-19 or 50-watt mill type used with 2¼-in. Form "O" Holder.

Dimensions—

Height ..... 3½ in.
Front to back ..... 4⅛ in.
Center to back ..... 2 $\frac{9}{16}$ in.
Width ..... 4⅛ in.
Minimum spacing ..... 4½ in. on centers

May be used with Conduit No. 1 or Assemblies, Series B-1.



Permaflector No. 29

Primarily for tall and shallow wall display cases. Concentrating asymmetric distribution; with maximum candlepower at 15°. Spacing should be 12 to 15 in. on center. Minimum 7 in. on center.

Also useful for lighting small show windows, bank cages, bookcases, stock shelves, for cove lighting, etc.

Color-Lite—No. 4-A. (See page 17.)

Flush Mounting Ring—No. I-60. (See page 16.)

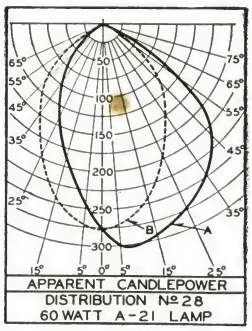
Lamp—25-watt A-19, 50-60-watt A-21 or 50-watt mill type.

Holder—2¼-in. Form "O."

Dimensions—

Height ..... 3⅞ in.
Diameter ..... 6¾ in.
Center to back ..... 3 in.

May be used with Conduit No. 1 or Assemblies, Series B-1.



Permaflector No. 28

For tall and shallow wall display cases. It is concentrating, asymmetric in distribution; maximum candlepower occurs at 10°.

Also useful for lighting small show windows, bank cages, book cases, stock shelves, side walls of gasoline service stations.

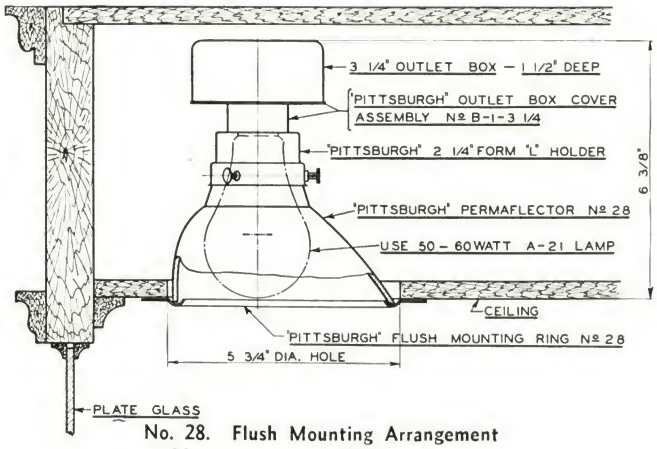
Lamp—25-watt A-19 or 50-watt mill type, use Form "S" holder; 50-60-watt A-21 lamp, use Form "L" holder.

Dimensions—

Height ..... 3 $\frac{7}{16}$ in.
Diameter ..... 5½ in.
Center to back ..... 2 $\frac{3}{4}$ in.

Minimum spacing 6 in. on centers; ordinary spacing from 9 to 15 in. on centers.

May be used with Conduit No. 1 or Assemblies, Series B-1.



No. 28. Flush Mounting Arrangement

Minimum spacing 7½ in. on centers

Permaflector No. 73

For wall cases, interior bulletin boards, paintings, cove lighting, stage footlights. Spacing recommended, 12 in. on center. May be placed as closely as 7 in.

Color-Lite—No. 4-A. (See page 17.)

Flush Mounting Ring—No. I-60. (See page 16.)

Lamp—75-100-watt A-23.

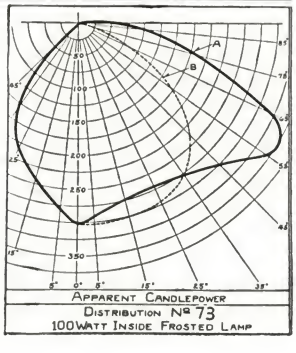
Holder—2¼ in. Form "H."

Dimensions—

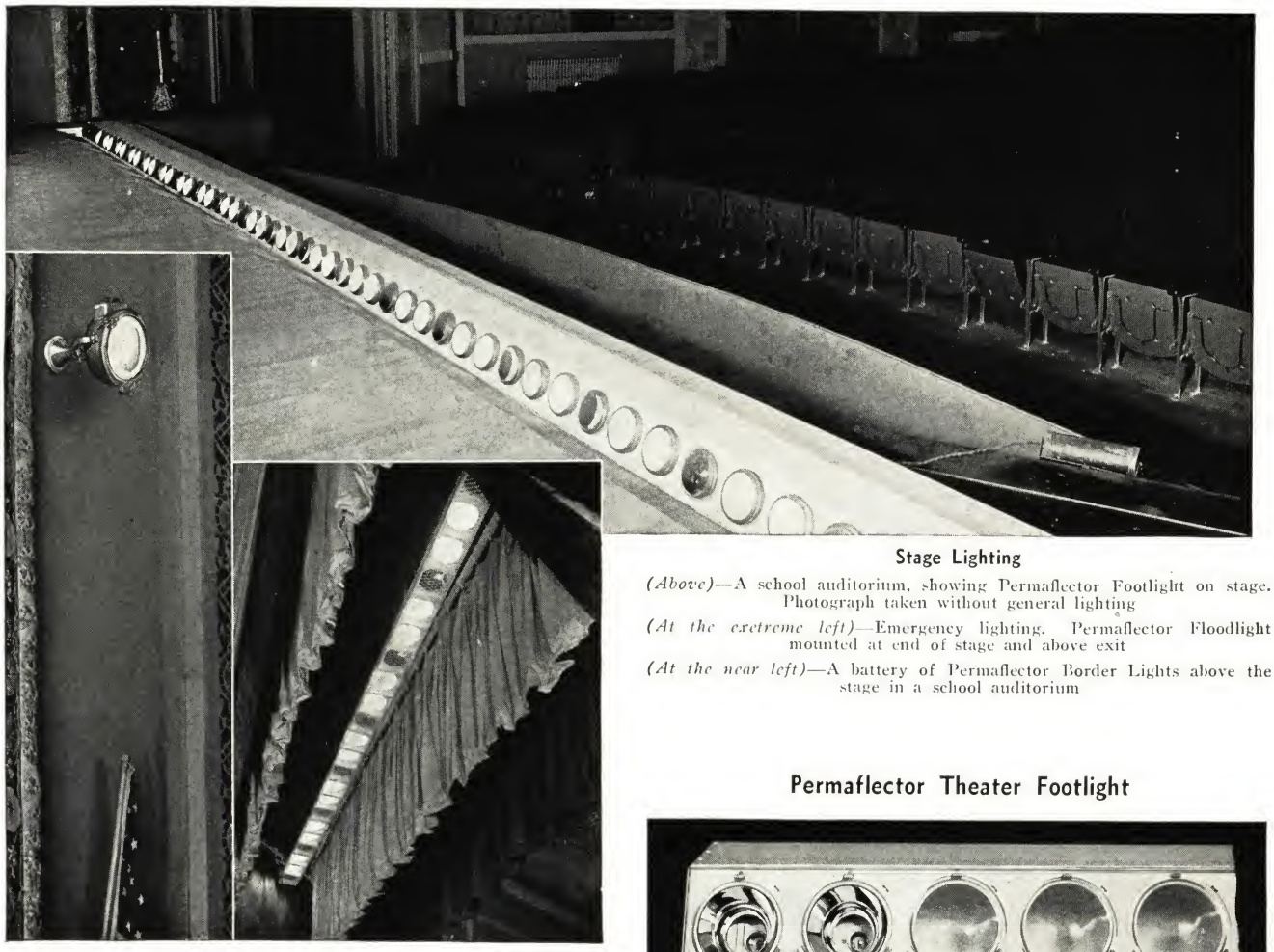
Height ..... 5 $\frac{17}{32}$ in.
Width ..... 6¾ in.
Front to back ..... 6¼ in.
Center to back ..... 2¾ in.

Receptacles must be not less than 3 in. from glass.

May be used with Conduit No. 1 or Assemblies, Series No. B-1.



PERMAFLECTORS FOR STAGE LIGHTING



Stage Lighting

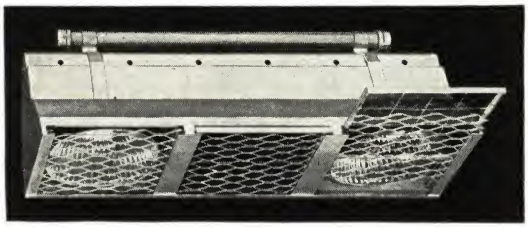
(Above)—A school auditorium, showing Permaflector Footlight on stage. Photograph taken without general lighting

(At the extreme left)—Emergency lighting. Permaflector Floodlight mounted at end of stage and above exit

(At the near left)—A battery of Permaflector Border Lights above the stage in a school auditorium

Permaflector Theater Border Light

Consists of heavy gauge sheet metal housing, pipe hanger extending full length of each unit, slide for guard of expanded metal and slide for Color-Lite frame containing gelatin. Glass Color-Lites are also available.



Permaflector Theater Border Light 3 Feet Long

Provides fine light control and efficiency, at no increase in operation cost over ordinary border lights of low efficiency.

Permaflector Theater Border Light completely protects the silvered glass reflectors with the heavy gauge metal housing and expanded metal guard beneath.

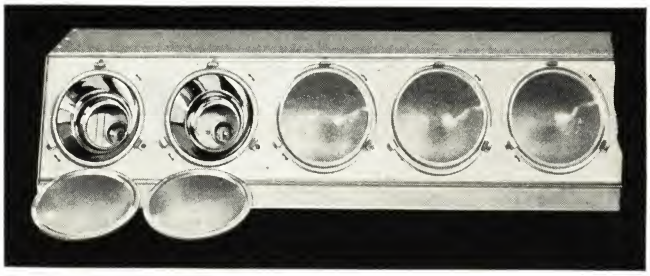
Built in any length; in sections, when more than 25 ft. long. Specifications for 300 to 500-watt border lights for very large theaters available on request.

Border Light No. 1—For either 100 or 150-watt lamps, spaced 12 in. on centers. Overall height, 14½ in.; width, 10½ in.

Border Light No. 2—For 200-watt lamps, spaced 12 in. on centers. Overall height, 16 in.; overall width, 11½ in.

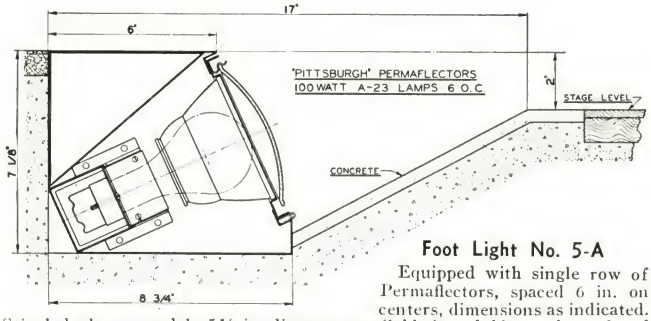
Border Light No. 3—For 300-watt lamps, 12 in. on centers. Overall height, 17 in.; width, 11½ in.

Permaflector Theater Footlight



Permaflector Footlight is completely enclosed, self-contained, dust-tight. The convex glass roundels are easily removed to renew lamps. Front plate containing roundels is hinged in sections to get at the wiring. With this enclosed, dust-tight footlight, the lamps and reflectors are always protected against the accumulation of dust and dirt.

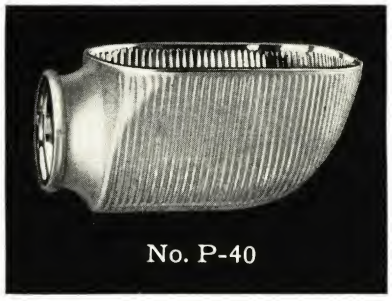
When specifying No. 5-A Permaflector Footlight, architects should detail as indicated, thus requiring the general contractor to build the stage so that the Permaflector Footlight will accurately fit into place.



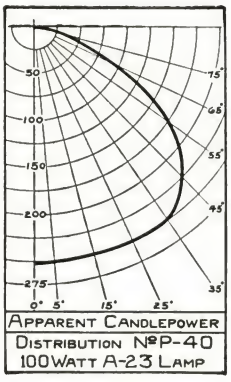
Foot Light No. 5-A

Equipped with single row of Permaflectors, spaced 6 in. on centers, dimensions as indicated. Stippled glass roundels 5½ in. diameter, available in red, blue and uncolored

INDIRECT LIGHTING



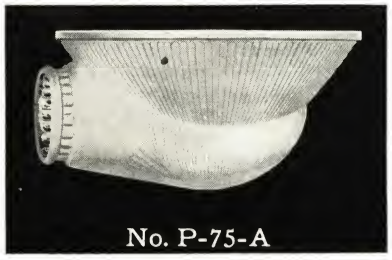
Permaflector No. P-40



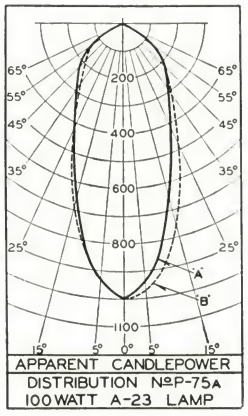
For indirect lighting from coves. Broad distribution. Minimum spacing 8 in. on center. Also for lighting wall cases, bank cages, indirect lighting fixtures, art gallery lighting, etc.

Lamp—50-60-watt A-21 with 2¼-in. holder Form "O"; 75-100-watt A-23, with 2¼-in. Holder Form "H."

Dimensions—
Height, 2¾ in. Width, 4¼ in. Length, 5½ in.
May be used with No. 2 or No. 2-A Conduit or Outlet Box Assemblies, Series No. B-2.



Permaflector No. P-75-A



For cove lighting, where a concentrated distribution is required for throwing the light some distance. Also for stock quotation boards; art galleries; small shallow show windows where overhead room is limited and high intensity is desired; and for indirect lighting fixtures.

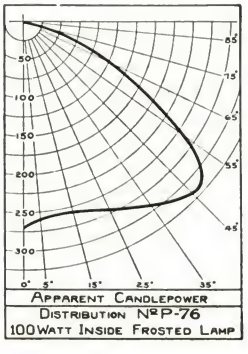
Color-Lighting—Color-Lite No. 4-A (see page 17).

Lamp—75-100-watt A-23.

Holder—Standard 2¼-in. Form "O"; or "Pittsburgh" Form "S," OB holders.

Dimensions—
Height, 3⅝ in. Diameter, 6¾ in. Length, 7 in.
May be used with No. 2 or No. 2-A Conduit, or Outlet Box Assemblies No. B-1 and B-2.

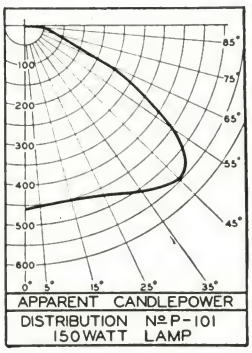
Permaflector No. P-76

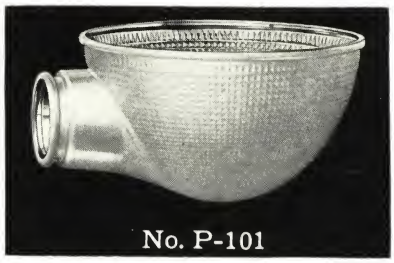


For indirect lighting from coves; distribution broader than No. P-40. Minimum spacing 7½ in. o. c. Also for indirect lighting fixtures and special applications where spacing is limited.

Lamp—50-60-watt A-21 with holder 2¼-in. Form "O"; 75-100-watt A-23 with holder 2¼-in. Form "H."

Dimensions—
Height, 3 in. Diameter, 4¾ in. Length, 5 5/16 in.
May be used with No. 2 or No. 2-A Conduit or Assemblies, Series No. B-2.





Permaflector No. P-101

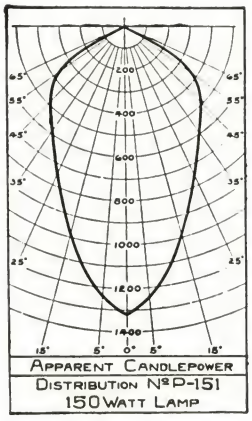
For cove lighting particularly where large areas are to be lighted or greater absorption of light by surfaces of lower reflection factor must be counteracted by additional wattage. Also for indirect lighting fixtures and for special applications requiring high wattages within limited space. Minimum spacing, 9 in.

Color-Lighting—Color-Lite No. 4-A (see page 17).

Lamp—150-watt PS-25.

Holder—2¼-in. Form "O." (Or with 200-watt and 2¼-in. Form "H" holder.)

Dimensions—
Height, 3⅞ in. Diameter, 6¾ in. Length, 7¾ in.
May be used with No. 2 or No. 2-A Conduit or Assemblies, Series No. B-2.



Permaflector No. P-151

Designed primarily for indirect lighting from coves, where light must be thrown some distance, and, therefore, a concentrated beam of light is desired.

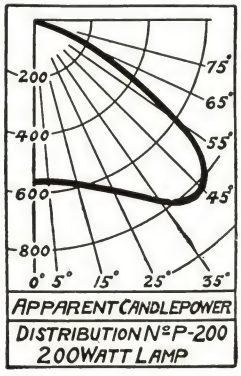
Also for indirect lighting fixtures, rug racks, wall paper racks, wall cases, stock quotation boards, art galleries, and for small shallow show windows, where overhead room is limited and high intensity is desired. Minimum spacing 8¼ in.

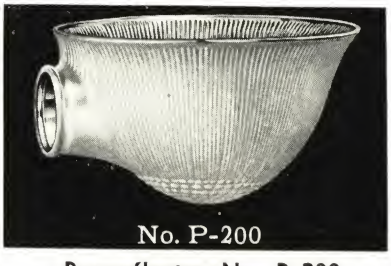
Color-Lighting—Color-Lite No. 4-A (see page 17).

Lamp—150-watt PS-25.

Holder—2¼-in. Form "O."

Dimensions—
Height, 3¾ in. Diameter, 6¾ in. Length, 7 1/16 in.
May be used with No. 2 or No. 2-A Conduit or Outlet Box Assemblies, Series No. B-2.





Permaflector No. P-200

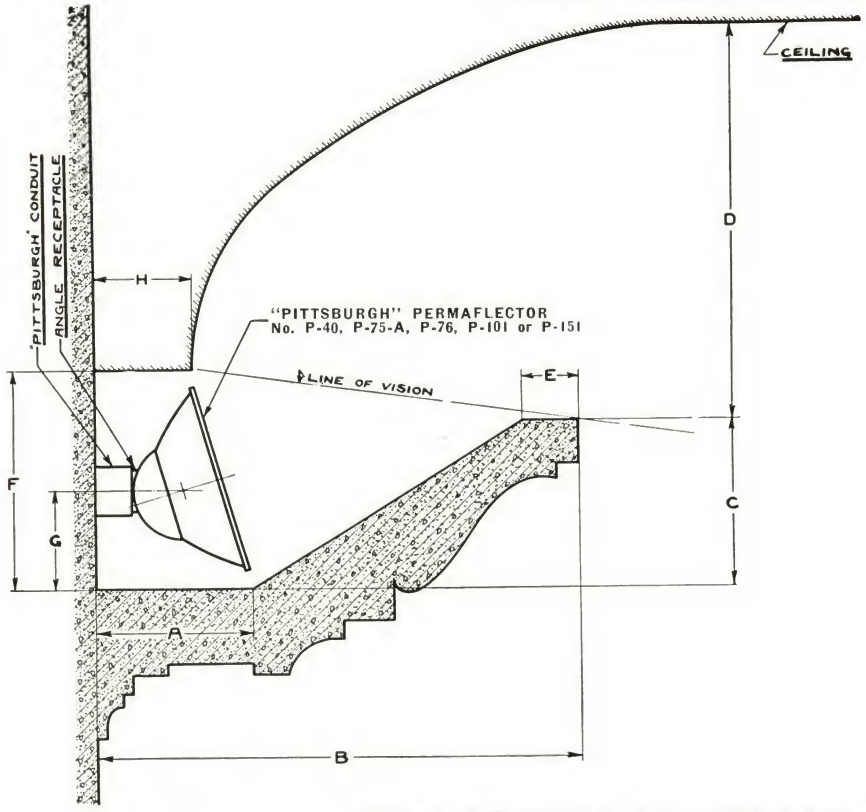
Primarily for cove lighting; broad distribution. Minimum spacing 10 in. o. c. Also for indirect fixtures, etc.

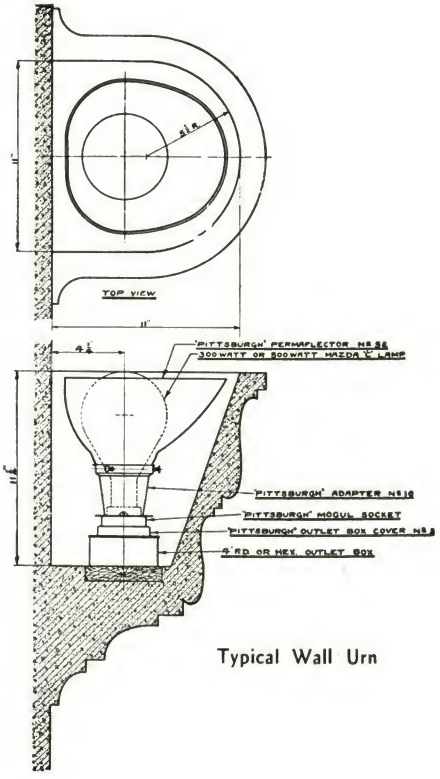
Lamp—150-watt PS-25 with 2¼-in. Form "O"; 200-watt PS-30 with 2¼-in. Form "H" holder.

Dimensions—
Height, 4¼ in. Diameter, 7½ in. Length, 8 in.
Cannot be used with Conduit No. 2 or No. 2-A. May be used with Outlet Box Assemblies, Series No. B-2.

INDIRECT LIGHTING—CONTD.

TYPICAL COVES AND URNS



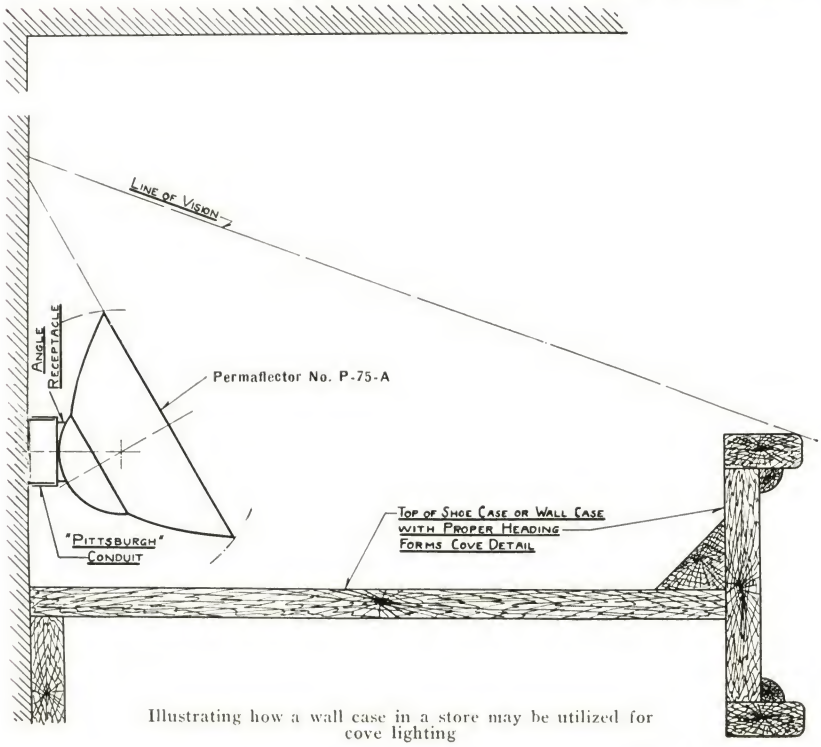


Typical Wall Urn

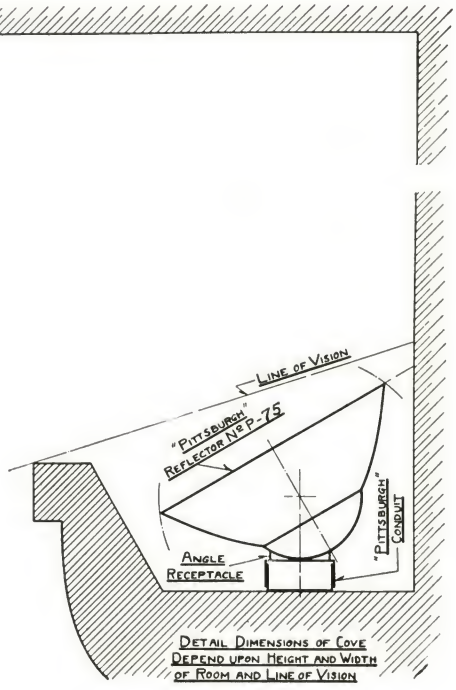
Information Required for Cove Lighting Recommendations

If our recommendations are desired, it is necessary for us to know the following dimensions:

Floor to ceiling.
Length of room.
Width of room.
Dimensions A, B, C, D, E, F, G and H.
Plan of cove, if not rectangular or circular.



Illustrating how a wall case in a store may be utilized for cove lighting



Typical Cove

INDIRECT LIGHTING—CONTD.

PERMAFLECTOR LUMINAIRES

The use of indirect lighting has been held back by the high cost of fixtures. Now there is available a line of excellently designed, pleasing, mechanically good, efficient luminaires at a low price. Indirect lighting is put within the reach of any commercial institution desiring to eliminate eye strain of employees and increase their production. No longer need schools place strains on the eyes of children, sending them out into the industrial world with vision impaired.

Permaflector Luminaires are designed primarily for commercial service such as lighting of stores and offices and for other service where highly decorative fixtures are not required as for schools, barber shops, manufacturing operations, etc.

The distribution of the light over the ceiling is extremely broad and adequately covers an 18-ft. bay from a single central unit with 30-in. suspension.

The field of light is beautifully uniform, as graphically shown in the reproduction from an unretouched photograph; shadows from supporting arms are absent; there is no sharp cutoff to the field of light, rather a gradual fading away.

These unusual results are achieved by means of Permaflectors designed specifically for this purpose. The interior of the reflector is smooth glass and is easy to keep clean—a most important feature. Any one of the supporting arms may be disconnected, allowing the bowl to hang from the other two arms, for quick cleaning of the Permaflector, which cannot drop out. See illustration.

The bowls are of spun copper, suspended from the spun copper husks enclosing the sockets, by means of the detachable steel arms. Canopy is of spun steel; stem of brass tubing; chain of steel. All external parts of fixture are finished in dark statuary bronze for use where a dark finish is best suited or in pewter where a light finish is preferred.

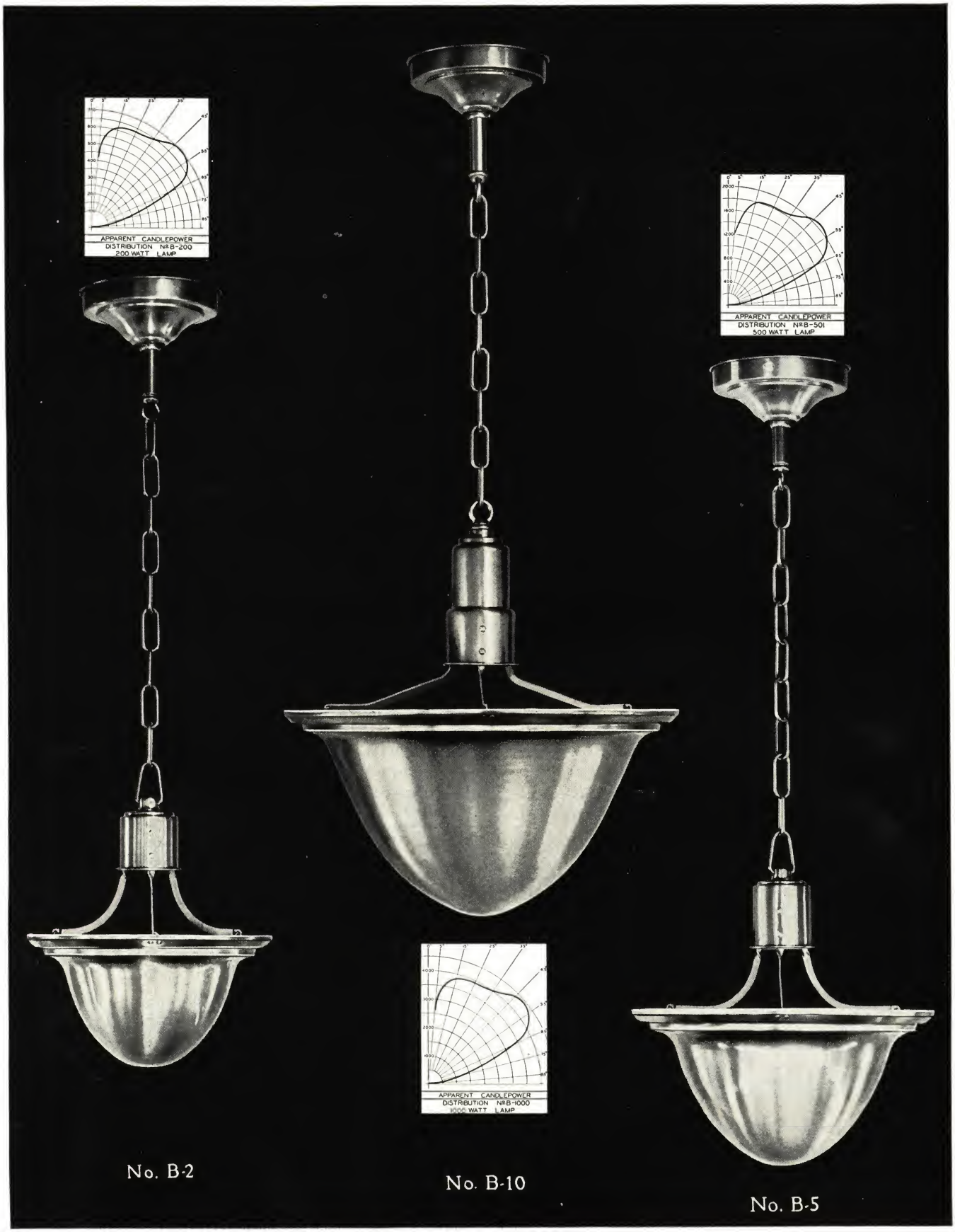
One complete luminaire, including wire, to the standard package.

From Unretouched Photograph. Note Even Distribution

Easy to Clean

SPECIFICATIONS

No. B-2	No. B-5	No. B-10
Bowl size: Diameter .....11⅛ in. Depth ..... 5⅞ in.	Bowl size: Diameter .....13¾ in. Depth ..... 7 in.	Bowl size: Diameter .....17⅞ in. Depth ..... 9¼ in.
Reflector: Permaflector No. B-200.	Reflector: Permaflector No. B-501.	Reflector: Permaflector No. B-1000.
Lamp: Use 200 watt.	Lamp: Use 300-500 watt.	Lamp: Use 750-1000 watt.



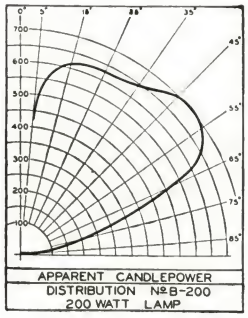
PERMAFLECTOR LUMINAIRES

PERMAFLECTORS FOR INDIRECT FIXTURES

(Lamps Burning Base Up)

These have an exterior silvered surface which is deeply cross-fluted, in order to provide a smooth distribution of light over the ceiling. The interior of the glass, however, is smooth and, therefore, easy to clean and to keep clean; there are no deep wrinkles in which dust and dirt may lodge.

The distribution of light over the ceiling is extremely broad, the ceiling effect is beautifully smooth, uniformly graded, no sharp cutoff to the field of light, but a gradual fading away.

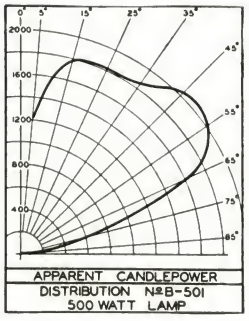


Permaflector No. B-200

Same Permaflector as used in Luminaire No. B-2 (see page 25).

Dimensions—
Diameter ..... 9½ in.
Depth ..... 4¾ in.

To produce the light distribution indicated on the curve, center contact of base of 200-watt lamp must be 4⅞ in. above top rim of Permaflector.



Permaflector No. B-501

Same Permaflector as used in Luminaire No. B-5 (see page 25).

Dimensions—
Diameter ..... 12 in.
Depth ..... 6 in.

To secure the light distribution indicated on accompanying curve, center contact of base of 300 or 500-watt lamp must be 5⅜ in. above top rim of Permaflector.

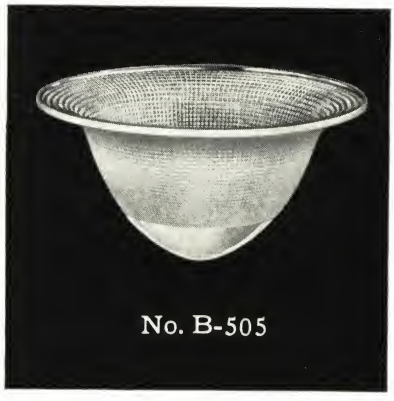
No. B-502

For indirect lighting units of the deep luminous bowl type, employing a narrow metal band for supporting the enclosing bowl. The upper portion is a silvered reflecting surface having same contour, fluting and light distribution as Permaflector B-501. The lower portion is translucent glass of density and shape to provide a moderate uniformly distributed illumination of the enclosing bowl. Center contact of base of 300-500-watt lamp should be 5⅜ in. above top rim of Permaflector.

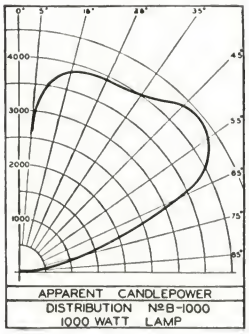
Dimensions—
Diameter ..... 12 in.
Depth ..... 6⅝ in.

No. B-505

For indirect lighting fixtures of the luminous bowl type. It consists of a silvered upper portion, identical with Permaflector B-501, as to contour, fluting and light distribution, and a translucent lower section which transmits a low percentage of light to the opal glass bowl of the fixture. If the shape of the opal glass bowl of the fixture is of the mushroom type, there will be transmitted a sufficient flux of light to illuminate the exterior surface of the upper metal bowl. Center contact of base of 300-500-watt lamp should be 5⅜ in. above top rim of Permaflector.



Dimensions—
Diameter ..... 12 in.
Depth ..... 5½ in.



Permaflector No. B-1000

Same Permaflector as used in Luminaire B-10 (see page 25).

Dimensions—
Diameter ..... 16 in.
Depth ..... 8 in.

To secure the light distribution indicated on accompanying curve, center contact of 750-1000-watt lamp base must be 7¼ in. above top rim of Permaflector.

INDIRECT LIGHTING—Continued

PERMAFLECTORS FOR URNS AND URN-TYPE FIXTURES

(Lamp Installed Base Down)

Indirect lighting is desirable for some interiors without coves and in which luminaires cannot be used. For these interiors, urns and urn-type fixtures may be employed. Some of these interiors are: private and public offices; banks; specialty shops, special departments in department stores, automobile, furniture and other show rooms; hotels lobbies, dining rooms, dance halls, etc.

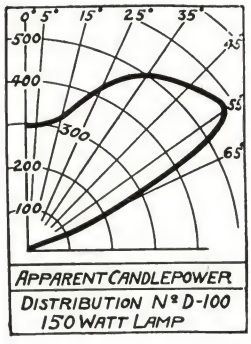
Permaflector No. B-1001

For use in indirect urn-type Luminaires (see also B-508). Lighting distribution the same as B-1000.

Dimensions—

Diameter ..... 10 in.
Depth of reflector only ..... 8 13/16 in.
Depth, complete with holder and 4-in. outlet box, as shown ..... 13 5/8 in.

For 750-1000-watt, PS-52 lamp.



Permaflector No. D-100

For use in indirect lighting fixtures with the lamp burning tip up.

Lamp—150-watt clear with 2¼-in. Form "H" holder; 75-100-watt A-23 with 2¼-in. Form "O" holder.

Dimensions—

Height ..... 4½ in.
Diameter ..... 7 in.

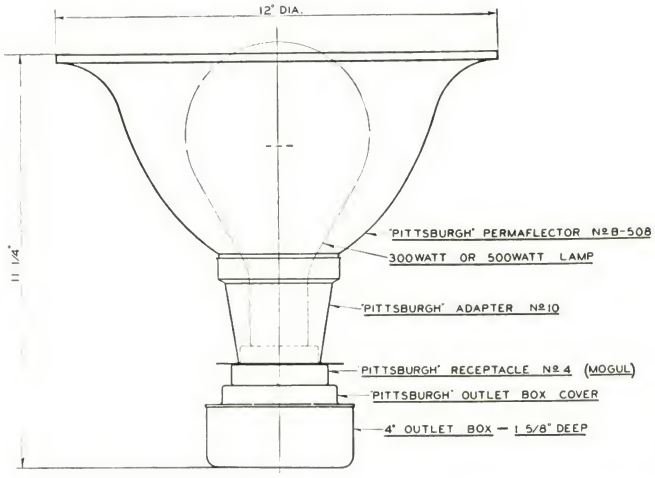
Permaflector B-508

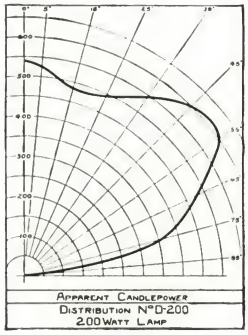
Permaflector B-508 is identical with Permaflector B-501 with respect to contour, fluting, light distribution. It differs in that it is equipped with a 3¼-in. bottom opening and neck, permitting the use of 300-watt PS-35, 500-watt PS-40 lamps in the base-down position.

In other words, it is a companion Permaflector to B-1001, for use in floor urns and pedestal lamps.

Dimensions—

Diameter ..... 12 in.
Depth, overall including Adapter No. 10, Mogul Socket No. 4 and 4-in. Outlet Box Cover ..... 11¼ in.
Depth, glass only ..... 6⅛ in.





Permaflector No. D-200

For use in indirect lighting fixtures, lamp burning tip up. The distribution of light is wider than that of No. D-100.

Lamp—200-watt.

Holder—3¼-in. Form "O."

Dimensions—

Height ..... 5¾ in.
Diameter ..... 9½ in.

PERMAFLECTORS FOR INDUSTRIAL LIGHTING

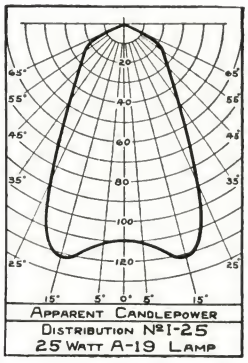
Factory lighting, in order to accomplish beneficial results, must conform to a number of fundamentals as follows: (1) adequate intensity of illumination at the work; (2) proper shading of lamps to minimize glare; (3) reasonably uniform distribution of light on the work; (4) absence of excessive brightness contrast within the field of view.

(1) Adequate intensity is a matter of selecting the proper size and spacing of lighting units, having due regard for their efficiency.

(2) Permaflectors are designed on the principle of concealing the electric lamp so as to provide the requisite degree of shading.

(3) Uniformity will be obtained through proper mounting and spacing of lighting units.

(4) Excessive contrasts are avoided through the use of light-colored ceilings and medium-colored walls.



Permaflector No. I-25

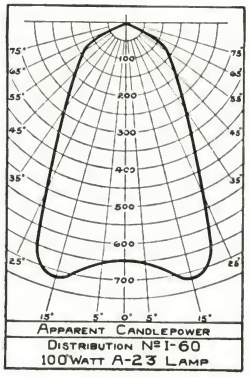
For service whenever highly concentrated beam over a limited area is desired. Useful for special applications where space is limited.

Lamps—15-25-watt A-19.

Holder—2¼-in. Form "O."

Dimensions—

Height ..... 3 in.
Diameter ..... 4½ in.



Permaflector No. I-60

For the same uses as No. I-25. Also for low mounting industrial use, as over benches, inspection tables, stock shelves, etc.

Lamps—60-watt A-21 or 100-watt A-23.

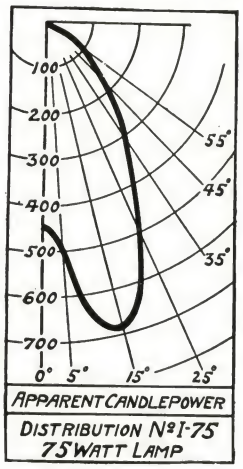
Holder—2¼-in. Form "O" for 60-watt. 2¼-in. Form "H" for 100-watt.

Color-Lite—No. 4-A (page 17).

Flush Mounting Ring—No. I-60 (page 16).

Dimensions—

Height ..... 4 7/16 in.
Diameter ..... 6¾ in.



Permaflector No. I-75

For low mounting localized industrial lighting (5-12 ft. above work plane). Also for ornamental direct lighting fixtures; for flush mounting in low ceilings.

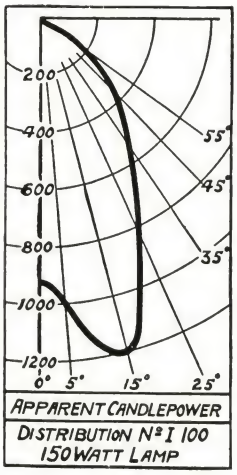
Flush Mounting Ring—No. 55 (page 16).

Lamp—75-100-watt A-23.

Holder—2¼-in. Form "H."

Dimensions—

Height ..... 4¾ in.
Diameter ..... 8⅜ in.



Permaflector No. I-100

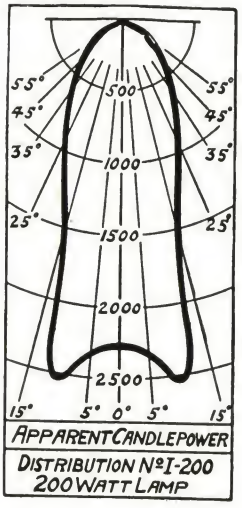
Same as No. I-75, excepting for 100-watt A-23 and 150-watt PS-25 lamps.

Lamp—150-watt with 2¼-in. Form "H" holder; 100-watt with 2¼-in. Form "O" holder.

Flush Mounting Ring—No. C-201 (page 16).

Dimensions—

Height ..... 5⅞ in.
Diameter ..... 9¾ in.



Permaflector No. I-200

For use whenever a highly concentrated beam over a limited area is desired. Primarily a local lighting unit. Adapter No. 1256 supplied.

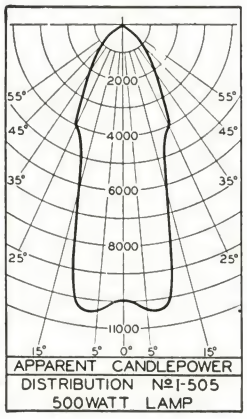
Lamp—200-watt, Adapter extended; 150-watt, Adapter compressed.

Holder—2¼-in. Form "O."

Dimensions—

Height ..... 7 5/8 in.
Diameter ..... 11 in.

PERMAFLECTORS FOR INDUSTRIAL LIGHTING—Continued



Permaflector No. I-505

Companion to Permaflector I-1000. Fixed focus unit. The light distribution curve shown herewith, indicates an exceptional concentration of light.

The entire output of the unit is confined to the zone 0-60° and amounts to 71.3 per cent of the bare lamp lumens.

For high bay industrial lighting where the lighting equipment is located 25 ft. or more above the floor. Also very effective for lighting through skylights as in art galleries, bank lobbies and similar applications. Also a splendid reflector for service in direct lighting ornamental lanterns.

For industrial lighting the spacing between Permaflectors should not exceed their height above the work plane.

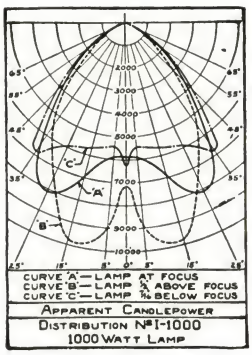
Lamps—300-500-watt.

Holder—Furnished with 4-in. round box cover, Mogul receptacle and Form "M" holder.

Dimensions—

Height, overall, including 1⅝-in. outlet box ..... 14⅝ in.
Height of Permaflector ..... 9¾ in.
Diameter of Permaflector ..... 16 in.

(When used on conduit No. 6, discard box cover and attach socket and holder to conduit.)



Permaflector No. I-1000

For industrial lighting where the lighting unit must be from 25 to 50 ft. or more above the floor, usually above the crane as well. Also for lighting through skylights.

Very concentrating, most of the reflected light being confined to the zone 0° to 40°, with a cut-off at approximately 60°.

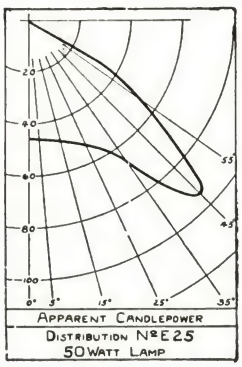
Spacing between permaflectors should not exceed their height above the work plane.

Lamps—300-500-750-1000-watt.

Holder—Mogul Socket and special holder furnished, tapped for ½-in. conduit. Two socket position: one for 300-500 watt; one for 750-1000-watt lamps.

Dimensions—

Height overall ..... 16¾ in.
Height of Reflector ..... 8 9/16 in.
Diameter ..... 16 in.



Permaflector No. E-25

Distributing type for local lighting purposes.

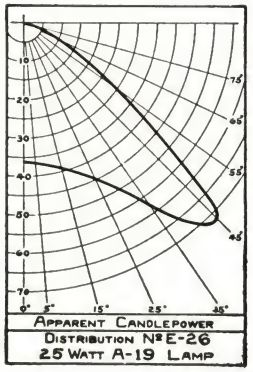
Flush Mounting Ring—No. E-25 (page 16).

Lamp—25-watt A-19 and 50-watt A-21.

Holder—2¼-in. Form "O" with 25-watt; Form "H" with 50-60-watt.

Dimensions—

Height ..... 3½ in.
Diameter ..... 4½ in.



Permaflector No. E-26

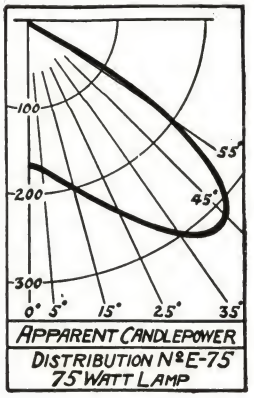
A semi-distributing type for local lighting purposes.

Flush Mounting Ring—No. 28 (page 16).

Lamp—25-watt A-19 with holder 2¼-in. Form "O"; 50-60-watt A-21 with holder 2¼-in. Form "H."

Dimensions—

Height ..... 3 7/16 in.
Diameter ..... 5⅝ in.



Permaflector No. E-75

Distributing type for low mounting (5-12 ft. above work plane), industrial service; for use in ornamental direct lighting fixtures, and for use in flush mounting in low ceilings.

Flush Mounting Ring—No. I-60 (page 16).

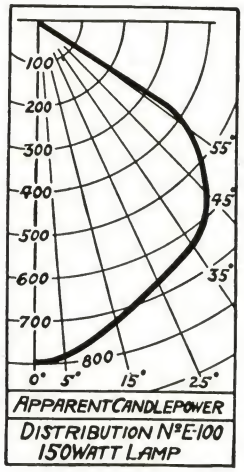
Lamp—75-100-watt A-23.

Holder—2¼-in. Form "H."

Dimensions—

Height ..... 4¾ in.
Diameter ..... 6½ in.

PERMAFLECTORS FOR INDUSTRIAL LIGHTING—Continued



Permaflector No. E-100

Same as No. E-75, excepting for use with 100-watt A-23 and 150-watt PS-25 lamps.

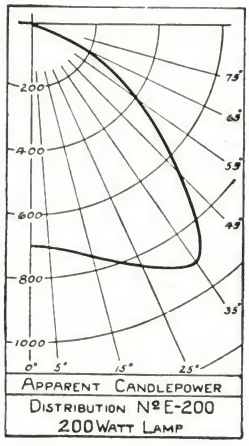
Flush Mounting Ring—No. 55 (page 16).

Ceiling Roundel—(Page 17.)

Lamp—150-watt, PS-25 with 2¼-in. Form "H" holder; 100-watt A-23 with 2¼-in. Form "O" holder. When equipped with "LC" holder, No. E-100 in combination with Hinged Ceiling Roundel No. 1 takes the 200-watt PS-30 lamp.

Dimensions—

Height ..... 6¼ in.
Diameter ..... 8½ in.



Permaflector No. E-200

Same as No. E-75, excepting for use with 200-watt lamps. Adapter No. 1256 supplied.

Lamp—200-watt, PS-30 Adapter extended—150-watt, PS-25 Adapter compressed.

Holder—2¼-in. Form "O."

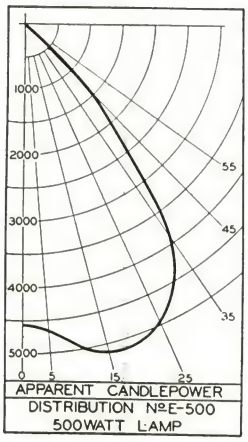
Flush Mounting Ring—No. 54 (page 16).

Dimensions—

Height ..... 9⅜ in.
Diameter ..... 9½ in.

Bank Light No. 5

Primary application to wicket above teller's window, for illuminating counter. Standard unit is 2 ft. 6 in. long, 5⅝ in. high and 6 in. deep. It contains wire way, sockets, holders, and five Permaflectors No. I-25 in which are used 25-watt A-19 lamps. Hinged bottom contains individual heat-resisting glass roundels which produce diffuse uniform illumination and are of pleasing appearance.



Permaflector No. E-500

Distributing type intended for intermediate mounting high intensity industrial service, mounting 12 to 25 feet above the work plane; for the lighting of gymnasiums; and for flush mounting in ceiling in combination with Hinged Ceiling Roundel No. 2. (Page 17.)

Also useful for installation in Gothic and other designs of lanterns, in churches and public buildings.

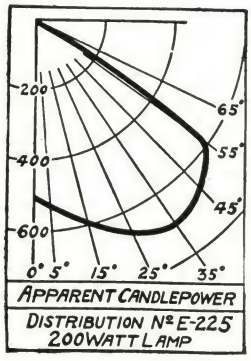
Lamp—300-500-watt, clear or bowl frosted.

Holder—Form "M," with Mogul Socket and 4-in. round outlet box cover.

Ceiling Roundel—(Page 17.)

Dimensions—

Glass, height ..... 9⅛ in.
Glass diameter ..... 11⅞ in.
Overall, height, including 4-in. outlet box ..... 14 in.



Permaflector No. E-225

Semi-distributing, otherwise same as the No. E-200. Adapter No. 1256 supplied.

Lamp—200-watt, PS-30 Adapter extended—150-watt, PS-25 Adapter compressed.

Flush Mounting Ring—No. 54 (page 16).

Dimensions—

Height ..... 8⅛ in.
Diameter ..... 9½ in.

Permaflector No. T-1

For use with traffic lamps.

Lamp—60-watt special traffic.

Holder — 2¼-in. Form "O."

Dimensions—

Height ..... 4 in.
Diameter .... 8⅜ in.

PERMAFLECTOR FLOODLIGHTS

Since floodlighting equipment must be used out-of-doors, the first essential is that the floodlight case, in which the lamp and reflector are enclosed, be thoroughly weatherproof and capable of withstanding weather conditions for a reasonable number of years, without deterioration.

Permaflector Floodlight cases are designed and constructed of such materials as to enable them to give good service under all weather conditions encountered in this country, whether used in the North, the South, in the mountains or on the sea coast.

Two Types of Permaflector Floodlights

There are two general types of Permaflector floodlights. The "FL" line is characterized by the position of the lamp, which is such that the axis of the lamp is perpendicular to the axis of the reflector. The "FL" floodlights are designed for use primarily where the light is to be projected in a generally horizontal or slightly upward or downward direction. These floodlights when used in this manner, keep the lamp approximately vertical. If the beam of light is to be projected more than 45 degrees above the horizontal, or more than 45 degrees below the horizontal, it is preferable to use Pittsburgh "FLC" line of Floodlights.

The "FLC" floodlights are designed for floodlighting service where the beam of light is to be projected sharply upward, as when illuminating any vertical surface from below and from a location rather close to the surface, and occasionally for sharply downward service. When used in this way, the lamp will be in approximately a vertical position. The axis of the lamp coincides with the axis of the reflector.

The "FL" line consists of the following numbers: FL-301, FL-302, FL-500, FL-750, FL-1500.

The "FLC" line of floodlights consists of the following numbers: FLC-100, FLC-103, FLC-104, FLC-250, FLC-300, FLC-501, FLC-1001, FLC-1002. Floodlights FLC-100, FLC-103, FLC-104 are designed for use in the vertically upward position only; Floodlights FLC-300, FLC-501, FLC-1001 may be used for lighting upward or lighting downward. Floodlights FLC-250, FLC-1002, since they employ "G" type floodlight lamps, may be used in any position except base-up position; that is, for directing light any direction except under 45 degrees below the horizontal.

Permaflectors Provide the Reflecting Medium

In order to secure light control, from extreme concentration to extra broad spread, it is essential that floodlights be equipped with reflectors capable of securing these results. All Permaflector Floodlights are equipped with Permaflectors, the silver-plated glass reflectors with the permanent efficiency, of appropriate design for the particular service for which the floodlight is intended. A table of Permaflector numbers, as employed with the various Permaflector Floodlights, will be found on page 38.

HEAT-RESISTING COVER GLASS

C—CLEAR ST—STIPPLED
D—DIOPTRIC SP—SPREAD

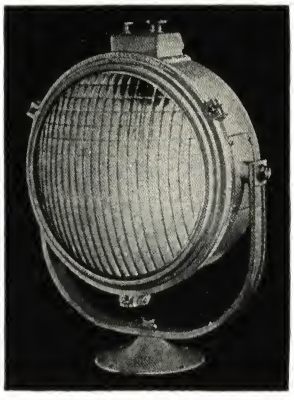
Size, in.	Type	For Use with
8	C	FLC-100
8	ST	FLC-100
8⅜	ST	Hinged Ceiling Roundel No. 1
9 7/16	C	FLC-103, FLC-104
9 7/16	ST	FLC-103, FLC-104
9 7/16	SP	FLC-103, FLC-104
11¼	C	FLC-250
11¼	ST	FLC-250
11¼	SP	FLC-250
12	C	FL-300, FL-303
12	ST	FL-300, FL-303
12	SP	FL-300, FL-303
13¾	C	FL-301, FL-302, FLC-300
13¾	ST	FL-301, FL-302, FLC-300
13¾	SP	FL-301, FL-302, FLC-300
16¾	C	FL-500, FL-750, FLC-501, FLC-1001, FLC-1002
16¾	ST	FL-500, FL-750, FLC-501, FLC-1001, FLC-1002
16¾	SP	FL-500, FL-750, FLC-501, FLC-1001, FLC-1002
18¾	C	FL-1500
18¾	ST	FL-1500
18¾	SP	FL-1500
18¾	D	Airport Field Flood

Clear

Stippled

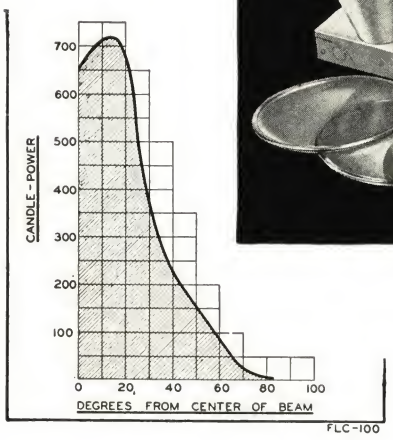
Spread

All floodlights, except FL-750, furnished with clear cover glass unless otherwise specified. If stippled or spread lens is desired, order must so state. Floodlight FL-750 furnished only with stippled cover glass.



Dioptric Lens

PERMAFLECTOR FLOODLIGHTS—Continued



Permaflector Floodlight FLC-100

Description—Consists of galvanized iron channel, to which are attached individual conical-spun copper drums, containing Receptacle and Permaflector. At additional cost, copper channel will be supplied. This channel must be supported by means of special iron brackets.

Units may be ordered on any desired spacing: Minimum spacing 9⅛ in. o. c.

Beam Spread—Extra broad, 120-degree spread. For complete illumination performance data see page 37.

Applications—For lighting vertical surfaces of a height of twelve feet or less, from equipment close to the face of such vertical surfaces. Cannot be used for downward lighting.

Color-Lighting—Color-Lite F-2 (page 17).

Permaflector—No. I-60 (page 38).

Lamps—100-watt, A-23. By use of a socket extension, it may be adapted for service with 50 or 60-watt A-21 lamp.

Cover Glass—8-in. clear or stippled, heat-resisting cover glass, cemented into cover (page 31).

Fixed-Focus—Floodlight FLC-100 is a fixed-focus unit. It is especially useful for installation in small space.

Dimensions—Over-all height, including channel, 9½ in.; over-all diameter at top, 9 in. To conceal these floodlights, therefore, calls for a space 9½ in. deep by approximately the same width. A greater width, of course, is desirable where obtainable, to permit installing the units farther from the surface to be illuminated.

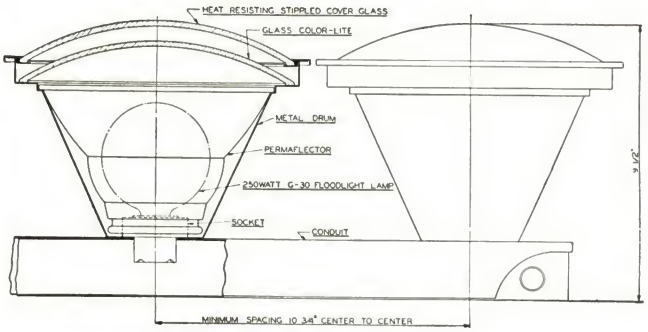
Permaflector Floodlight FLC-103

Description—See Permaflector Floodlight No. FLC-100.

Units may be ordered on any desired spacing: Minimum spacing 10¾ inches o. c.

Beam Spread—Medium beam 25-degree spread. For complete illumination performance data, see page 37.

Applications—For lighting vertical surfaces from equipment close to base of such surfaces. A vertical throw of 50 ft. may be handled very conveniently and effectively. Where it is possible to install the floodlight a short distance out from the base of the surface to be illuminated, considerably longer throws of light are feasible. Consult our engineering department in specific cases.



Color-Lighting—Color-Lite F-4 (page 17).

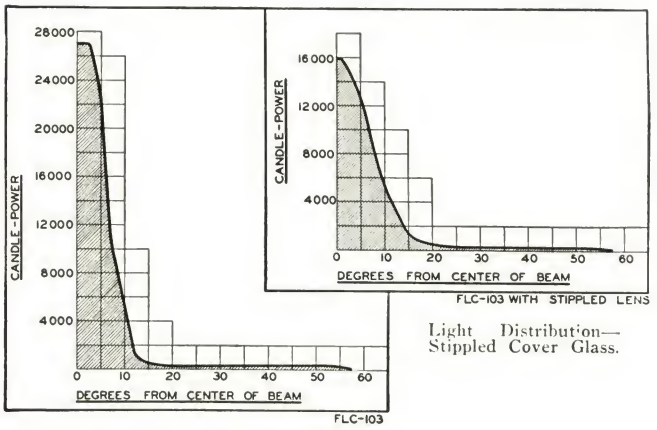
Permaflector—No. C-101 (page 38).

Lamps—250-watt G-30 floodlight lamps.

Cover Glass—$9\frac{7}{16}$-in. clear, stippled, or spread, heat-resisting roundel cemented in cover frame (page 31).

Fixed Focus—A fixed-focus unit, especially serviceable for the lighting of vertical surfaces in the upward direction.

Dimensions—Over-all height 9½ in. including the channel; over-all diameter of cover is 10½ in. It may, therefore, be located in a space 9½ in. high by 11 to 12 in. in width. A greater width is desirable to permit installing the floodlights out farther from the surface to be illuminated.



Light Distribution—No Cover Glass

Light Distribution—Stippled Cover Glass.

Permaflector Floodlight FLC-104

Description—See Permaflector Floodlight No. FLC-100.

Applications—For lighting vertical surfaces from equipment close to the base of such vertical surfaces. In general, it may be employed for illuminating such vertical surfaces to a height of 20 ft. Where a surface of great height must be illuminated in this manner, it is necessary to be able to locate the floodlights farther out from the base of the surface, or employ Floodlight FLC-103. It may not be employed for other than upward lighting of vertical surfaces.

Beam Spread—Broad-beam, 40-degree spread.

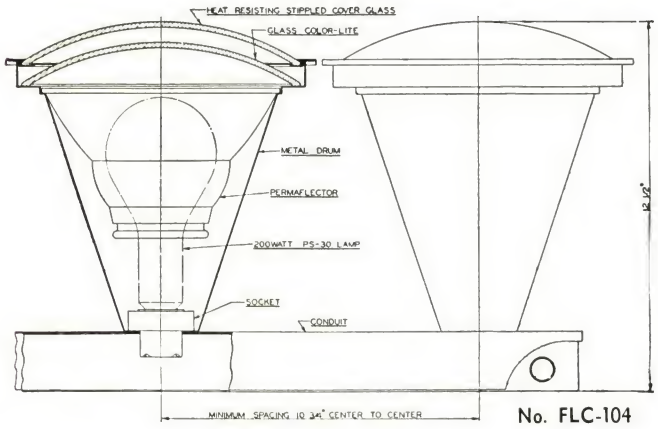
Color-Lighting—Color-Lite F-4 (page 17).

Permaflector—No. C-101 (page 38).

Lamps—200-watt PS-30. By the use of a socket extension, it may be adapted for the 150-watt PS-25 lamp.

Cover Glass—$9\frac{7}{16}$-in. heat-resisting clear stippled or spread glass roundel, cemented into cover frame (page 38).

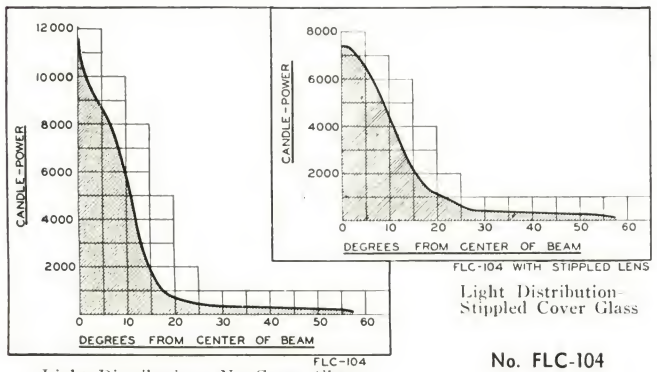
PERMAFLECTOR FLOODLIGHTS—Continued



No. FLC-104

Fixed Focus—A fixed-focus unit, very serviceable for the floodlighting of vertical surfaces from a location close to the base.

Dimensions—Over-all height 12½ in. including the channel. Diameter at top, 10½ in. This floodlight may therefore be installed in a location having a depth of 12½ in. and a width of 11 to 12 in. A greater width is desirable, in order to permit the location of the floodlights at somewhat greater distance from the surface to be illuminated.

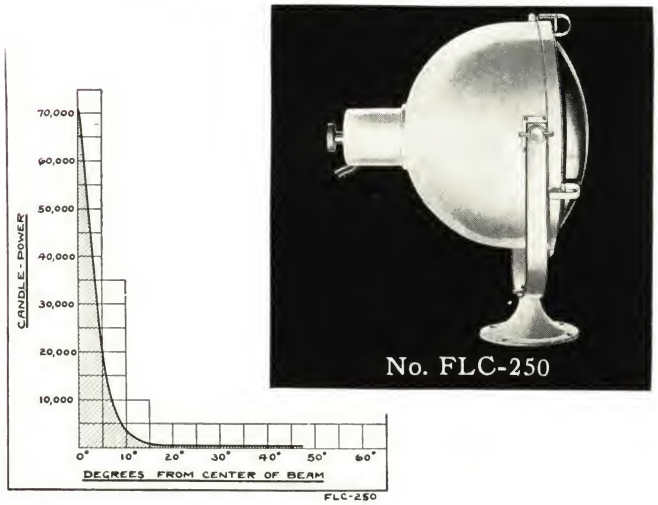


Light Distribution—No Cover Glass

Light Distribution—Stippled Cover Glass

No. FLC-104

Permaflector Floodlight FLC-250



Description—Constructed of highest-grade sheet steel Parkerized inside and outside. Base and trunnion of cast iron. Bow of steel. All moving parts, adjustments, screws, etc., are of brass and proof against corrosion and freezing.

Beam Spread—A narrow beam unit, 16 degrees spread. For complete illumination performance data, see page 37.

Applications—For floodlighting service requiring a narrow beam low wattage projector. Particularly serviceable for illuminating the exterior surfaces of buildings of the modern type having offsets in which the floodlights may be concealed. For specific cases, consult our Engineering Department. Also useful for illuminating traffic policemen at busy corners.

Color Lighting—Color-Lite F-1 (page 17).

Permaflector—No. C-201 (page 38).

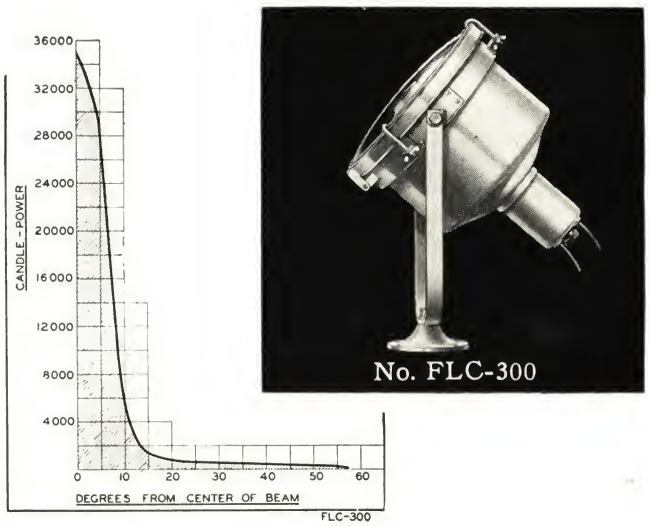
Lamps—250-watt G-30 floodlighting lamp. May be used only for base-down service, or lamp with axis in horizontal position. In no case may the unit be used with the lamp base more than 45 degrees above the horizontal.

Cover Glass—11¼-in. heat-resisting clear, stippled or spread glass cover (page 31).

Base—Furnished with low base (page 38) unless otherwise specified.

Dimensions—For the essential over-all dimensions, see diagram and table on page 37.

Permaflector Floodlight FLC-300



Description—Constructed of highest-grade sheet steel, Parkerized. Base is of cast iron, and bow of steel. All moving parts, adjustments, screws, etc., are of brass and proof against corrosion and freezing.

Beam Spread—A medium beam unit, 25 degree spread. For complete illumination performance data, see table on page 37.

Applications—For floodlighting service requiring a medium beam intermediate wattage projector. Particularly serviceable for illuminating exterior surfaces of buildings of the modern type having offsets in which floodlights may be concealed. For specific cases, consult our engineering department. Also useful for illuminating traffic policemen.

Color-Lighting—Color-Lite F-5 (page 17).

Permaflector—No. C-300 (page 38).

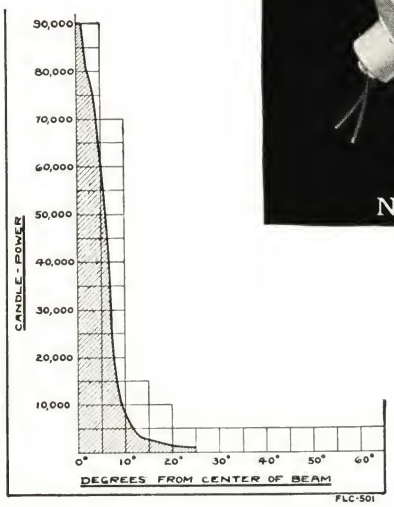
Lamp—Use 300-watt PS-35.

Cover Glass—13¾-in. heat-resisting glass cover (page 31).

Base—Furnished with low base (page 38) unless otherwise ordered.

Dimensions—For the essential over-all dimensions see diagram and table on page 37.

PERMAFLECTOR FLOODLIGHTS—Continued



Permaflector Floodlight FLC-501

Description—Constructed of highest-grade sheet steel, Parkerized inside and outside. Base, cover ring, cover, and trunnion, are of cast iron. Bow is built of heavy channel steel. All moving parts, adjustments, screws, etc., are of brass and proof against corrosion and freezing.

Beam Spread—A medium beam unit, 19.6 degrees spread. By change of lamp position, by means of focusing knobs, it may be converted to broad-beam spread. For complete illumination performance data, see table on page 37.

Applications—Designed for long-range floodlighting service. It is especially useful for lighting large vertical surfaces from below.

Color Lighting—Color-Lite F-3 (page 17).

Permaflector—No. F-1001 (page 38).

Lamps—300-watt PS-35 or 500-watt PS-40.

Cover Glass—16¾-in. heat-resisting glass cover, available in clear, inside stippled or spread, cemented into cover frame. See page 31 for full information on heat-resisting cover glasses.

Base—Furnished with low base unless otherwise specified (see page 38).

Dimensions—For the essential over-all dimensions, see diagram and table on page 37.

Permaflector Floodlight FLC-1001

Description—Same as No. FLC-501.

Beam Spread—Medium beam unit, 19.6 degrees spread. By change of lamp position, by means of focusing knobs, it may be converted to broad beam spread. For complete illumination performance data, see table on page 37.

Applications—Designed for long-range floodlighting service It is especially useful for lighting very large vertical surfaces from below.

Color-Lighting—Color-Lite F-3 (page 17).

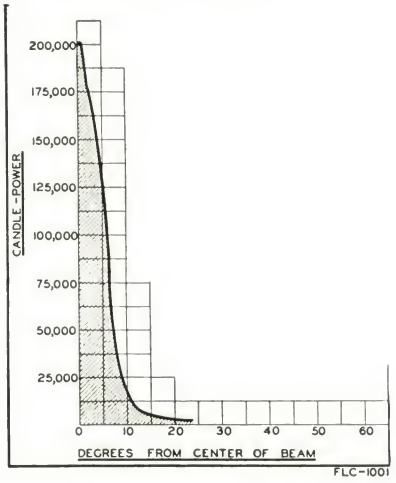
Permaflector—No. F-1001 (page 38).

Lamps—750-1000-watt PS-52.

Cover Glass—Same as No. FLC-501.

Base—Same as No. FLC-501.

Dimensions—Same as No. FLC-501.



Permaflector Floodlight FLC-1002

Description—Same as No. FLC-501.

Beam Spread—Narrow beam 13.6 degrees spread. By change of lamp position, by means of focusing knob, it may be converted into a medium beam spread. For complete illumination performance data, see table on page 37.

Applications—For exceptionally long-range floodlighting service. It is especially useful for lighting very tall vertical surfaces, 150 feet and higher, from locations close to the base of such surfaces. For specific cases consult our engineering department.

Color-Lighting—Color-Lite F-3 (page 17).

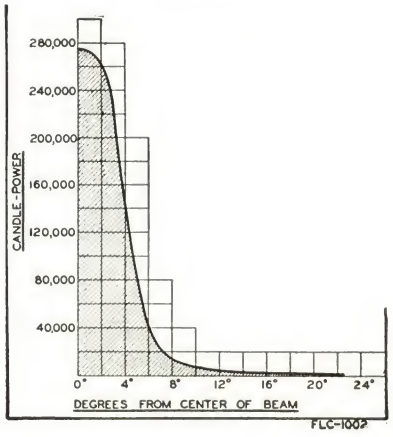
Permaflector—No. F-1001 (page 38).

Lamps—1000-watt G-40 floodlight lamps. Because of limitations placed on this lamp by the lamp manufacturers, this unit may be used only for base down service, or lamp with axis in horizontal position. In no case may the unit be used with the lamp base more than 45 degrees above the horizontal.

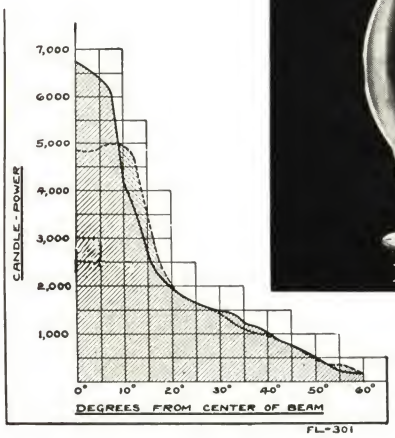
Cover Glass—Same as No. FLC-501.

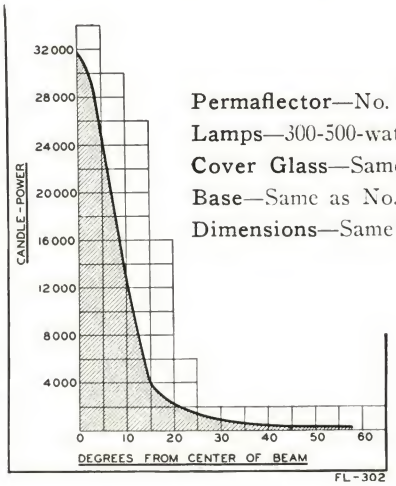
Base—Same as No. FLC-501.

Dimensions—Same as No. FLC-501.



PERMAFLECTOR FLOODLIGHTS—Continued





Permaflector—No. F-302 (page 38).
Lamps—300-500-watt general service lamps.
Cover Glass—Same as No. FL-301.
Base—Same as No. FL-301.
Dimensions—Same as No. FL-301.

Permaflector Floodlight FL-301

Description—Constructed of highest-grade sheet steel, Parkerized. Base is of cast iron and bow of steel. All moving parts, adjustments, screws, etc., are of brass and proof against corrosion and freezing.

Beam Spread—A broad beam unit, 100 degrees spread. For complete illumination performance data see table on page 37.

Applications—Particularly for mounting relatively close to the surface to be illuminated—approximately 10 to 20 ft. therefrom, such as upon lighting standards at the curb. Also useful for lighting larger areas from a greater distance, as for instance outdoor bathing pools, miniature golf courses, gasoline service stations, etc.

Color-Lighting—Color-Lite F-5 (page 17).

Permaflector—No. F-300 (page 38).

Lamps—300-watt, PS-35; 500-watt, PS-40.

Cover Glass—13¾-in. heat-resisting glass cover, available in clear, inside stippled, or spread, clamped into cover frame (page 31).

Base—Furnished with low base unless otherwise specified.

Dimensions—For the essential over-all dimensions see diagram and table on page 37.

Permaflector Floodlight FL-302

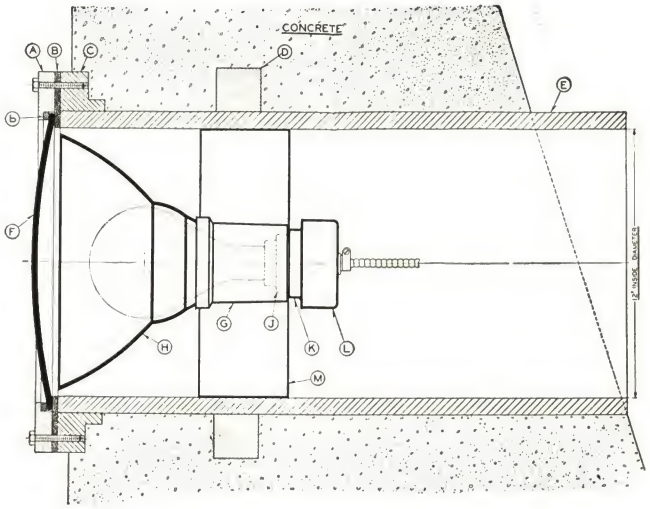
Description—Same as No. FL-301.

Beam Spread—A broad beam unit, 35 degrees spread, but it will be noted is not as broad in spread as its companion floodlight, No. FL-301. For complete illumination performance data see table on page 37.

Applications—Designed for applications similar to Floodlights No. FL-301, but where a lesser breadth of beam is desired. It is identical with Floodlight No. FL-301 except that it employs a compound parabolic, unfluted Permaflector having lesser spread.

Color-Lighting—Same as No. FL-301.

Underwater Projector



The drawing above illustrates this unit and its method of installation in the side walls of a swimming pool, the top being approximately 12 in. below the water line.

A steel pipe (E) having an inside diameter of 12 in. is set into the concrete in the manner shown. A 2-in. x 2-in. wrought iron band (D) is shrunk on the pipe to provide anchorage in the concrete. At the front a flange (C) also is shrunk on to provide the means for fastening a brass ring (A) by means of bronze tap bolts.

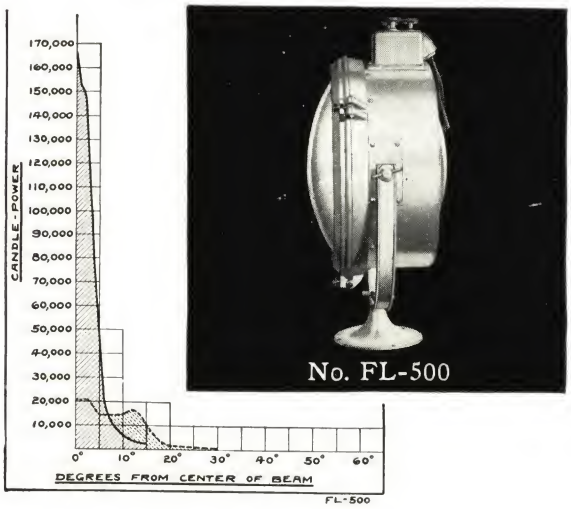
As will be seen, these are for the purpose of clamping in place, between rubber gaskets (B) and (b) the 13¼-in. diameter heat-resisting spread lens (F) ribs set vertically to spread light horizontally.

The underwater projectors are serviced from the rear, making it unnecessary to drain the pool for this purpose.

The light equipment consists of "Pittsburgh" Permaflector C-300 (H); 300-500-watt lamp, "Pittsburgh" adapter No. 12 (G); "Pittsburgh" mogul receptacle No. 4 (J); and "Pittsburgh" Outlet Box Cover (K); Outlet Box (L); and Copper Drum (M); of size to provide slip fit in steel pipe. Connection to junction box is made with flexible lead-covered cable.

Pittsburgh Reflector Company furnishes only those parts which constitute the lighting equipment. All items which are set into the concrete and the brass ring and gaskets are supplied by others, usually the contractor constructing the pool. The electrical contractor assembles, installs, and connects up the units.

PERMAFLECTOR FLOODLIGHTS—Continued



Permaflector Floodlight FL-500

Description—Constructed of highest-grade sheet steel, Parkerized. Base, cowl, cover ring, cover, and trunnions are of cast iron. Bow is built of heavy channel steel. All moving parts, adjustments, screws, etc., are of brass and proof against corrosion and freezing.

Beam Spread—A narrow beam, 13.6 degrees spread. By change of lamp position, it may be converted to medium or broad beam spread. For complete illumination performance data, see table on page 37.

Applications—Particularly for long-range floodlighting service. With the lamp at the focal center it is particularly serviceable for illuminating buildings 150 feet distant or more. For intermediate distances, up to 150 feet, the beam spread may be adjusted to medium or broad spread by means of the three focusing knobs. When equipped with inside stippled or spread type of cover glass, this unit is very useful for recreational areas, gasoline filling stations, automobile parking and used car lots, new homes in subdivisions, outdoor electrical substations, etc.

Color-Lighting—Not equipped for color-lighting applications. For temporary color lighting effects, Cel-O-Glass may be inserted under the protection of the heat-resisting glass cover.

Permaflector—No. F-500 (page 38).

Lamps—300-watt PS-35, 500-watt PS-40.

Cover Glass—16¾-in. heat-resisting glass cover, available in clear, inside stippled, or spread, cemented into cover frame (page 31).

Base—Furnished with low base unless otherwise specified (page 38).

Dimensions—For the essential over-all dimensions, see diagram and table on page 38.

Permaflector Floodlight FL-750

Description—Same as No. FL-500.

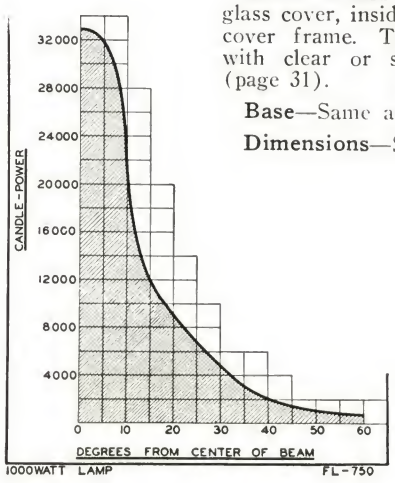
Beam Spread—A broad beam, approximately 50 degree average spread. For complete illumination performance data, see table on page 37.

Applications—For floodlighting service requiring a broad beam of light, intermediate between No. FL-500 and No. FL-301. Particularly serviceable for gasoline service stations, automobile parking and used car lots, recreational areas, swimming pools, industrial plant yards and night construction work, miniature golf courses, driving ranges and three par and regulation golf courses in combination with No. FLC-1001.

Color-Lighting—Same as No. FL-500.

Permaflector—No. F-1002 (page 38).

Lamps—750-1000-watt PS-52.



Cover Glass—16¾-in. heat-resisting glass cover, inside stippled, cemented into cover frame. This unit is not supplied with clear or spread type cover glass (page 31).

Base—Same as No. FL-500.

Dimensions—Same as No. FL-500.

Permaflector Floodlight FL-1500

Description—Same as No. FL-500.

Beam Spread—A medium beam, approximately 22-degree spread. By change of lamp position, by adjustment of three focusing knobs, it may be converted to a broad beam spread. For complete illumination performance data, see table on page 37.

Applications—Particularly for long-range service. With the lamp at the focal center, it is particularly serviceable for illuminating buildings 150 feet distant or more. For intermediate distances, up to 150 ft., the beam spread may be adjusted to broad spread by means of the three focusing knobs.

When equipped with inside stippled or spread type cover glass, this unit is very useful for recreational areas, gasoline filling stations, automobile parking and used car lots, new homes in subdivisions, outdoor electrical substations, etc.

When equipped with inside stippled cover glass, it is a very efficient and serviceable floodlight for the illumination of football fields and baseball fields.

When equipped with dioptric lens, it becomes a splendid airport field floodlight.

Color-Lighting—Same as No. FL-500.

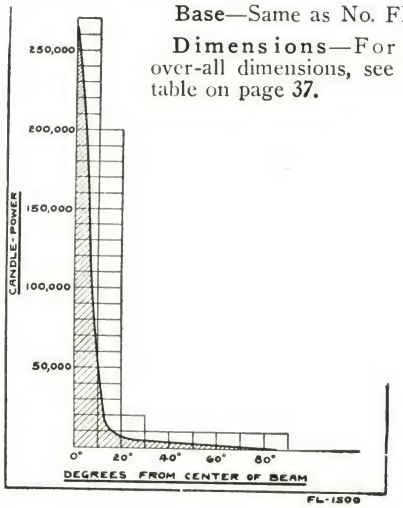
Permaflector—No. F-1500 (page 38).

Lamps—1000-watt PS-52 lamp for the usual applications. For football and baseball fields it may be equipped with 1500-watt general service lamps.

Cover Glass—18¾-in. heat-resisting cover glass, available in clear, inside stippled, spread, or dioptric, cemented into cover frame (page 31).

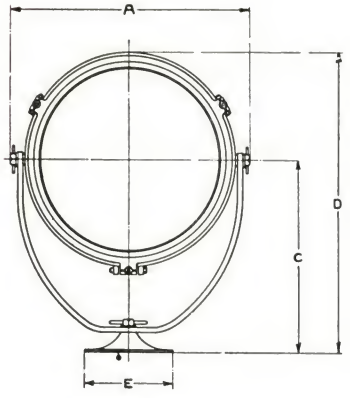
Base—Same as No. FL-500.

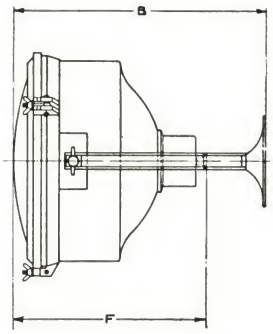
Dimensions—For the essential over-all dimensions, see diagram and table on page 37.

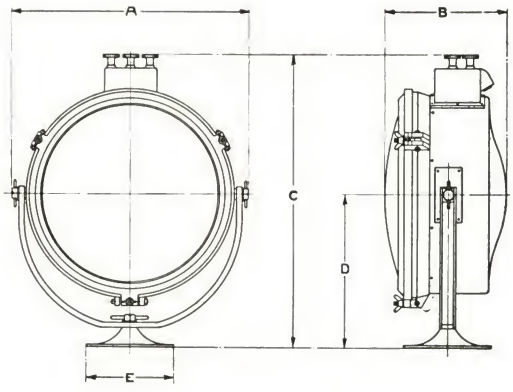


ILLUMINATION PERFORMANCE DATA ON PERMAFLECTOR FLOODLIGHTS

Floodlight Catalog Number	Lamp Watts and Bulb	Bare Lamp Lumens	Total Output (Percent)	Beam Output (Percent)	Beam Spread (Degrees)	Candle Power Maximum	Cover Glass
FLC-100	100, A-23	1320	70.5	65.7	120	649	Clear
FLC-103	250, G-30	3575	69.4	37.3	25	24390	Clear
FLC-103	250, G-30	3575	64	38.9	30	15950	Stippled
FLC-104	200, PS-30	3300	70.8	37.6	40	10440	Clear
FLC-104	200, PS-30	3300	68	42.8	50	7400	Stippled
FLC-250	250, G-30	3500	62.4	36.4	16	64000	Clear
FLC-300	300, PS-35	5400	64.6	35.5	25	31590	Clear
FLC-501	300, PS-35	5400	73.7	33.9	19.6	46530	Clear
FLC-501	500, PS-40	9400	73.7	33.9	19.6	81000	Clear
FLC-1001	750, PS-52	14500	73.7	33.9	19.6	114650	Clear
FLC-1001	1000, PS-52	22000	73.9	33.9	19.6	189000	Clear
FLC-1002	1000, G-40	17800	67.1	27.3	13.6	247500	Clear
FL -301	300, PS-35	5200	64.8	60.3	100	6710	Clear
FL -301	500, PS-40	9400	64.8	60.3	100	10900	Clear
FL -302	300, PS-35	5200	69.1	43.5	35	31800	Clear
FL -302	500, PS-40	9400	69.1	43.5	35	57400	Clear
FL -500	500, PS-40	9400	73	30	13.6	150400	Clear
FL -750	750, PS-52	14500	71	46.3	63.5	24000	Stippled
FL -750	1000, PS-52	22000	71	46.3	63.5	36400	Stippled
FL -1500	1000, PS-52	20400	76	33	22	178000	Clear
FL -1500	1500, PS-52	33075	66	38	44.5	70000	Stippled
FL -1500	1500, PS-52	33075	65	38	33.5	85000	Spread







DIMENSIONS

No.	A, in.	B, in.	C, in.	D, in.	E, diam., in.	F, in.
FLC-501	21	25	16	25½	8	19
FLC-1001	21	27	17	27	8	23
FLC-250	15	17	13¾	20	6	14
FLC-300	16	20¼	16¾	23½	6	17
FLC-1002	21	25	16	25½	8	19

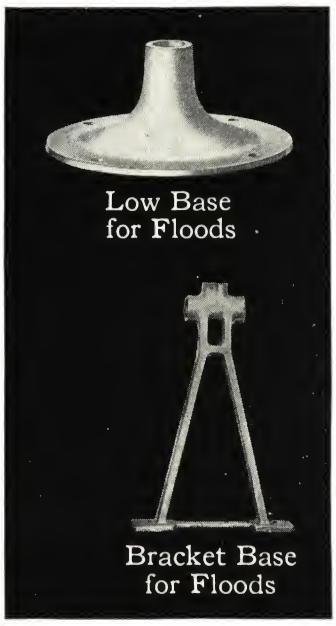
DIMENSIONS

No.	A, in.	B, in.	C, in.	D, in.	E, diam., in.
FL-301	16	11⅝	21	11½	6
FL-500	21	12	28¼	16	8
FL-750	21	12	28¼	16	8
FL-1500	24½	12½	30	17	10
FL-302	16	11⅝	21	11½	6

PERMAFLECTORS USED IN PERMAFLECTOR FLOODLIGHTS

Permaflector	Type	Diameter in Inches	Depth in Inches	For Use with
F-60	Fluted	6¾	4 7/16	FLC-100
C-101	Unfluted	8⅛	5⅛	FLC-103 FLC-104
C-201	Unfluted	10	9⅜	FLC-250
C-300	Unfluted	11½	6¾	FLC-300
F-1001	Unfluted	16	7½	FLC-501 FLC-1001 FLC-1002

Permaflector	Type	Diameter in Inches	Depth in Inches	For Use with
F-300	Fluted	11½	7	FL-301
F-302	Unfluted	11½	7	FL-302
F-500	Unfluted	16	6¼	FL-500
F-1002	Major Reflecting Surface Unfluted	16	8 1/16	FL-750
F-1500	Unfluted	18	7¾	FL-1500



FLOODLIGHT BASES

Low Base

For Floodlights FL-301, FL-302, FLC-250, FLC-300.
Diameter: 6 in.; height, 1 9/16 in.
For Floodlights FL-500, FL-750, FLC-501, FLC-1001, and FLC-1002.
Diameter: 8 in.; height, 2¼ in.
For Floodlight FL-1500.
Diameter: 10 in.; height, 2¼ in.

Bracket Base

May be used in either upright or horizontal position.
For use with Floodlights FL-301, FL-302, FL-500, FL-750, FL-1500, FLC-250, FLC-300, FLC-501, FLC-1001 and FLC-1002.

High Base

The high, (portable) base may be used with Floodlights FL-301, FL-302, FL-500, FL-750, FL-1500, FLC-250, FLC-300, FLC-501, FLC-1001 and FLC-1002.
Height: 36 in.
Diameter at Base: 15 in.

TAKE ADVANTAGE OF OUR COMPLETE LIGHTING SERVICE

For more than twenty years we have specialized in all forms of lighting for which the silver-plated glass reflector is particularly suited. We have accumulated a fund of information that is valuable to architects, engineers, and others having problems of this nature who have not had this varied experience. This information is at your service, without obligation, on all problems relating to the lighting of show windows, color lighting, spot lighting, cove lighting, as well as direct and indirect lighting, outdoor floodlighting, etc. The catalogue and booklets listed below will be found very interesting as well as useful in connection with their particular subjects. Copies will be sent free on request. Check the subjects in which you are interested:

Book on Floodlighting

The Permaflector Engineering Department has prepared a 64-page book discussing in detail various phases of floodlighting, including floodlighting in colors and in changing colors. The book is profusely illustrated, showing a wide variety of typical floodlighting installations—specific information on calculating floodlighting installations—how to decide the intensity of illumination required; how to select the floodlight locations; how to select the most suitable type of floodlights; how to decide the beam spread required; how to select the type and size of lamp; and how to determine the number of floodlights required.

Permaflector Catalog No. 34

Issued in April, 1931. This catalogue is practically a reprint of the pages here in SWEET'S ARCHITECTURAL CATALOGUES—a very complete book on illumination problems, illustrating and describing the complete Permaflector line. In bound form; size, 8½ x 11 in.—suitable for your files.

Permaflector Lighting Magazine

This 28-page magazine (8½ x 11 in.) is published several times a year, each issue being devoted to one subject. All architects who receive SWEET'S ARCHITECTURAL CATALOGUES are on the mailing list to receive this magazine as published. If you do not receive it, or wish additional copies, please write. Back issues available are as follows:

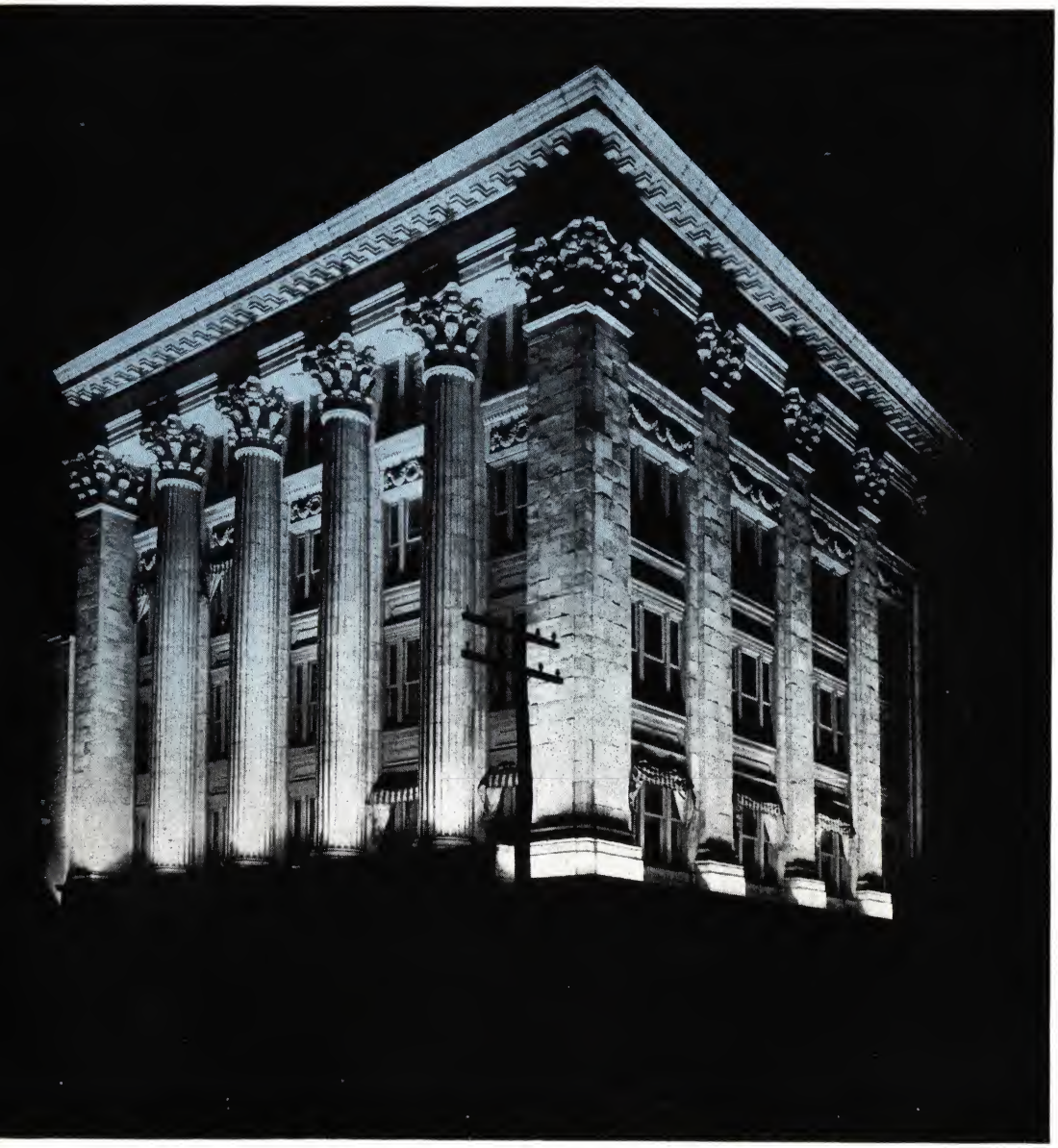
Church Lighting	School and College Lighting	Theater Lighting
Automotive Lighting	Floodlighting	Retail Store Lighting (other
Bank Lighting	Recreational Lighting	than show windows)

Other Permaflector Publications Available

Lighting Through Skylights—Henry Art Gallery, Seattle, Wash.
What Engineers Found Out About Show Windows
Permaflector Luminaires

PITTSBURGH REFLECTOR COMPANY

304 ROSS ST., PITTSBURGH, PA.



PERMAFLECTOR LIGHTING

WHEELER REFLECTOR COMPANY

275 Congress Street, BOSTON, MASS.

NEW YORK, N. Y., 144 Duane Street ATLANTA, GA., 128 Marietta Street CLEVELAND, OHIO, 4614 Prospect Avenue

Sales Offices also at St. Louis, Indianapolis, Denver, San Francisco, Los Angeles, and Seattle

WORKS AT BURRAGE, MASS.

Products

PORCELAIN ENAMELED STEEL REFLECTORS for industrial lighting; STREET FIXTURES; SIGN REFLECTORS; EXIT SIGNS; and REFLECTORS for bank, theater, window and other special lighting.

Also Metal Shades and Lamp Guards.

Wheeler

Wheeler Industrial Reflectors

Wheeler Reflectors are made of Armco Ingot Iron, finished with Wheeler porcelain enamel. The industrial reflectors are green outside and white inside unless otherwise stated. Wheeler Reflectors are designed to meet particular lighting requirements and to give correct light distribution. They are available in a wide variety of types, shapes, and sizes. Several popular Wheeler Reflectors are shown.

R.L.M.—"H" Group

Shallow Dome

Standard Angle

Standard Bowl

Standard Reflector Shapes

Duratach Fixtures

Duratach construction (patent applied for) allows lamp and reflector to be attached to or removed from canopy as one unit—eliminates handling of hot lamps and allows extreme convenience in installation and maintenance. Duratach embodies the patented Wheeler screw ring construction.

Duratach Fixture R.L.M.

Duratach Construction

Reflectors may be changed without disturbing the wiring of the original installation. It is not necessary to break the circuit when relamping, either medium or mogul base, as circuit is broken in socket when reflector is detached from canopy.

Duratach Fixtures are available with four types of reflector—R.L.M. Standard Dome, Shallow Dome, Standard Bowl, and Standard Angle. There are five types of canopy, meeting every installation need. All Duratach Reflectors, either medium or mogul base, are interchangeable in all Duratach canopies. Sizes for 25 to 1000-watt lamps.

Vapolux Fixtures

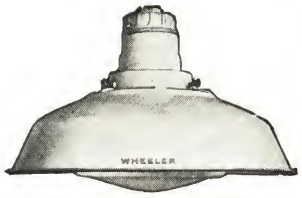
Vapolux Fixtures are vaporproof, smokeproof and dustproof—thoroughly protecting the bulb, socket, and reflecting surfaces from vapor, smoke and dust. A special convex glass disc is tightly and permanently sealed into the mouth of the reflector by asbestos gaskets and an aluminum pressure ring. Vapolux canopies are made of cast aluminum, assuring light weight, and embody the Wheeler patented screw ring construction. The diameter of the reflector neck is sufficient to allow the reflector to be removed over the lamp without disturbing the glass disc. All metal parts are aluminum and monel metal and withstand smoke, acid, and sulphurous fumes.

Vapolux Fixture "H" Group

There are three types of Vapolux Fixtures—"H" Group, Standard Angle, and Standard Bowl. Sizes for 50 to 500-watt lamps.

Glassteel Diffusers

For lighting of offices and factory workrooms where fine operations require minimized shadows. White inside and outside. Furnished complete, ready for wiring. White diffusing globe is supported in neck of reflector by setscrews which bear against a copper overcollar.



Duratach Glassteel Diffuser

Glassteel Diffusers are available with Duratach construction, which allows reflector, globe and lamp to be removed from canopy as one unit. Duratach Glassteel Diffusers are available to fit ½-in. pipe and 4-in. outlet boxes. Glassteel Diffusers also supplied with Wheeler canopies "R" and "F."

Isolux Reflectors

For lighting signboards and other vertical surfaces. Wide, rectangular light outlet and flat reflecting planes assure even distribution of light with no high lights or shadows. Body drawn in one piece, canopy tapped for ½-in. pipe. Two-piece construction for sign lighting provides easy installation and wiring—no elbows are required. Reflectors are easily removed from canopy for cleaning.

One-piece Isolux construction is recommended for lighting of yards, platforms, bowling alleys and for side lighting in factories.

Two-piece construction available for 100, 150, 200, and 500-watt lamps.

One-piece construction available for 100 to 1000-watt lamps.

Two-piece Isolux Reflector

Wheeler Exit Signs

The attractive appearance of Wheeler Exit Signs meets the requirements of the finest theater, auditorium or public building.

Surface Type Exit Sign

There are three types—Stenciled Exit Signs, Etched Glass Exit Signs and Painted Glass Exit Signs. Made of heavy galvanized iron, finished dark bronze outside and aluminum bronze inside, unless otherwise ordered. Available in surface and flush types, with 5, 6, and 8-in. letters.

Special Lighting Equipment

For theater lighting, there is a complete line of Wheeler footlights, borderlights, and proscenium reflectors.

For bank lighting there are several designs for counter screen, bank table and customers' desk reflectors.

Also reflectors for cove, showcase, window, picture and art gallery lighting.

Bank Reflector

Wheeler Service

Specific data and plans for your needs will be drawn up by our Engineering Department, if desired. We shall be glad to submit recommendations and layouts, without obligation.

Catalogues showing the complete Wheeler Lines of Industrial, Street, and Special Lighting Equipment are available on request.

GENERAL ELECTRIC COMPANY

Designers and Engineers of Floodlighting for Buildings
Manufacturers of Floodlighting Projectors

GENERAL OFFICE
1 River Road, SCHENECTADY, N. Y.

For Sales Offices, Service Shops and Associated Companies, see Section on Motors
For Other G-E Products, see Manufacturers' Index

FLOODLIGHTING AN IMPORTANT FACTOR IN MODERN BUILDING DESIGN

The architect's experience and taste enable him to prevail over the most disadvantageous site and surroundings—to adapt his design to the conditions imposed by adjacent structures and topography and, despite all, to impress his fabric with the effect and beauty of his conception. But he must contend with darkness. Night veils his creation—not only the fine details but, to a large extent, the general lines—and all its grace and power are lost during the hours when most men find their only leisure to admire the art of its design and to appreciate the embodied suggestions of the purpose for which it was erected.

Illumination engineers have arrived at a system of floodlighting that literally wrests buildings and monuments from the powers of darkness; that utilizes surrounding shadow to emphasize the charm and dignity of the structure; that gives nightly force to its eloquent message; that projects it against the sky and compels the admiring attention of throngs who must otherwise pass by in ignorance of its worth.

By the scientific control of floodlights it is possible either to bathe an entire building in their rays and make it a monument of white beauty or to pick out unusual architectural features for the study of those who appreciate artistic distinction. With the whole spectrum at command, tints may be introduced where they will be of effect and shadows may be cast that will give depth and significance to facade and colonnade.

These comprehensive applications of floodlighting have met such wide approval that many architects, builders, and owners are now deeply interested in designs and materials that will especially lend themselves to night illumination.

Union Terminal Building, Cleveland, Ohio, Floodlighted by G-E Projector

Architects, in particular, are bending their talents to the incorporation of structural details that will be in artistic keeping with floodlighting developments. They are adopting hitherto unused tints of terra cotta, brick, and stone for the sake of their fine effect under the concentrated beams of floodlighting projectors. Floodlighting has become an instrument of architectural art.

The Manifold Uses for Floodlighting

The possibilities, and the practical uses, of floodlighting are unlimited. Following are a few of the many applications that have been made both in architectural and industrial fields:

Monumental buildings	Towers
Business blocks	Gas filling stations
Building fronts	Automobile showrooms
Public buildings	Industrial plants
Athletic grounds	Grain elevators
Outdoor theatricals	Power stations
Winter sports	Prison walls
Monuments, fountains, etc.	Construction work

General Electric Company's Facilities and Service to Architects and Engineers

The GENERAL ELECTRIC COMPANY has specially equipped laboratories in which lighting specialists, engineers and artists, devote their skill and experience to new accomplishments in the technique of floodlighting—to new applications and new effects.

The Company offers the services of its specialists to co-operate with architects or engineers in planning exterior or interior illumination of either new or old structures.

G-E MOBILE COLOR LIGHTING

General Electric illuminating engineers have perfected a new and striking development in the art of decorative lighting. At the present time, this method has been applied principally to the projection of richly hued, ever-changing color designs upon architectural exteriors by means of floodlighting projectors, and upon interior areas of wall and ceiling by means of concealed MAZDA lamps. In both cases, operation and intensities are centrally controlled through a G-E Novalux Selsyn-Thyratron system.

This spectacular painting with light—with its possibilities of almost infinite change in design and tint—is accomplished by the use of floodlighting projectors with colored lenses for exterior illumination, and for interior applications, by color caps and aluminum collars about each lamp. While only three fundamental colors are used—red, green, and blue—their dimming and mixing permit many variations of orange, yellow, purple, cerise, and the pastel shades of red, blue, green, yellow and purple. The dimming of one series of lights as another comes on produces effects so surprising and yet so artistic that G-E mobile color lighting may easily revolutionize exterior illumination and the decoration of hotels, ballrooms, theaters, and public buildings.

Where this system is used for interior illumination, no lighting fixtures are needed, as the lights may be used for steady projection in white or in any color, as well as for mobile decoration. The walls are simply given an appropriate flat tint, the inconspicuous projectors are installed, and the compact control apparatus—either manual, automatic or combined—is located in any out-of-the-way corner.

The possibilities inherent in the mobile floodlighting of exteriors have already led architects to a serious consideration of terra cotta and like materials as a wall surface because of their superior reflecting qualities.

The control system involves principally the use of three devices—the Selsyn motor, the low-vacuum rectifying tube marketed under the trade name "Thyratron," and a new type of saturated-core reactor. The power apparatus can be placed in any desired location, since there are no mechanical connections, and only small currents and low voltages are required. The absence of energy-absorbing devices, such as resisters, gives high efficiency.

Among prominent installations may be mentioned those in the great ballroom of the St. George Hotel, Brooklyn, N. Y., in the dining room of Great Captain's Beach and Yacht Club, East Portchester, Conn., and the exterior of the Staley Administration Building at Decatur, Ill.

For complete information, refer to our nearest Sales Office.

Type L-29, with Clear Plain Lens

Type L-30, with Clear Lightly Stippled Lens

Standard Types of G-E Floodlighting Projectors

KEYSTONE METAL SPECIALTIES CO.

Manufacturers of "Covelite" for Exterior Floodlighting

Formerly sold by the Ochiltree Electric Co., Pittsburgh, Pa.

44 Water Street, PITTSBURGH, PA.

SALES REPRESENTATIVES

ATLANTA, GA., M. L. Whitman, Bona Allen Building
BALTIMORE, MD., W. B. Masland Co., 105 E. Franklin Street
BOSTON, MASS., Detweiler-Bell Co., Inc., 101 Milk Street
BUFFALO, N. Y., H. H. Mallon, 350 So. Elmwood Avenue
CHICAGO, ILL., Clyde W. Lint, 300 W. Adams Street
CINCINNATI, OHIO, H. C. King, 622 Broadway
CLEVELAND, OHIO, Handel-Davies Co., 202 Chester-Twelfth Building
DALLAS, TEX., The Lighting & Specialty Co., 2205 Leonard Street
DENVER, COLO., Wesco Co., Seventh and Lawrence Streets
DETROIT, MICH., James D. Carr, 141 E. Elizabeth Street
INDIANAPOLIS, IND., Scott-Jacque Co., 31 E. Georgia Street
KANSAS CITY, MO., Fitzhugh L. Funsten, 219 E. 14th Street
LOS ANGELES, CAL., Frank E. Hastings, 201 Transportation Building
LOUISVILLE, KY., Nicholson Electrical Sales, 214 Keller Building
MILWAUKEE, WIS., A. J. Singer, 1134 No. 46th Street
PHILADELPHIA, PA., Hopkin Bros., Inc., 235 So. 8th Street
SALT LAKE CITY, UTAH, Raymond Ackerman, 318 Dooly Block
SEATTLE, WASH., Lyman D. Morgan, 240 Securities Building
ST. LOUIS, MO., Geo. H. Wacker Co., 2647 Washington Avenue
ST. PAUL, MINN., C. O. Kindy, 1236 Lincoln Avenue
TORONTO, ONT., Wilson Illumination Co., Ltd., 186 Adelaide Street, W.
WASHINGTON, D. C., W. B. Masland Co., 3220 Connecticut Avenue, N. W.

Description

"Covelite" is a lighting system with individual mirrored glass reflectors, scientifically spaced in a compact metal housing with reflectors secured to individual removable front plates made in lengths to fit the building, easy to install, easy to maintain.

"Covelite" uses standard lamps eliminating the possibility of lamps getting out of focus or equipment being moved when cleaned—insuring an even distribution of light at all times.

The light source is concealed from view yet the building is evenly illuminated with glareless, intense, attention-compelling light.

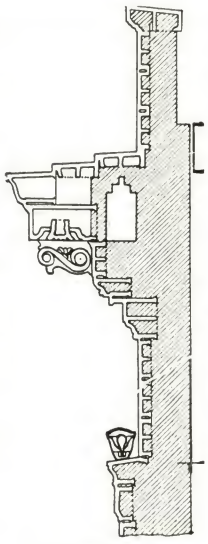
"Covelite" is furnished in two types: one weatherproofed for use where equipment is subject to all weather conditions and the light projected upward with a cover plate having heat-resisting glass lenses weatherproofed over each outlet; the other non-weatherproof, where equipment is placed under the overhang of a building or at the outside of a coping of a building throwing the light downward.

"Covelite" is constructed of either galvanized steel or 16-ounce copper.

Ogee or egg mouldings can be had on face of either type of equipment.

Covelite

TRADE-MARK REGISTERED



Application Penn Central Light & Power Co.

Weatherproof "Covelite"

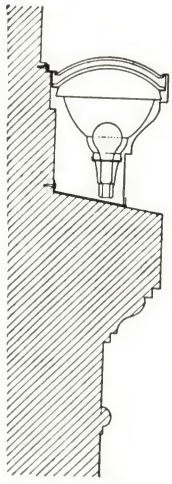
For lighting the exterior of buildings either in white or colored light. This equipment is constructed so that it can be placed on a small ledge on the building and be secured to the building by means of flat iron brackets bolted to equipment and building. Brackets are not furnished with equipment.

Weatherproof "Covelite" equipment is for use where light is to be projected upward and equipment is subject to all weather conditions, generally being placed where rain and snow fall directly on equipment.

The weatherproof lens over each reflector in "Covelite" is of the highest grade heat-resisting glass obtainable.

On the concentrated type of equipment an inside color lens of natural color heat-resisting glass, held in place by a color frame of the same grade of heat-resisting glass as the outside lens, is used.

On the semi-concentrated equipment natural color heat-resisting glass lenses are weather-proofed in top cover eliminating inside color lenses.



Application Coraopolis Savings & Trust Co.

Penn Central Light & Power Co., Altoona, Pa.

Coraopolis Savings & Trust Co., Coraopolis, Pa.
PRESS. C. DOWLER, Pittsburgh, Pa., Architect

EXTERIOR FLOODLIGHTING (WEATHERPROOF EQUIPMENT)

(Patented United States and Canada)

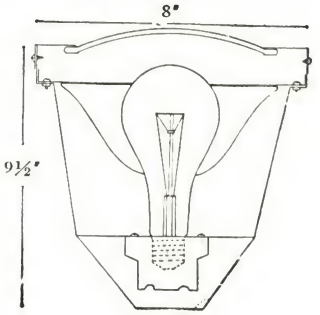
E40GW "Covelite" Semi-concentrating Type Reflectors

For use where a portion of the building not exceeding 15 ft. in height is to be lighted. Natural color heat-resisting glass lenses, weatherproofed, in amber, blue, clear, green or red, furnished with equipment. No supports.

WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
E40GW8	A23	100	8
E40GW12	A23	100	12
E40GW15	A23	100	15
E40GW18	A23	100	18

Note: Above equipment can be had for use with 50-watt A21 lamp, same spacing of outlets as 100 watts.



E40GW

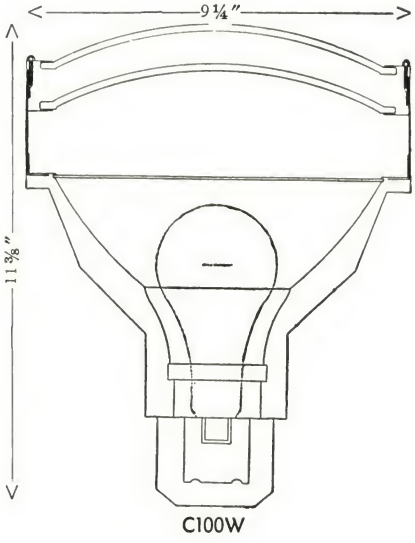
C100W "Covelite" Concentrating Type Reflectors

For use where the light is to be projected on the building not exceeding 25 ft. in height. Clear heat-resisting glass lenses, weatherproofed, furnished with equipment. Inside color frames and natural colored heat-resisting glass lenses in amber, blue, green or red, extra. No supports.

WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
C100W10½	A23	100	10½
C100W12	A23	100	12
C100W15	A23	100	15
C100W18	A23	100	18
C100W24	A23	100	24

Constructed of either galvanized iron or 16-oz. copper.



C100W

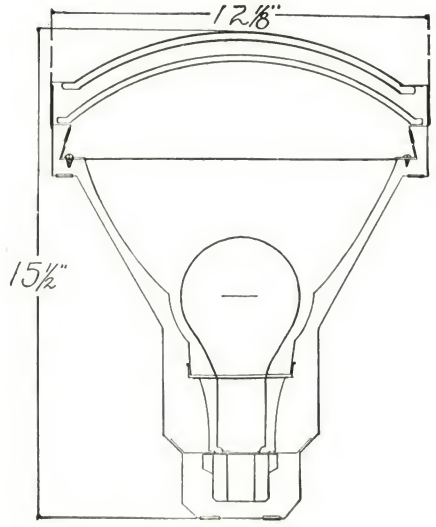
E200W "Covelite" Concentrating Type Reflectors

For use where the light is to be projected on the building not exceeding 35 ft. in height. Clear heat-resisting glass lenses, weatherproofed, furnished with equipment. Inside color frames and natural colored heat-resisting glass lenses, in amber, blue, green or red, extra. No supports.

WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
E200W13	PS30	200	13
E200W15	PS30	200	15
E200W18	PS30	200	18
E200W24	PS30	200	24
E200W30	PS30	200	30

Constructed of either galvanized iron or 16-oz. copper.



E200W

EXTERIOR FLOODLIGHTING (WEATHERPROOF EQUIPMENT)

First National Bank, Port Arthur, Tex.

WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
C300W15	PS35	300	15
C300W24	PS35	300	24
C300W30	PS35	300	30
C300W36	PS35	300	36

Constructed of galvanized steel or 16-oz. copper.

C500W "Covelite" Concentrating Type Reflectors

For use where the light is to be projected on the building not exceeding 75 ft. in height; clear or stippled heat-resisting glass lenses, weatherproofed, furnished with equipment. Inside color frames and natural colored heat-resisting glass lenses in amber, blue, green or red, extra. No supports. "Covelite" will give you a permanent job —ideal for set-back building for lighting two or three stories when a high intensity of illumination is desired.

WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
C500W18	PS40	500	18
C500W24	PS40	500	24
C500W30	PS40	500	30
C500W36	PS40	500	36

Constructed of galvanized steel or 16-oz. copper.

F1000W "Covelite" Concentrating Type Reflectors

For use where the light is to be projected on the building not exceeding 150 ft. in height; clear or stippled heat-resisting glass lenses, weatherproofed, furnished with equipment. Inside color frames and natural colored heat-resisting glass lenses in amber, blue, green or red, extra. No supports. "Covelite" will give you a permanent job. Where long throws are desired, use this type of "Covelite" equipment for a uniform light.

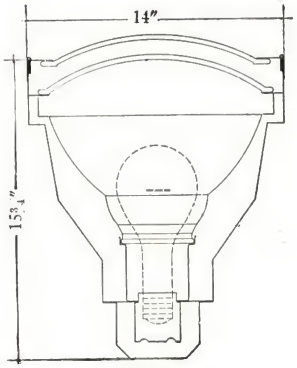
WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
F1000W18	PS52	1000	18
F1000W24	PS52	1000	24
F1000W30	PS52	1000	30
F1000W36	PS52	1000	36
F1000W48	PS52	1000	48

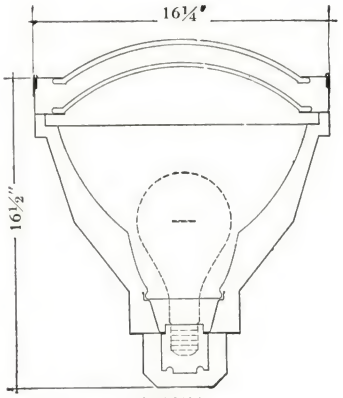
Constructed of galvanized steel or 16-oz. copper.

C300W "Covelite" Concentrating Type Reflectors

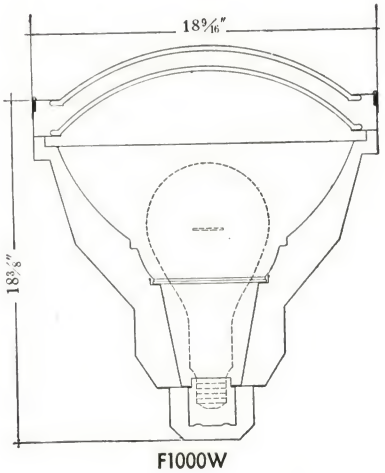
For use where the light is to be projected on the building not exceeding 50 ft. in height; clear or stippled heat-resisting glass lens, weatherproofed, furnished with equipment. Inside color frames and natural colored heat-resisting glass lenses in amber, blue, green or red, extra. No supports. "Covelite" will give you a permanent job.



C300W

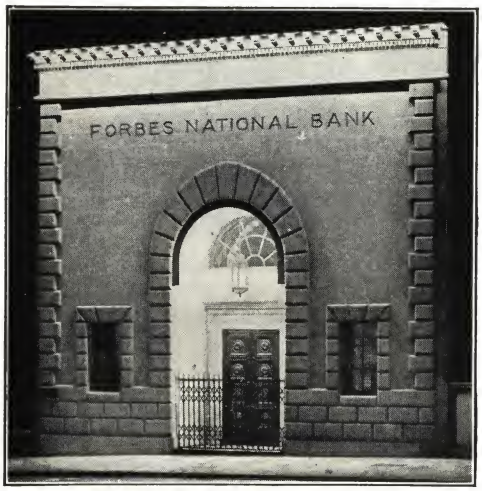


C500W



F1000W

"COVELITE" FOR EXTERIOR FLOODLIGHTING (NON-WEATHERPROOF)



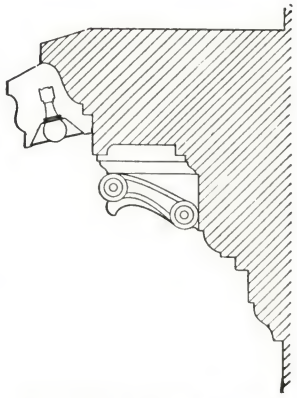
Forbes National Bank, Pittsburgh, Pa.

Non-weatherproof "Covelite"

For use where equipment is placed under the overhang of a building such as gasoline stations or at the outside of the coping of a building as used on the Forbes National Bank where the light is projected downward.

No cover plates are used with non-weatherproof "Covelite."

This type of equipment is made for 90° or surface mounting, as E40G, E40R, E15B where a facial board is placed in back of equipment: or with straight side and flush mounting, as E40GS, E40RS, E15BS where equipment is to be inset in ceiling or where the angle of projection is other than 45°.



Application Forbes National Bank

Flush mounting equipment is used on Forbes National Bank; surface mounting on the Sun Oil Company and Gulf Refining Company filling stations.

Non-weatherproof "Covelite" equipment is ideal for lighting picture galleries, stock quotation boards, border lights in small theaters, fronts of store buildings, etc.

The reflectors used in non-weatherproof "Covelite" are of the semi-concentrated type and give a fairly wide distribution of light. The reflectors are secured to the individual removable front plates assuring reflectors to be in proper alignment with the receptacle at all times. Lamps or reflectors need not be removed for cleaning.

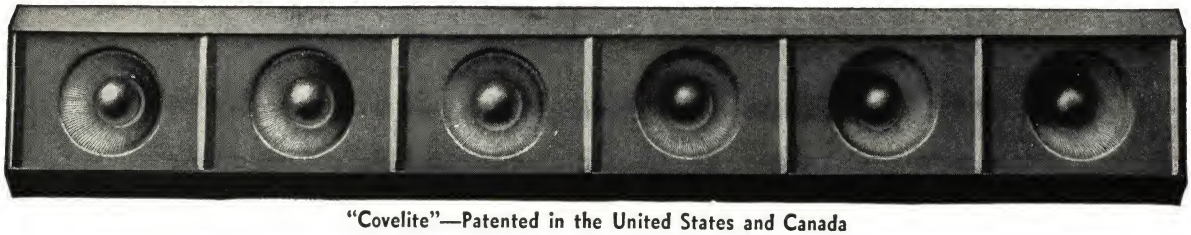
Construction

"Covelite" equipment is constructed in lengths to fit the building. By removing the individual front plates, easy access can be had to the interior of equipment. By punching a hole, by means of nail or drill, through the sides, equipment can easily be secured to the building or filling station. Flat iron brackets bent to conform to the contour of "Covelite" and the building, can be used for supporting equipment where used at the outside of copings. No supporting brackets furnished with equipment.

"Covelite" equipment is listed and passed by the Underwriters' Laboratories, Inc.

One of the 112 Sun Oil Company Stations Lighted by "Covelite"

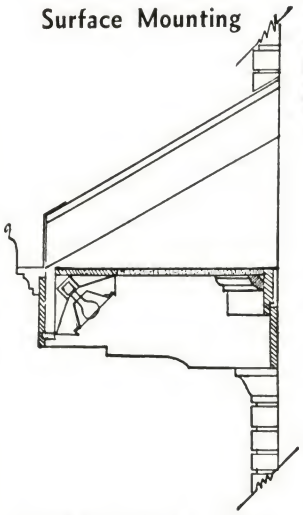
One of the 342 Gulf Refining Company Stations Lighted by "Covelite"



"Covelite"—Patented in the United States and Canada

"COVELITE" FOR EXTERIOR FLOODLIGHTING (NON-WEATHERPROOF)

Surface Mounting



Typical Application for Filling Station
90° angle mounting

Covelite

TRADE-MARK REGISTERED

Information Required

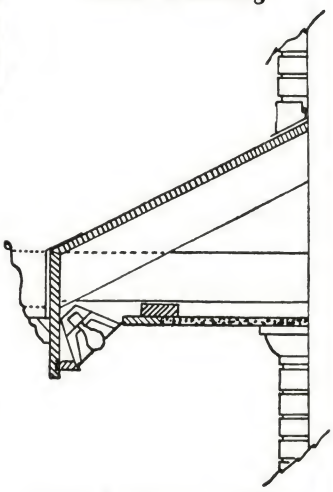
Exact dimensions of building, extent of overhang, depth of facial board, material of which building is to be constructed, color of material, whether galvanized iron or copper, spacing of outlets, size of lamps, radii of eyebrows, degree of angles at miter and catalogue number of equipment.

Specifications

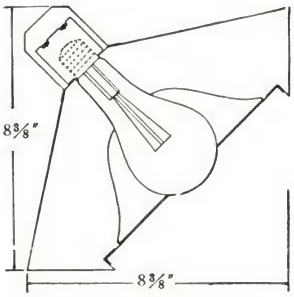
Housing either galvanized steel or 16-ounce copper; mirrored glass reflectors, lengths as required; straight or mitered sections; wired or unwired; one shop coat of paint on galvanized steel, crated.

"Covelite" costs no more than ordinary lighting equipment; easy to install; easy to maintain.

Flush Mounting



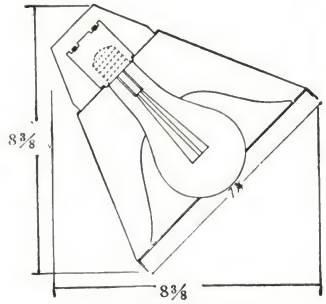
Typical Application for Filling Station



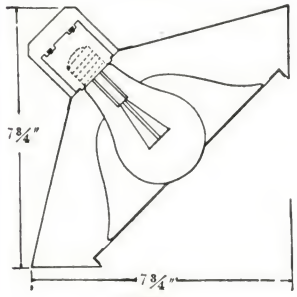
E40G

"COVELITE" RECOMMENDED FOR USE ON BUILDINGS OF DARK MATERIALS—RED BRICK OR CONCRETE

Catalog No.	Type lamp	Size lamp, watts	Spacing, in.
Surface Mounting			
E40G8	A23	100	8
E40G12	A23	100	12
E40G15	A23	100	15
E40G18	A23	100	18
E40G24	A23	100	24
Flush Mounting			
E40GS8	A23	100	8
E40GS12	A23	100	12
E40GS15	A23	100	15
E40GS18	A23	100	18
E40GS24	A23	100	24



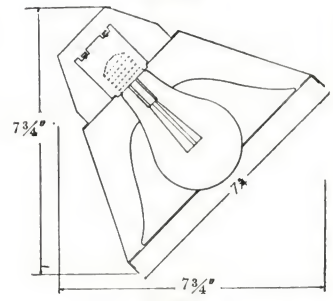
E40GS



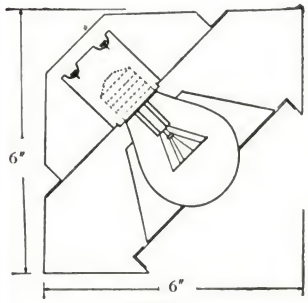
E40R

"COVELITE" RECOMMENDED FOR USE ON BUILDINGS OF MEDIUM COLORED MATERIALS—BUFF BRICK OR STUCCO

Catalog No.	Type lamp	Size lamp, watts	Spacing, in.
Surface Mounting			
E40R8	A21	50	8
E40R12	A21	50	12
E40R15	A21	50	15
E40R18	A21	50	18
E40R24	A21	50	24
Flush Mounting			
E40RS8	A21	50	8
E40RS12	A21	50	12
E40RS15	A21	50	15
E40RS18	A21	50	18
E40RS24	A21	50	24



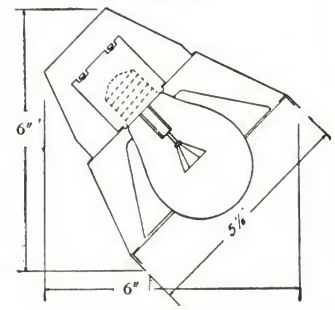
E40RS



E15B

"COVELITE" RECOMMENDED FOR USE ON BUILDINGS OF LIGHT COLORED MATERIALS—WHITE STUCCO OR WHITE BRICK

Catalog No.	Type lamp	Size lamp, watts	Spacing, in.
Surface Mounting			
E15B8	A19	25	8
E15B12	A19	25	12
E15B15	A19	25	15
E15B18	A19	25	18
E15B24	A19	25	24
Flush Mounting			
E15BS8	A19	25	8
E15BS12	A19	25	12
E15BS15	A19	25	15
E15BS18	A19	25	18
E15BS24	A19	25	24



E15BS

Listed by Underwriters' Laboratories, Incorporated

"COVELITE" FOR EXTERIOR FLOODLIGHTING

BOSTON STEEL AND MFG. CO.

ELECTRICAL DEPARTMENT

Manufacturers of "Acme" Exit Signs

TELEPHONE
Malden 3000

OFFICES AND FACTORY
MALDEN, MASS.

Products

"Acme" Illuminated Exit Signs; Special Signs.
Also manufacturers of Panelboards and Junction Boxes.

"Acme" Illuminated Exit Signs

The "Acme" is a complete unit—a steel box with knockouts and holders for receptacles. It has the following advantages:

Cast Metal Front—The fronts may be made in either light or heavy pattern cast iron, finished with black japan—prime coated a neutral color—or finished in electro bronze or brass. The front may also be cast of solid bronze or brass and toned in harmony with the interior decorations.

Hinged Door—Complete access is always obtained by turning a knob and opening the door.

Perforated Letters—The perforated letters are backed with ruby glass ground on the back side for perfect diffusion of light. We can also furnish any other color of glass desired. Either Plain block letters or a Greek architectural type letter can be furnished as standard.

Inside of Box—The inside is white enameled.

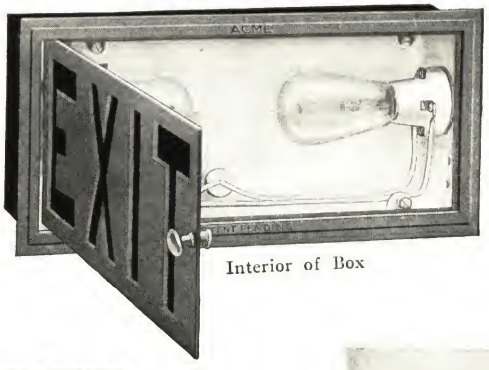
Wiring—The receptacles can be wired outside of the box and slipped into the holders. At any time, the receptacles can be removed or inserted without unscrewing.

Special Provision—If the box has been set out of square, provision has been made for squarely setting the front of the box.

Sizes—Boxes are made in two sizes: 6¼x14¼x4 ins. with front 7¼x15 ins.; and 7½x16¼x4 ins. with front 8⅜x16⅞ ins.

Approval—The "Acme" Illuminated Exit Sign has been approved by the Commissioner of Wires, Boston, Mass., and also by prominent engineers.

Prices—Upon receipt of information as to type of letter, size of box and finish required, prices and discounts will be submitted.



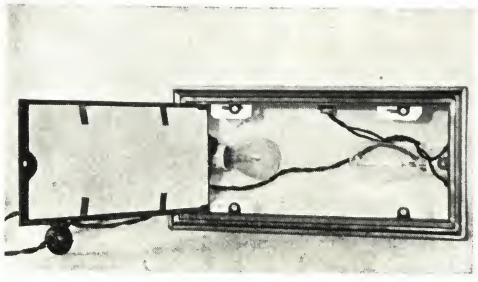
Interior of Box

Special Signs

We are equipped to build boxes to architect's specifications, to make surface mountings, boxes with exit faces on both sides, pedestal boxes, or boxes with the word "Fire" on them to put over fire extinguishers, etc.

We are also in a position to make special lettering for church work or to architect's designs.

Front View


Simplicity of Wiring

"Acme" Illuminated Exit Signs

Some Buildings Equipped with "Acme" Illuminated Exit Signs

Theatres

Metropolitan Theatre, Boston, Mass.
Keith-Albee Theatre, Boston, Mass.
Scollay Square Theatre, Boston, Mass.
Park Theatre, Boston, Mass.
Orpheum Theatre, Malden, Mass.
Mystic Theatre, Malden, Mass.
Granada Theatre, Malden, Mass.
Capitol Theatre, Everett, Mass.
Cameo Theatre, Bristol, Conn.

Public Buildings

Rhode Island State College, Wakefield, R. I.
Massachusetts Mutual Life Insurance Building, Springfield, Mass.

Public Buildings (Continued)

City Hospital, Boston, Mass.
Horticultural Hall, Worcester, Mass.
American Woolen Building, Andover, Mass.
New Parker House, Boston, Mass.
Quincy Masonic Temple, Quincy, Mass.

Schools

All City of Boston Schools
East Boston High School
Milton High School
Lancaster High School
Reading High School
Athol High School
Beverly High School
Arlington High School
Winthrop High School
Medford Junior High School
Reading Junior High School
Washington Irving School
Malden Junior High School
Osgood School, Medford, Mass.

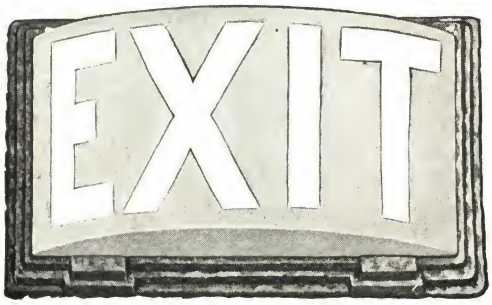
CONSOLIDATED LAMP & GLASS CO.

LIGHTING GLASSWARE DIVISION
CORAOPOLIS, PA.

BRANCH OFFICES

NEW YORK, N. Y., 225 Fifth Avenue BOSTON, MASS., 10 High Street CHICAGO, ILL., 17 North Wabash Avenue
SAN FRANCISCO, CALIF., Western Glass Products Co., 735-737 Folsom Street

CURVED GLASS EXIT LIGHTS—AN INNOVATION IN LIGHTING FIXTURES



No. 3130 Curved Exit Light
(Patent Applied for)

This is the latest product in our wide line of lighting fixtures.

The curved glass exit box is a lighting unit as well as a distinctive and unusual form of exit marker. It is manufactured to the well-known CONSOLIDATED standard of quality and is furnished wired and ready to install.

It consists of a special pewter or bronze back plate ready for mounting.

The curved glass is 9¾ inches long and 5 inches high. Letters are full 4 inches high and due to the curve is readable at wide angles.

Colors are white letters on red or green ground, and red or green letters on white ground.

Complete unit dimensions are 11 inches long, 6½ inches high, and extends 4½ inches from wall.

Takes 25, 40, 50 or 60-watt lamps.

SPECIAL MOULDS

The development of the modern trend many times necessitates that the architect and the manufacturer of lighting glassware work out new forms and design, and the CONSOLIDATED LAMP & GLASS CO., solicits inquiries from architects along the lines of these special mould developments.

These special pieces may be made of blown or pressed ware as the case requires.

RESIDENCE LIGHTING

Those architects who specialize in residence work will be more than interested in the CONSOLIDATED shaded light lines for the home, as they embody the decorative features as well as the light shading factors that are important for this class of illumination.

OTHER CONSOLIDATED QUALITY PRODUCTS

Modern Units and Pendants
Martelé and Tower Lines
Standard Type Units and Pendants
One-piece Jeweled Bottom Units
Semi-indirect School Units Green Cased Ware
Cora Cased and Nuite Ball Globes and Shades

Blown Ware Pressed Ware
(NB) Special Moulds
Modernizers and Wall Pockets
Shaded Light Fixtures

Write for complete information to the factory or any CONSOLIDATED Branch Office.

PRICE BROTHERS, INC.

AND SUBSIDIARY: ATLAS BRONZE M'F'G COMPANY

Illuminated Signs and Reflectors, Ornamental Bronze and White Metal Work

TELEPHONE
Armitage 4755

2646 North Maplewood Avenue, CHICAGO, ILL.

EASTERN SALES OFFICE: 2 Park Avenue, NEW YORK, N. Y.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES

Products and Facilities

ILLUMINATED SIGNS.
ELEVATOR SIGNS and SIGNALS.
BANK WICKET SIGNS.
EXIT SIGNS.
TROUGH REFLECTORS.
REFLECTORS for BANK SCREENS.
INDIVIDUAL REFLECTORETTES.
COVE LIGHTING REFLECTORS.

Pattern and modeling department. Foundry for making finest French sand castings. Fabricating and assembly department for cast, extruded, drawn and sheet, bronze and white metal work. Plating department for all metal finishes. Electro copper plating on glass. Sandblasting and etching on glass. Designing and engineering service without cost or obligation.

Sign Panels

Dayanite—Opal glass, *raised* sandblasted letters, electro copper plated background, plated to match frame.

Pribro—Letters outlined with incised line flush with background. Background electro copper plated, buffed, polished to smooth finish, giving appearance of metal.

Edgebrite—Plate glass sunken letter, illuminated through edge of glass.

Diffusalite—Metal stencil containing lettering applied on opal glass and covered with special diffusing glass front.

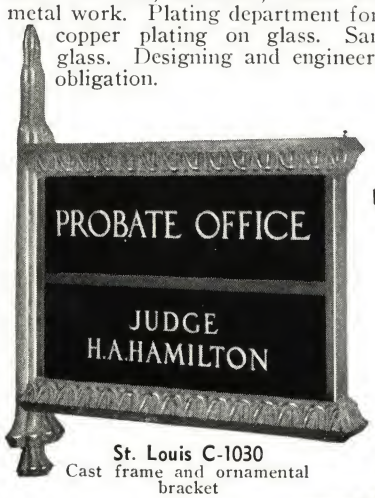
Disappearing Letter—Metal stencil containing lettering applied on diffusing glass and covered with special glass front. Lettering legible only when illuminated.

Metalfase—Raised crystal letters protruding through and above sheet bronze stencil plate.

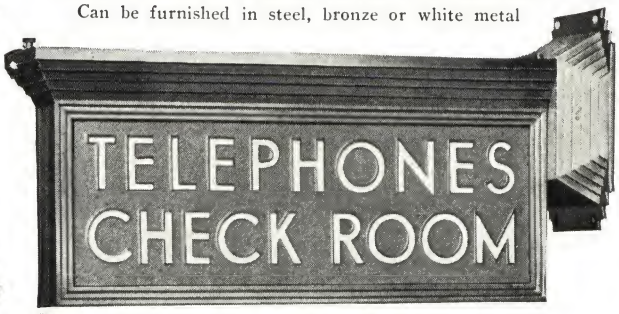
Catalog—Write for Catalog No. 32 on signs and reflectors.

DIRECTIONAL SIGNS AND REFLECTORS

Can be furnished in steel, bronze or white metal

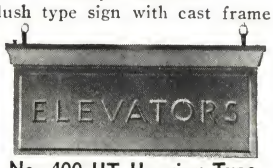


St. Louis C-1030
Cast frame and ornamental bracket



Carew EC-1001
Modern motif with fluted frame, bottom and ends

Forsyth C-1005
Flush type sign with cast frame



No. 400 HT Hanging Type
Drawn metal frame. Chain or rod hangers

La Salle EC-1020
Cast frame and bracket. Fluted ends, top and bottom, adapted to modern design

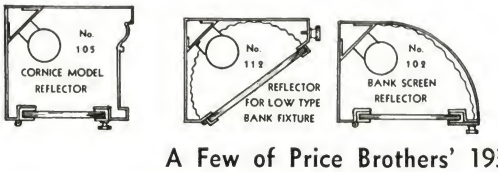
Kansas E-1003
Flush type elevator signal and sign

Right
No. 475 FW Surface Type
Drawn metal frame

No. 444 WF Wall Flange Type
Drawn metal frame

No. 800 Flush Type
Cast frame and hinged door

Cleveland C-1010
Cast frame and bracket enriched with hand-chased ornament. Two light compartments with partition between



Continuous Trough Reflectors

We manufacture a complete line of reflectors of *continuous* type for bank counter screens, cove lighting, window lighting and special lighting. Write for Catalogue No. 32.

Higbee EC-1006
Cast frame and bracket, fluted front, ends and bottom. Pribro sign panel

A Few of Price Brothers' 1930-31 Installations

JOB	CITY	ARCHITECT
Cities Service Building	New York, N. Y.	Clinton, Russell, Holton & George
Merchandise Mart	Chicago, Ill.	Graham, Anderson, Probst & White
22 E. 40th Street Building	New York, N. Y.	Kenneth Franzheim
19 Rector Street Building	New York, N. Y.	L. A. Goldstone
Gulf Refining Building	Pittsburgh, Pa.	Trowbridge & Livingston
Dallas Gas Company	Dallas, Texas	Lang & Witchell
Continental Building	New York, N. Y.	Ely Jacques Kahn
Northwestern National Bank	Minneapolis, Minn.	Graham, Anderson, Probst & White
Carew Tower	Cincinnati, Ohio	Walter W. Ahlschlager
Warner Brothers Theatres	New York, N. Y.	Thomas Lamb, Inc.
Starretts Netherland Plaza Hotel	Cincinnati, Ohio	Walter W. Ahlschlager
LaSalle Wacker Building	Chicago, Ill.	Holabird & Root, Rebori & Wentworth
Meier Frank Building	Portland, Ore.	DeYoung-Moscowitz & Rosenberg
Higbee Department Store	Cleveland, Ohio	Graham, Anderson, Probst & White
Publix Theatres	New York; Chicago	Rapp and Rapp
Kansas City P. & L. Building	Kansas City, Mo.	Holt, Price & Barnes
First National Bank	Chicago, Ill.	Leonard Const. Co.
Mayo Clinic	Rochester, Minn.	Ellerbe & Company
First National Bank	St. Paul, Minn.	Graham, Anderson, Probst & White

DETEX WATCHCLOCK CORP.

70 Varick Street
NEW YORK, N. Y.

4155 Ravenswood Avenue
CHICAGO, ILL.

27 Beach Street
BOSTON, MASS.

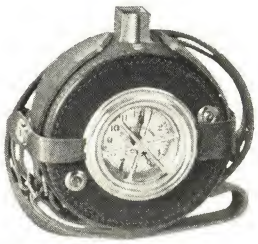
Room 802, 116 Marietta Street
ATLANTA, GA.

DETEX SERVICE STATIONS IN ALL LARGE CITIES

Products

PORTABLE WATCHMAN'S CLOCKS, ELECTRICALLY (Magneto) OPERATED WATCHMAN'S CLOCK SYSTEMS, SUPERVISORY ANNUNCIATOR SYSTEMS and WATCHMAN'S TELEPHONE SYSTEMS.

Listed by the Underwriters' Laboratories, Inc., and Factory Mutuals Laboratory.



Detex Patrol Watchman's Clock

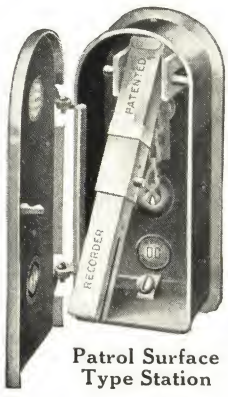
Detex Patrol Watchman's Clock System

Consists of a portable clock and any number of recording stations. A system that is unique in its flexibility and adaptability.

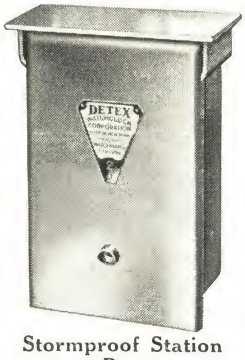
Clock — Full eleven-jewel movement. Enclosed in leather pouch.

Recording Stations—Flush, surface or stormproof type. Lock or non-lock. No wiring required.

Equipment Furnished — Watchman's clock, leather carrying pouch, one year's supply of dials, required stations with keys (or recorders), chains, metallic seals and screws, and complete instructions for installation and operation.



Patrol Surface Type Station



Stormproof Station Box

DIMENSIONS, INCHES

Surface station, non-lock	1¾x4x2½
Surface station, lock	2¼x4x2⅝
Flush station plate	4½x4⅞
Key box	3x2x3½
Stormproof station box	8⅜x6⅛x2⅝

Detex Newman Watchman's Clock System

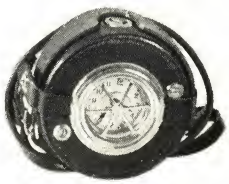
Consists of a portable clock and from one to thirty stations of the key type. This is the first type of watchman's clock ever made in the United States.

Clock—Strongly made. Jeweled movement. Enclosed in leather case.

Key Boxes — Surface, flush or stormproof type non-lock. No wiring required.

DIMENSIONS, INCHES

Surface station	5¾x2⅝x1⅝
Flush station plate	6x3
Key box	5½x2½x2
Stormproof station box	8⅜x6⅛x2⅝



Detex Newman Watchman's Clock

Flush Type Station

Detex Eco Magneto Watchclock System

Consists of a centrally located recorder and from 1 magneto patrol station to the limit of requirements.

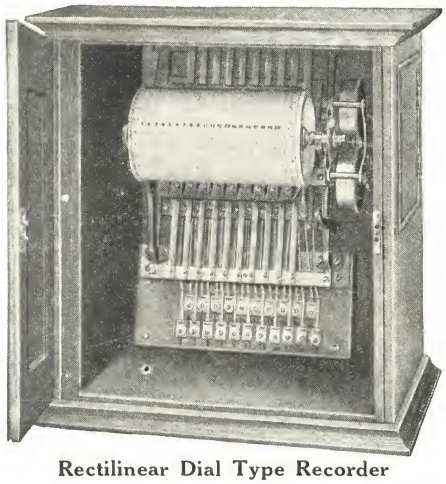
This system can be used as a simple recording system, or can be combined with the supervisory annunciator system, or the supervisory annunciator and telephone system.

Recorder—Seth Thomas eight-day movement. *Record:* either 12, 24, 48, or 72-hour record dials. *Recorder case:* wood in any specified finish.

Annunciator—The annunciator enables the supervisor to tell at a glance the exact location of all watchmen. A turn of the crank at a station not only registers in the recorder but also drops a corresponding target on the annunciator. No additional wiring is required.

Telephone System—Enables the supervisor to communicate instantly with all watchmen. Central telephone located at supervisor's desk. Each watchman carries a small hand set telephone which can be plugged in at stations.

Generator Stations—Of the 3-bar type. Surface, flush or weatherproof design.



Rectilinear Dial Type Recorder

RECORDER DIMENSIONS, INCHES

Type	Maximum capacity, station	Height	Width	Depth
48-hour rect. dial type	20	17¾	17¼	12½
	40	17¾	23¼	12½
	60	17¾	29¼	12½
72-hour rect. dial type	25	22⅛	23	12
	40	22⅛	29	12
Circular dial type	20	17¾	16	9 1/16
	30	21¾	18⅜	9 1/16

GENERATOR DIMENSIONS, INCHES

Surface generator	6x5x4 1/16
Flush generator plate	8⅞x5⅝
Flush generator insert	8x4¾x4¾

TELEPHONE SYSTEM DIMENSIONS, INCHES

Master telephone	10x6½x3
Standard generator	8½x5x4
Flush generator plate	8¾x5½
Flush generator insert	8x4¾x4¾

Surface Type Generator

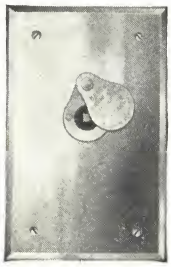
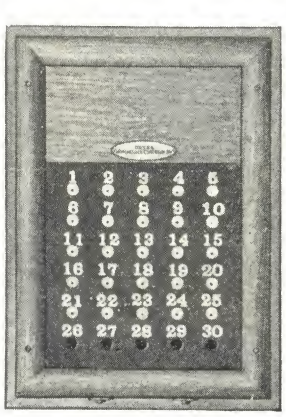
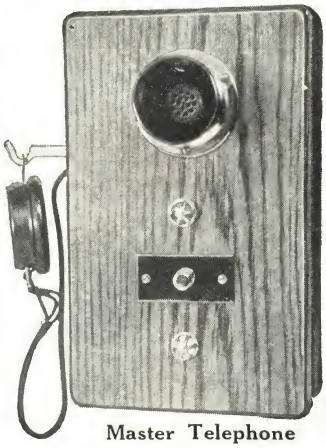


Plate for Flush Station



Annunciator



Master Telephone

Standard Generator

AMERICAN DISTRICT TELEGRAPH COMPANY

155 Sixth Avenue, NEW YORK, N. Y.

A. D. T. SERVICES AVAILABLE IN THE FOLLOWING CITIES AND ADJACENT COMMUNITIES

AKRON, OHIO
ALBANY, N. Y.
ANDERSON, IND.
ATLANTA, GA.
BALTIMORE, MD.
BIRMINGHAM, ALA.
BOSTON, MASS.
BRIDGEPORT, CONN.
BROCKTON, MASS.
BROOKLYN, N. Y.
BUFFALO, N. Y.
BURLINGTON, VT.
CANTON, OHIO
CEDAR RAPIDS, IOWA
CHARLESTON, S. C.
CHATTANOOGA, TENN.
CHICAGO, ILL.
CINCINNATI, OHIO
CLEVELAND, OHIO
COLUMBUS, OHIO
DALLAS, TEX.
DAVENPORT, IOWA
DAYTON, OHIO
DENVER, COLO.
DES MOINES, IOWA
DETROIT, MICH.
DUBUQUE, IOWA
DULUTH, MINN.
EL PASO, TEX.
ERIE, PA.
EVANSVILLE, IND.
FLINT, MICH.
FORT WAYNE, IND.
FORT WORTH, TEX.
GALVESTON, TEX.
GRAND RAPIDS, MICH.
GREEN BAY, WIS.
HAMILTON, OHIO
HAMMOND, IND.
HARTFORD, CONN.
HOUSTON, TEX.
INDIANAPOLIS, IND.
JACKSON, MICH.
JACKSONVILLE, FLA.
JERSEY CITY, N. J.
KALAMAZOO, MICH.
KANSAS CITY, MO.
KNOXVILLE, TENN.
LANSING, MICH.
LINCOLN, NEB.
LONG ISLAND CITY, N. Y.
LOS ANGELES, CAL.
LOUISVILLE, KY.
MACON, GA.
MANSFIELD, OHIO
MARION, IND.
MEMPHIS, TENN.
MILWAUKEE, WIS.
MINNEAPOLIS, MINN.
MOLINE, ILL.
MUNCIE, IND.
MUSKEGON, MICH.
NASHVILLE, TENN.
NEWARK, N. J.
NEWARK, OHIO
NEW HAVEN, CONN.
NEW ORLEANS, LA.
NEW YORK, N. Y.
NIAGARA FALLS, N. Y.
OAKLAND, CAL.
OKLAHOMA CITY, OKLA.
OMAHA, NEB.
OSHKOSH, WIS.
OTTUMWA, IOWA
PADUCAH, KY.
PATERSON, N. J.
PEABODY, MASS.
PEORIA, ILL.
PHILADELPHIA, PA.
PITTSBURGH, PA.
PORTLAND, ME.
PORTLAND, ORE.
QUINCY, ILL.
RACINE, WIS.
READING, PA.
ROCHESTER, N. Y.
ROCKFORD, ILL.
SAGINAW, MICH.
ST. JOSEPH, MO.
ST. LOUIS, MO.
ST. PAUL, MINN.
SALT LAKE CITY, UTAH
SAN ANTONIO, TEX.
SAN FRANCISCO, CAL.
SAVANNAH, GA.
SCRANTON, PA.
SEATTLE, WASH.
SIOUX CITY, IOWA
SIOUX FALLS, S. D.
SOUTH BEND, IND.
SPOKANE, WASH.
SPRINGFIELD, MASS.
SPRINGFIELD, OHIO
SUPERIOR, WIS.
SYRACUSE, N. Y.
TACOMA, WASH.
TERRE HAUTE, IND.
TOLEDO, OHIO
TOPEKA, KAN.
TRENTON, N. J.
WASHINGTON, D. C.
WATERBURY, CONN.
WAUSAU, WIS.
WICHITA, KAN.
WORCESTER, MASS.
YOUNGSTOWN, OHIO
ZANESVILLE, OHIO

If Our Name Is Not in the Telephone Directory, write the Home Office for Name of Operating Company
For A. D. T. Protection Service, see Manufacturers' Index

Central Station Systems (Available in Above Cities)

The following systems are owned, installed, operated and maintained by the A. D. T. Company on a fee or contract basis:

CENTRAL STATION NIGHT WATCHMAN SUPERVISION.
CENTRAL STATION MANUAL FIRE ALARM.
CENTRAL STATION AUTOMATIC FIRE ALARM.
CENTRAL STATION AUTOMATIC SPRINKLER SUPERVISION.

Also Central Station Mercantile Burglar Alarm; Central Station Bank Vault Burglar Alarm; Holdup Alarm and Central Station Police Call Systems.

Local Systems (Available Anywhere)

The following systems are sold outright and can be installed by the A. D. T. Company if desired:

A. D. T. PROPRIETARY (Local) NIGHT WATCHMAN SUPERVISION and FIRE ALARM.

A. D. T. PROPRIETARY (Local) AUTOMATIC SRINKLER SUPERVISION.

Also Local Mercantile Burglar Alarm; Signal Call Paging Systems; Local Bank Vault Burglar Alarm and Holdup Alarm.

A. D. T. CENTRAL STATION PROTECTION SERVICE

The AMERICAN DISTRICT TELEGRAPH COMPANY provides a nation-wide protection service maintained by permanent wire connections to A. D. T. Central Stations manned by experienced supervisors and backed by more than ten million dollars worth of equipment and a complete emergency patrol force.

A. D. T. is the only nationally operated system of protection. It is also the only organization that furnishes both local and Central Station service—a choice of protection which can only be made after a careful study of each individual problem.

Its never-sleeping electrical system and personnel are recognized as standard by the Underwriters' Laboratories, Inc., and as indispensable protection by 25,000 users in financial, commercial and industrial fields.

Continuous Supervision—The A. D. T. Central Station Service is based on the continuous supervision of the protected property by experienced A. D. T. operators at conveniently located Central Stations.

Any irregularity, either accidental or deliberate, flashes a signal to the A. D. T. Central Station and causes immediate investigation. Protection is positive.

A Typical A. D. T. Central Station with Constant Supervisory Service by Experienced Operators

Each Alarm Investigated—The illustration on preceding page shows one of the A. D. T. Central Stations where alarms are received. Response varies according to kind of service rendered. A. D. T. maintains a competent and experienced patrol force at each Central Station to conduct investigations. A gong rings—a light flashes—an operator calls out the location and, in a few seconds, organized protective forces are on their way to meet the emergency.

Cuts Operating Costs—In planning a building there are two important items—the cost of protective equipment and the cost of maintaining a permanent and adequate patrol. Complete A. D. T. Protection Service invariably reduces these costs besides providing permanent, positive and comprehensive protection. In many cases it reduces insurance costs as well.

Unit Responsibility—A. D. T. Equipment is manufactured and installed by A. D. T. The installation, upkeep and entire responsibility for proper operation and maintenance are placed within one organization

A. D. T. Proprietary Systems

Proprietary Systems are furnished for owner operation wherever A. D. T. Central Station Service is not available. The devices used are the same as for A. D. T. Central Station Service with the addition of the necessary equipment for local supervision.

Engineering Service

Any architect, insurance agent or owner can obtain the fullest co-operation of our engineering department. Plans, layouts, estimated costs will be worked out, based on the experience in protecting more than 25,000 properties. These systems are used extensively in public buildings, hotels, theatres, office buildings, railroads, and factories.

Equipment in Architectural Design

A. D. T. equipment is made to order when desired. The fire alarm boxes in the Empire State Building and other large buildings were designed to conform to the design of the building.

WATCHMAN'S COMPULSORY TOUR AND MANUAL FIRE ALARM SYSTEMS

Watchman's Compulsory Tour System

The A. D. T. Watchman's Compulsory Tour System supplies a means of maintaining a constant check on the performance of the watchman's patrol. It compels the watchmen to visit each of their stations in a prescribed sequence and to signal from certain of the stations which are electrically connected to the Central Office.

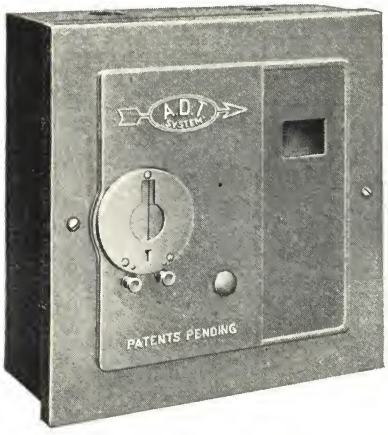
At the start and finish of each round or series of stations, the watchman is required to signal from a transmitting box which can only be actuated by means of the watchman's register. The latter consists of a locking device, which is set up in definite combinations by inserting it in each and every "preliminary" station. Further, the watchman must visit each and every station in correct sequence in order to step up the register for use in succeeding stations and final actuation of the transmitting station. Signals to the Central Office are transmitted over circuits operated on the McCulloh principle—so arranged that even if open or grounded, signals will still be transmitted pending repairs.

Manual Fire Alarm System

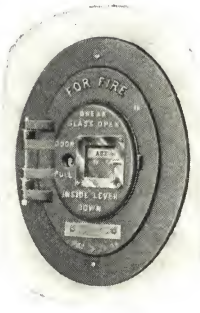
Manual fire alarm boxes are usually installed in conjunction with the Watchman's Compulsory Tour System and on the same electrical circuit. They provide a means whereby employees may turn in an alarm at any time.

Operating one of these boxes sends a coded alarm to the fire department through the Central Station, giving the exact location of the fire. At the same time, roundsmen are dispatched to the scene and the owner notified by the Central Station operators.

When desired a local interior fire alarm system may be installed to operate in conjunction with the Central



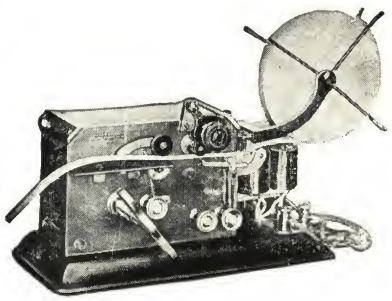
Signal Transmitting Station



Fire Alarm Box

Watchman's Register

Preliminary Station



Central Station Registering Instrument

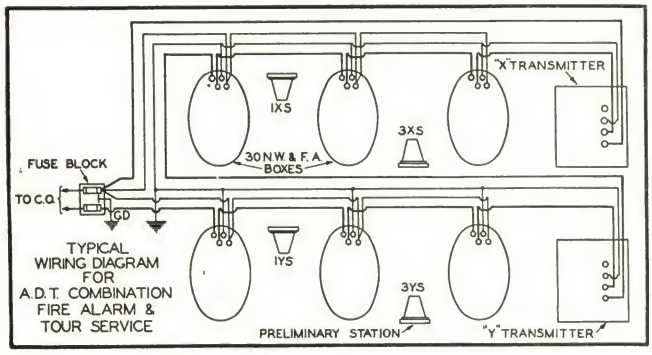
Station Manual Fire Alarm System. In this case the fire alarm box is designed so that when it is operated it will signal the Central Station and at the same time sound its code on the local gong system.

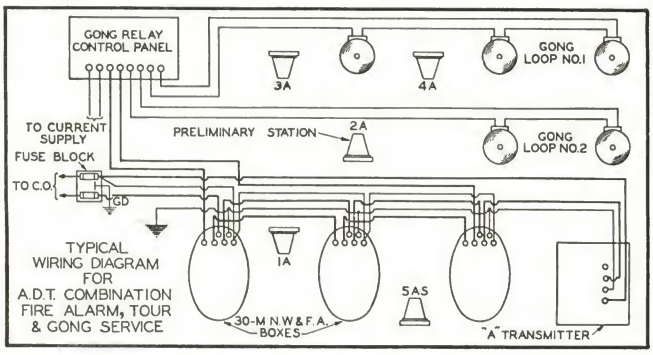
Types Available

The above systems can be obtained in either of the following types of installation:

Type (1) Central Station System—A system or group of systems, the operation of which is signaled to, recorded in, maintained and supervised from an A. D. T. Central Station, an outside organization in which are competent and experienced observers and operators in attendance at all times whose duty is to check the performance of the watchmen and investigate their delinquencies. Installed on a fee or contract basis.

Type (2) Proprietary System—A system or group of systems operated from a local office and having its operations under the control and domination of the owners or others interested in the property to be protected. This requires equipment on the owner's premises for the accurate recording of signals. Experienced operators must be on constant duty in accordance with the Underwriters' requirements. Sold outright.





SPECIFICATION FOR A. D. T. WATCHMAN'S COMPULSORY TOUR AND MANUAL FIRE ALARM SYSTEM

General

There shall be installed the necessary equipment for a complete Underwriters' approved Watchman's Compulsory Tour and Manual Fire Alarm System meeting all requirements of insurance organizations having jurisdiction.

This system shall be arranged to operate through [an outside Central Station of the *(name of controlled company of A. D. T.)* Company] [a Central Station established exclusively within the protected premises] and is to include the necessary devices and connections to transmit coded signals to the Central Station.

Watchman's Compulsory Tour System

Equipment—The equipment shall consist of the required number of [flush] [surface] type preliminary stations, [flush] [surface] type transmitting stations and watchman's registers.

The preliminary stations are to be entirely mechanical and not connected to the electrical circuit. The transmitting stations shall be wired to the Central Station and when actuated by means of the watchman's register shall transmit a coded signal indicating the particular station visited by the watchman.

There shall also be installed one or more emergency transmitting stations located as designated and connected to the Central Station circuit.

The watchman's register shall consist of a locking device which must be inserted in each of the preliminary stations in sequence before it will actuate a transmitting station.

All preliminary and transmitting stations are to be of polished aluminum and shall bear the Underwriters' label of approval.

Operation—The stations shall be so arranged as to make it necessary for the watchman to follow a prescribed route through the premises, actuating the tour register at each of the preliminary stations in consecutive order, and in turn actuating the tour transmitting stations at regular intervals.

The design of the system is to be such as to make it impossible for the watchman to actuate the register unless he follows the prescribed route. The neglect to do so shall result in the non-transmission of the signals to the Central Station, thereby causing an investigation to be made.

Installation—[Flush] [surface] type preliminary tour stations and [flush] [surface] type tour transmitting stations (together with back shells) are to be furnished by the *(Name of Controlled Company of A. D. T.)* Company.

These are to be set in place by the electrical contractor who shall provide and install a line of conduit to contain four (4) No. 16 rubber-covered copper wires between the service entrance and the tour transmitting stations.

Tour registers shall be furnished by the *(Name of Controlled Company of A. D. T.)* Company at the time the service is placed in operation.

Fire Alarm System

Fire Alarm Boxes—Shall consist of the required number of boxes designed for [flush] [surface] mounting and equipped with break glass door to permit access to the fire alarm lever.

The mechanism shall include code wheels for normal and McCulloh operation respectively, and also a shunt cam wheel for the purpose of shunting out the more remote boxes in the event of simultaneous operation.

When operated the boxes shall cause a coded alarm to be transmitted to the Central Station.

Boxes are to be finished in red enamel and shall bear the Underwriters' label of approval.

Installation—Fire alarm boxes (and back shells) are to be furnished by the *(Name of Controlled Company of A. D. T.)* Company and shall be set in place by the electrical contractor who is to install a line of conduit containing four (4) No. 16 rubber-covered copper wires between the A. D. T. service entrance and the fire alarm stations. Conduit and wires may be the same as used for the Watchman's Compulsory Tour System.

Fire Alarm System Including Local Gongs

(*Note:* Use the following specification when it is desired to operate a system of interior fire alarm gongs in conjunction with the Central Station Fire Alarm System.)

Fire Alarm Boxes—Shall consist of the required number of boxes designed for [flush] [surface] mounting equipped with break glass door to permit access to the fire alarm lever.

The mechanism shall include code wheels for normal and McCulloh operation respectively, and, in addition, a code wheel and associated contacts for the purpose of operating a system of local gongs installed within the premises. A shunt cam wheel shall be provided for the purpose of shunting out the more remote boxes on the Central Station circuit in the event of simultaneous operation.

When operated for fire, the boxes shall cause an alarm to be transmitted to the Central Station, and five (5) rounds of coded signals to be sounded on the local gongs.

(Include the following only when Pre-signal operation is desired.)

Boxes shall include a pre-signal switch so connected that when the box is first operated for fire, an alarm will be sounded on a system of pilot bells only. When a key is used in the box and it is again operated, the arrangement shall be such that a general alarm will then be sounded on all gongs throughout the premises.

Control Panel (for local gong system)—Shall be designed for operation from ..... (specify voltage and current) supply taken from [commercial lighting or power circuit] [storage battery].

The panel shall be designed to accommodate ..... general alarm circuits, and ..... pilot circuits.

The panel is to be of approved ebony asbestos, equipped with the necessary relays, milliammeters and devices required for operation.

The panel shall be securely mounted in a steel housing having a small glass panel in door for reading of meter and equipped with a suitable lock.

The trouble bell is to operate from [same] [separate] power source.

Test Box—One No. 105 test box shall be furnished for sounding a test signal on the local gongs and signaling the Central Station.

Drill Key—One No. 107 drill key shall be furnished for sounding any desired code on the local gongs for fire drill purposes.

Fire Alarm Bells—The bells shall be of underdome construction, equipped with a special hot pressed alloy steel gong having a black rust-resisting finish. All moving parts are to be concealed under the bell shell. The movement is to be of the solenoid type. The coils are to be form wound and moisture proof.

Universal outlet boxes are to be provided for all bells so that sizes may be interchanged without removing the outlet boxes. One-half inch knockouts are to be provided on all sides.

Installation—The necessary fire alarm boxes, gongs, trouble bells and control panel with back shells (if required) are to be furnished by the *(Name of Controlled Company of A. D. T.)* Company who will also furnish wiring diagrams.

The devices are to be set in place by the electrical contractor who shall provide and install the necessary conduit to contain the wires.

SPRINKLER SUPERVISORY AND VALVE ALARM SYSTEM

The reliability and efficiency of sprinkler systems depend upon careful supervision. This supervision can be obtained through either of the following types of installations:

Type (1) Central Station System—A system, the operation of which is entirely maintained and supervised from an A. D. T. Company's Central Station (a disinterested party). Installed on a fee or contract basis.

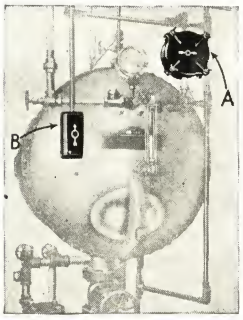
This system effects economy in protecting premises by eliminating personnel required for inspecting the sprinkler system and detecting fires.

In many cases, such supervision is accepted by insurance interests in lieu of the watchman.

Type (2) Proprietary System—A system operated from a local office under the control and responsibility of the owners' employees.

Also requires additional equipment on the premises and experienced operators on constant duty.

Installed and sold outright.



Pressure Tank Supervisory Devices

What a Sprinkler Supervisory Service Does

The more important functions performed by a supervisory service are:

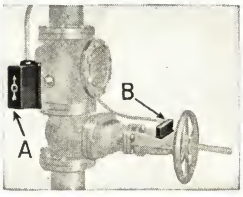
(1) Immediately transmits alarm of fire to the Central Station and through it to the fire department, the fire insurance patrol and the owner.

(2) Immediately warns when any valve is closed.

(3) Immediately warns if water in gravity tank is too low.

(4) Immediately warns if temperature of the water is too low and the water likely to freeze.

(5) Immediately warns if air pressure (in a dry system) is too high or too low.



Wet System Supervisory Alarm and Gate Valve Supervision

(6) Immediately warns when water in pressure tank is too high or too low or when the air pressure in tank is too high or too low.

(7) Immediately warns when power supply for the fire pump fails.

(8) Immediately warns in case of accidental leakage of water.

(9) Keeps Underwriters informed daily of conditions of the sprinkler system.

(10) Inspects equipment periodically, assuring its operation in emergency.

(11) Provides adequate intelligence service by telephone and runner.

When an alarm is received indicating trouble, the owner is called by telephone and a runner is immediately dispatched to investigate.

In emergency conditions, the fire department and insurance patrol are also advised.

Equipment consists of especially designed actuating and transmitting devices, so connected that any departure from normal conditions will cause a signal to register in the Central Station.

Sprinkler Supervisory Annunciator

The A. D. T. Sprinkler Supervisory Annunciator may be installed in connection with the Central Station System or Proprietary System, to provide a local indication whenever an abnormal condition of the system exists.

The panel is enclosed in a steel cabinet with glass door and consists of a panelboard of approved insulating material, on which are mounted a milliammeter, red lamp, transfer switches, relays equipped with targets, resistances and terminals.

Each target is labeled to indicate the nature of supervision.

SPECIFICATION FOR A.D.T. SPRINKLER SUPERVISORY AND VALVE ALARM SYSTEM

General

There shall be installed a complete Underwriters' approved Sprinkler Supervisory System for supervision of all alarm valves, shut-off valves, tanks and other points of the sprinkler system, as required by the regulations of insurance organizations having jurisdiction.

This Sprinkler Supervisory System shall be installed to operate through a Central Station (established exclusively within the protected premises) of the AMERICAN DISTRICT TELEGRAH COMPANY and all wiring and devices installed within the premises are to be of a type approved for connection to the Central Station circuits.

Equipment

The equipment shall be furnished by the AMERICAN DISTRICT TELEGRAPH COMPANY and is to consist of the necessary supervisory actuating devices, transmitters and power supply equipment.

Actuating Devices—Actuating devices for wet alarm valves shall consist of a switch mechanism held in place by the valve clapper in such a way that it will be released when the clapper is lifted from its seat by a flow of water in the system.

Actuating devices installed on the dry valves shall be of the type which operates due to an increase in pressure in the intermediate chamber of the valve caused by tripping of the valve due to the opening of a sprinkler head or otherwise.

Pressure switches are to be installed on all dry pipe risers, and shall be designed to operate when there is an increase or decrease of pressure beyond permissible limits.

Gate valve devices shall be mounted on the frame or yoke of the gate valve and are to consist of the necessary contact springs and plunger arranged to operate between the first and second revolution of the hand wheel.

Gravity tank devices shall consist of the necessary float and switch contacts, arranged to operate when the water level is low, and a mercurial thermometer equipped with the necessary contacts for indicating high or low temperature of the water within the tank.

Pressure tank devices shall consist of the necessary float and switch contacts to operate when the water in the pressure tank is abnormally high or low and a pressure switch which will operate on an increase or decrease of pressure beyond permissible limits.

When required, pressure switches are also to be installed for supervision of the steam pressure on the fire pump and pressure of the water in the city supply.

If an electrically driven pump is installed, a current supervisory relay is to be connected to the line side of the current supply at the main switch and circuit breaker of the starting panel so that an alarm will be transmitted if the current supply is cut off, reduced or reversed.

Sprinkler Supervisory Transmitters—Transmitters for water flow alarms shall be of the retard type consisting of two independent clock movements and a retard magnet movement. The retard movement shall be adjusted to delay the transmission of signals approximately ten seconds to overcome momentary movements of the water in the system.

Water flow transmitters shall transmit a trouble signal, a water flow signal and a restoration signal, the latter indicating that the fire alarm side of the transmitter has been rewound.

Water flow transmitters are to be mounted in individual wooden cabinets, equipped with tamper switches arranged so that a signal will be transmitted when the cover is removed or replaced.

Supervisory transmitters shall consist of a single clock mechanism arranged to transmit signals when the circuit is opened through the functioning of the actuating devices.

Supervisory transmitters are to transmit a trouble signal upon the operation of the actuating devices or trouble on the circuit and an "O. K." signal when conditions are restored to normal.

The transmitters are to be mounted in combinations in a wooden cabinet equipped with tamper springs arranged to transmit a signal when the cover is removed and replaced.

Both water flow and supervisory transmitters are to be equipped for McCulloh operation, so that signals will be recorded in the Central Station even though the circuit is open or grounded or both open and grounded.

A suitable clear, clean, dry space shall be provided on a solid wall for the mounting of the transmitters and power equipment—preferably in the basement or on the first floor of the building.

Current Supply—The current supply for the local circuits shall be obtained from a storage battery of proper capacity, which shall be maintained on a floating charge by means of a suitable charging device.

The battery and charging equipment is to be housed in a metal cabinet equipped with the necessary switches, fuses and terminals. One charging unit shall be provided for each group of transmitters installed within the premises.

If a direct-current lighting or power source is available, the local circuits may be energized direct by means of a suitable resistance unit enclosed in a metal cabinet equipped with the necessary fuses and terminals.

The current supply for the Central Office circuit is to be furnished by a battery maintained in the Central Office.

Installation

Installation of the necessary actuating and transmitting devices and all wiring and connections will be made by, or upon, order of the AMERICAN DISTRICT TELEGRAPH COMPANY, who will provide all the necessary installation diagrams and details together with the necessary supervision of the installation. The conduit is to be furnished and run by the electrical contractor.

Upon completion, the entire system shall be tested out to the satisfaction of the insurance organizations having jurisdiction, and arrangements shall be made for periodical testing thereafter.

Specifications for A. D. T. Sprinkler Supervisory Service are conditional upon the sprinkler system being in good condition, tight and free from leaks, equipped with approved alarm valves and where necessary having provision for the introduction of excess pressure protecting alarm valve against water hammers due to fluctuation of city pressure.

SPECIFICATION FOR PROPRIETARY CENTRAL OFFICE EQUIPMENT

This specification is to be used in conjunction with specifications for Watchman's Compulsory Tour and Manual Fire Alarm System and specifications for Sprinkler Supervisory and Valve Alarm System when signals are to be recorded in a local central office established exclusively within the protected premises

General

All signals from watchman's stations, fire alarm boxes and sprinkler supervisory devices shall be recorded in the local central office where attendants are to be constantly on duty for the purpose of checking the signals and investigating delinquencies.

The system shall be arranged for operation in accordance with the McCulloh principle, which provides a means whereby signals may be received and recorded when the central office line is open or grounded, or both open and grounded.

Equipment

The equipment for the local central office shall consist of the following: central office switchboard for mounting all necessary supervising and control relays, meters, etc.; charging panel and all necessary devices for charging from [a-c.] [d-c.] supply; recording register, take-up reel and associated equipment; timing apparatus, including time stamp and master clock, etc.; storage batteries, rectifier (when batteries are charged from a-c.). (List any other miscellaneous equipment that may be required, such as timing tables, gong control panels, telephone control units, etc.

Recording Apparatus—The recording apparatus shall consist of the necessary number of (single circuit) (double circuit) recording registers of the (ink writing) (punching) type with take-up reels and automatic time stamp mounted under a glass cover. The recording apparatus is to be mounted on a mahogany base and the cover equipped with a suitable lock.

Master Clock—An electrically wound master clock shall be provided for control of the automatic time stamp. This shall be the No. 029 type as manufactured by the Self Winding Clock Company of New York, N. Y. This clock is to be equipped with suitable contacts and relay for sending out minute impulses to the recording apparatus.

Battery and Charging Equipment—The storage battery for the system shall consist of ..... cells, ... volts, type..... It is to be of the (portable) (sealed glass jar) type with cells completely charged and ready for service. The battery is to be of sufficient capacity for satisfactory operation of the system. Suitable apparatus shall be provided for charging the battery from the available power source.

Switchboard—The control devices for watch, fire alarm and battery charging are to be mounted (on a standard No. 295 switchboard section) (in a metal cabinet equipped with glass paneled door). Panels shall be of ebony asbestos or other approved insulating material.

The watch control equipment shall consist of the necessary number of No. 302 McCulloh circuit panels, supervising relays, switches, milliammeters, voltmeters, jacks, pilot lamps, resistance tubes and terminals.

The control devices for the local gongs shall be type ..... for operation from ..... (specify voltage and current) supply taken from (commercial lighting or power circuit) (storage battery).

The necessary relays shall be provided for ..... general alarm circuits and ..... pilot circuits. Also the necessary milliammeters, time delay cutouts, balancing resistors and terminals.

The devices for control of the charging equipment shall include the necessary rheostat, circuit breaker, switches, meters and terminals.

Installation

The equipment is to be installed complete by the electrical contractor under the supervision of the *(Name of Controlled Company of A. D. T.)* Company, who will furnish the necessary conduit and wiring diagrams.

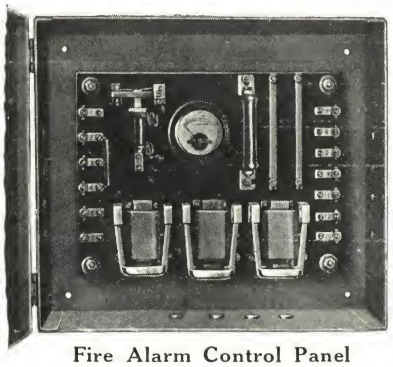
A.D.T. INTERIOR FIRE ALARM SYSTEM

Description

This system may be installed independently or in conjunction with either Central Station or Proprietary Systems.

It is provided to give a coded alarm on a system of local gongs installed throughout the premises to permit prompt evacuation of the building and, at the same time, to give the local fire patrol the exact location of the fire.

Manual fire alarm boxes of the coded type are installed in accordance with requirements. In addition, equipment consists of the necessary number of gongs or signals, control panel and trouble bell. The gongs may be energized direct from the alternating or direct-current commercial lighting or power supply, if reliable, otherwise a storage battery should be provided.



Fire Alarm Control Panel

Systems are furnished for either general alarm or pre-signal operation. The general alarm type sounds all the gongs throughout the premises immediately upon the first operation of the fire alarm box. The pre-signal type sounds an alarm first on a system of pre-signal or pilot gongs, audible only in certain locations. If upon investigation it is desired to sound a general alarm the use of a special key in the fire alarm box permits all gongs to be sounded when the box is again operated.

The system is of the closed circuit, electrically supervised type. Provision is made for testing all local circuits and box mechanisms.

Signal Box
No. X46-CF

Specification

General—Furnish and install an approved closed circuit, electrically supervised local Fire Alarm System of the (general alarm) (pre-signal) type as furnished by the *(Name of Controlled Company of A. D. T.)* Company. This system to be arranged for operation on ..... (specify voltage and current).

Equipment—*Fire Alarm Boxes*—Shall be of the (open door) (break glass door) type designed for (flush) (surface) mounting.

A.D.T. Single Stroke
Gong

(Note: Include the following only when pre-signal operation is desired.)

Boxes shall include a pre-signal switch so connected that when the box is first operated for fire, an alarm will be sounded on a system of pilot bells only.

When a key is used in the box and it is again operated for fire, the arrangement shall be such that a general alarm will be sounded on all gongs throughout the premises.

Control Panel—Shall be designed for operation from ..... (specify voltage and current) supply taken from (commercial lighting or power circuit) (storage battery).

The system shall be designed to accommodate ..... general alarm circuits and ..... pilot circuits.*

The panel is to be of approved ebony asbestos equipped with the necessary relays, milliammeters, and other devices required for operation.

It shall be securely mounted in a steel housing, having a glass panel in door for reading of meter, and equipped with a suitable lock.

The trouble bell is to operate from (same) (separate) power source.

Fire Alarm Bells—The bells shall be of underdome construction, equipped with a special hot pressed alloy steel gong having a black, rust-resisting finish.

All moving parts are to be concealed under the bell shell. The movement is to be of the solenoid type. The coils are to be form-wound and moistureproof.

Universal outlet boxes are to be provided for all bells so that sizes may be interchanged without removing the outlet boxes. One-half inch knockouts are to be provided on all sides.

Installation—The necessary fire alarm boxes, gongs, trouble bells, and control panel with back shells (if required) are to be furnished by the *(Name of Controlled Company of A. D. T.)* Company.

These are to be set in place by the electrical contractor who shall provide and install the necessary conduit to contain the following wires:

From control panel to and through each fire alarm box (general alarm), 2 No. 14 wires.

(Pre-signal),* 4 No. 14 wires.

From control panel to trouble bell, 2 No. 14 wires.

From control panel to each group of pilot gongs,* 2 No. 14 wires.

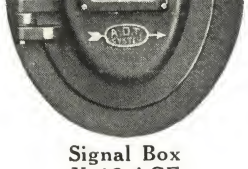
From control panel to each group of general alarm gongs, 2 No. 14 wires.

From control panel to power source, 2 No. 14 wires.

(If trouble bell is energized from third wire of three-wire system, 3 No. 14 wires.)

Group of bells—10 or less a-c., 14 or less d-c.

**Include only if pre-signal operation is desired.*



Signal Box
X-46-ACF

AERO AUTOMATIC FIRE ALARM SYSTEM

The "Air Tube" System is a Scientific Application of Nature's Law

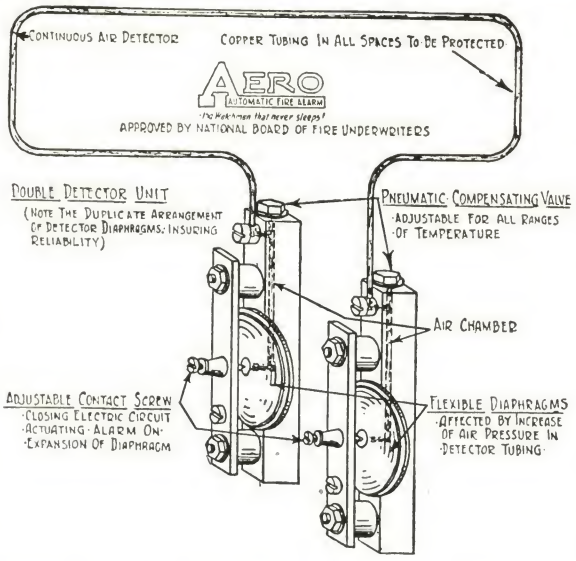
Aero is the result of extensive scientific research and operates on the fundamental law of nature that heated air expands. Air is one of the most fire-sensitive elements. This never-failing law has been utilized as the basis of the *Aero* System of fire detection.

Description

The sensitive, fire-detecting element is a very small copper tube, less than $\frac{1}{12}$-in. in diameter, which is attached to the ceilings or roof of the premises to be protected. The tubing contains nothing but air at ordinary atmospheric pressure. In case of fire the contained air becomes heated and expands.

At each end of the tube is a diaphragm or small metal box with very thin sides capable of being bulged outward by air pressure. The bulging of the diaphragm closes electrical contacts which operate a transmitter, automatically sending the alarm. An annunciator indicates the floor or section of the building where the fire originated and a local alarm is sounded on gongs.

All parts of the system can be tested for operation as frequently as desired and no part or device has to be renewed after a fire call has been sent in order to replace the system in service. This applies not only to the electrical parts but to the tubing circuits as well.



Apparatus

The apparatus installed on the premises consists of one or more *Aero* circuits, each connected to a detector unit, one or more manual stations, a control panel with transmitter and relay, an annunciator and local alarm bell. A local source of electrical energy is also provided, together with necessary wire, conduit and miscellaneous fittings.

Aero Tubing—Pure drawn copper. Outside diameter approximately $\frac{1}{12}$-in.

Detector Unit—One required for each tube circuit, both ends of tubing terminating in the unit which contains, on a small bakelite panel, an assembly of the necessary devices for operation of the circuit.

Manual Fire Alarm Stations—These are of the "one operation break glass" type and designed so that they can be assembled onto any detector unit.

Control Panel with Transmitter and Relay—Consists of two clock-driven transmitters with a retard and associated relay. One transmitter is used to give trouble signals and the other operates for fire alarm signals.

Annunciators and Bells—The annunciator operated from the unit detector sets is used to show the exact location of the fire. Usually placed on the outside of the building but an interior type can be provided. The local alarm bells are of the single or double vibrating type, located so as to give a general alarm throughout the building.

Source of Energy—Current is supplied from a storage battery with an automatic charger where a-c. is available, otherwise a suitable storage battery is used.

Types of Aero Alarm Service

The *Aero* Automatic Fire Alarm System is used in the following four classes of service:

A. D. T. Central Station Service Direct-to-Fire Station Service; A. D. T. Proprietary Service; Local Service.

SPECIFICATION FOR CENTRAL STATION AERO AUTOMATIC FIRE ALARM SYSTEM

General

There shall be installed the necessary equipment for a complete Central Station *Aero* Automatic Fire Alarm System meeting all requirements of insurance organizations having jurisdiction.

The system shall be of the *(Aero)* pneumatic-electric "rate of rise" type. It shall be arranged to operate through the Central Station of the *(Name of Controlled Company of A. D. T.)* Company, and shall include the necessary devices and connections for the transmission of coded signals from the protected property to the Central Station.

The fire detecting system shall consist of the required number of *(Aero)* detector units and tube circuits, distributed throughout the entire property in such a manner as to ensure a prompt and reliable operation in event of an outbreak of fire at any point in the building (or plant).

It shall include as part of the equipment, a means whereby the fire detecting devices may be tested for operation periodically, without necessitating replacement of devices or parts as a result of such tests.

A means whereby the system may be set in operation manually shall also be included as part of the system.

Operation

The system shall be so arranged that when it operates automatically as a result of a fire condition, or is operated manually, a distinctive coded signal shall be transmitted to the Central Station. Such operation shall also cause a local signal to be sounded on a gong (or gongs), and shall indicate on a centrally located annunciator the location of the fire condition causing the operation of the system, or the manual station operated.

The fire alarm circuit and devices shall be electrically supervised, and so arranged that failure of the source of energy, or disarrangement of the electrical wiring shall cause a distinctive signal, indicating a trouble condition, to be transmitted to the Central Station.

Equipment

Tubing—The pneumatic tube installed as part of this system shall be of commercially pure copper, drawn to an outside diameter of 0.080 in., with an internal diameter of 0.050 in. It shall be seamless, and free from splits or cracks. It shall be thoroughly annealed, and free from scale inside and out.

All joints in the tube shall be brazed with silver solder and each continuous length shall be tested to hold an air pressure of sixty (60) lb. per sq. in.

Detector Units—The detector units shall include all the devices necessary for the operation of each tube circuit, said devices consisting of the detector diaphragms and compensating vents, a test valve, a test switch, annunciator relays, and the necessary electrical connections and terminals. These devices shall be trical connections and terminals. These devices shall be assembled on a bakelite panel, the entire assembly being enclosed in an enamelled steel housing provided with a special lock and key to prevent tampering.

Tapped conduit openings shall be provided at the top and bottom of the steel housing.

Where manual stations are required, detector units shall be provided with a break-glass manual fire alarm attachment. Such detector units shall be enamelled red, and a brass plate shall be attached to the front, on which the words "In Case of Fire Break the Glass Rod" shall be etched.

Transmitters—The transmitter shall be of the retard type, and shall consist of trouble and fire alarm transmitters and a retard magnet.

The retard shall be arranged to delay the transmission of fire alarm signals for approximately ten (10) seconds, to prevent such signals resulting from momentary local heat conditions.

The transmitter shall transmit fire alarm, trouble, and restoration signals, the latter to indicate that the system has been restored to its normal condition after the transmission of a fire alarm signal.

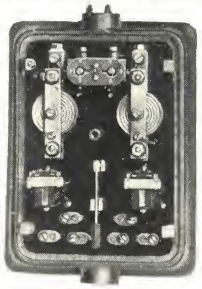
The entire transmitter assembly shall be enclosed in a dustproof case, with a special lock and key to prevent tampering.

Alarm Gongs—The local alarm gongs shall be of the vibrating type, and the frames of the gongs shall be provided with a tapped opening to take $\frac{1}{2}$-in. conduit.

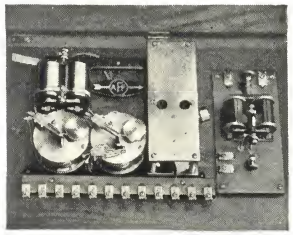
Annunciator—The annunciator shall be of the electrically restored type. It shall be enclosed in a weatherproof cast iron housing, enamelled red, and provided with brass designation plates on which the necessary indications will be stamped. The annunciator case shall be provided with tapped conduit openings at top and bottom.

Power Supply—Energy for the supervision and operation of the system shall be supplied by a suitable type storage battery. A suitable battery charger shall be furnished, and arranged to provide a continuous charge at a sufficient rate to maintain the battery in a fully charged condition at all times.

The battery and charger shall be enclosed in a locked sheet steel cabinet, the inside of which shall be finished with asphaltum base paint.



Detector Unit



Control Panel with Transmitter Relay

Annunciator

Installation

All the necessary devices and material for this system shall be furnished by the *(Name of Controlled Company of A. D. T.)* Company.

The entire system shall be installed in conformity with the Rules and Regulations of the National Board of Fire Underwriters for such systems.

All electrical conductors shall be installed in rigid conduit, and both conduit and wire shall conform to the requirements of the National Electric Code for systems of this type.

AMERICAN FIRE PREVENTION BUREAU, INC.

One Madison Avenue
NEW YORK, N. Y.

DERBY APPROVED DEVICES FOR FIRE CONTROL AND HOLDUP ALARM SYSTEMS

(Protected by Patents)

Derby Devices used in connection with fire prevention equipments have been approved by the Underwriters' Laboratories, Inc., the United States Bureau of Standards and the Bureau of Fire Prevention of the City of New York.

Devices and Systems

Derby Closed Circuit Automatic Fire Alarm Systems.
Derby Fire Sentinel (Fire Detecting Thermostat).
Derby Electric Release.
Derby Local Closed Circuit Sprinkler and Standpipe Supervisory Systems.
Derby High-Low Gravity Tank Alarm Switch.
Derby Gate Valve Supervisory Switch.
Derby Non-freezing Standpipe Systems.
Derby Mercury Contact Foot Switch.
Derby Locking Plunger Switch.
Derby Holdup Alarm Systems.
Derby Automatic Protection of Fur Storage Vaults.

General

Derby Devices and Systems are the result of years of experience in the fire protection and associated fields. Their design and the materials employed in their manufacture are based on good engineering practice. No expense is spared to maintain our standard of high-grade products.

Each inquiry relating to Derby Apparatus is treated individually from an engineering point of view and recommendations made accordingly. Apparatus is sold with the understanding that it will be installed in accordance with our layouts and specifications, and also to meet requirements of inspection departments having jurisdiction.

Descriptions in Brief

The Derby Fire Sentinel—A sensitive, fixed temperature type thermostat, simple and rugged in construction, without moving parts or contacts. Bright, new contacts are made at time of operation. The Sentinel is made of materials best suited to resist atmospheric and corrosive influences. It requires no adjustment. Designed for attachment to standard 3-in. outlet box. Face of Sentinel may be mounted flush with finished ceiling and painted to conform to ceiling decorations. This feature appeals particularly to architects and property owners.

Sentinels may be wired on open or closed circuit and on voltages up to 120 volts.

The Derby Closed Circuit Automatic Fire Alarm System—Utilizes the Derby Sentinel, as the automatic feature, and Derby Patented Wiring Circuits. The system is under constant electrical supervision, so that any interruption of current, broken wire, loose terminal, open fuse, or ground, will give instant notification of derangement by *distinctive* trouble bell.

Fire signal may be by single stroke, code ringing gongs, by vibrating gongs, or by fire horns, as desired. Mazda lamp annunciator is provided, as a part of the supervisory panel, to indicate the origin of the alarm.

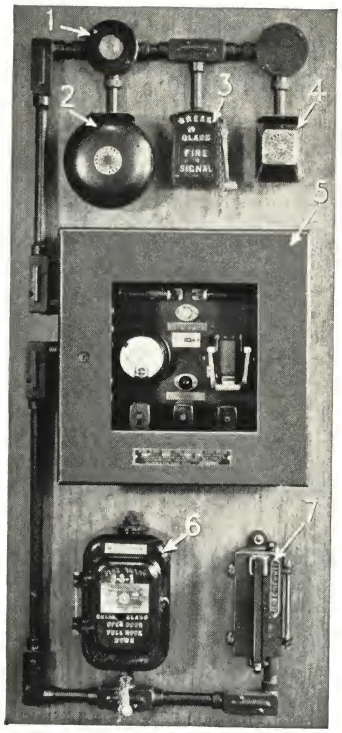
Connection to public fire department may be made without interfering with public fire alarm circuits.

The Derby Electric Release—A simple device, built on proper mechanical lines, designed to start or stop motion, such as closing fire doors, stair and elevator traps and dip tank covers, shutting down motors and engines, conveyor systems, hot air blower and exhaust systems, operating quick opening or closing valves, etc. The Release can be adapted to practically any industrial process where remote control is necessary. The Release will sustain a direct load of 50 lbs., which can be increased by leverage.

The Derby Closed Circuit Local Automatic Sprinkler and Standpipe Supervisory Alarm System—Utilizes the Derby Patented Wiring Circuits and Approved Supervisory Panels, with gauges and high-low float switches, to supervise automatic sprinkler and standpipe systems and indicate to those in authority when water is too high or too low in gravity tanks; when air is too high or too low in pressure tanks or in dry pipe systems; or when a waterflow from an automatic sprinkler system occurs.

Waterflow alarms and high-low alarms are sounded on separate gongs and ruby annunciator lamps on the supervisory panel indicate the circuit or piece of apparatus from which the alarm originates.

A *trouble* signal indicates any *derangement* of the system. *This is a distinctive feature of the Derby System. In other closed circuit systems a break or ground in the line gives the same alarm as does a waterflow or a high or low operation.*



Derby Supervisory Panel with Connected Equipment

1. Derby Fire Sentinel
2. Alarm Gong
3. Break Glass Fire Alarm Station
4. Trouble Gong
5. Derby Supervisory Panel
6. Transmitter
7. Derby Electric Release

The Derby Dry Line Standpipe System—Utilizes the Derby Patented Wiring Circuits and Derby Electrically Operated Valve to provide a non-freezing system suitable for the protection of unheated properties. This system eliminates the necessity for and saves expensive frostproof covering. The electrically operated valve holds the water supply in check until needed. A break-glass station, protected by outer cast iron case, is mounted at each hose station. Operation of any break-glass station will cause the valve to function and flood the standpipe system. Simultaneously, alarm will be sounded on gongs or horns. Indication of exact origin of alarm may be by audible coded signal or by lamp annunciators on supervisory panel.

The Derby Valve Supervisory Switch—Designed to supervise rising stem type gate valves of sizes from 3½ to 12 ins. One complete turn, or more, of the valve toward the closed position gives alarm to those in authority. This signal may be both audible and visible by means of gongs and annunciator lamps on supervisory panel. A *trouble* signal is given at supervisory panel in case of any derangement or tampering.

Protection of Fur Storage Vaults—This system is intended to minimize loss in the event of fire. Knowledge of an abnormal ceiling temperature is transmitted to those in authority and, at the same time, the fire dampers in the cooling system are shut and the circulating fan stopped.

The Derby Holdup System—Employs dustproof, noiseless, mercury contact, footrail type switches and also plunger type switches, as desired. These Derby Switches are of good appearance and are capable of withstanding hard usage. The switches are connected to the Derby Closed Circuit System of Wiring, the signals being transmitted to any point desired, through the medium of coded, musical tone gongs, vibrating gongs or sirens. The location from which alarm originates is indicated by means of lamp annunciators.

Inspection Service

Service contracts are made with the owner for periodic inspections by thoroughly competent men, reports on such inspections being furnished to the owner and inspection departments having jurisdiction.

Engineering Service

Proposals and specifications, covering type of system required and cost of same, will be furnished, without obligation, if plans giving necessary information are submitted to us.

THE AUTOCALL COMPANY

Fire Alarm, Paging, Watchman's, Sprinkler and Water Flow Supervisory Systems; Chimes, Bells, Program Dismissal Signals, etc.

Mack Avenue
SHELBY, OHIO
BRANCHES IN PRINCIPAL CITIES

Autocall Fire Alarm Systems

The Autocall line of signaling equipment includes the most complete and modern designs of fire alarm equipment. The systems consist essentially of fire alarm boxes, control panel, fire alarm gongs, recording unit and where necessary, storage batteries and charging apparatus. Autocall fire alarm systems are available in both local and proprietary classifications and include:

Plain non-code systems, supervised non-code systems, plain coded and supervised systems, pre-signal coded supervised systems, plain or pre-signal coded group type systems, automatic systems and any of the foregoing systems combined with paging or watchman's supervisory systems.

THE AUTOCALL COMPANY manufactures five distinct types of fire alarm boxes ranging from the most simple non-code alarm box to the new Type "F" line of boxes in bronze, Benedict nickel and other decorative metals so popular in modern architecture.

Equipment of Modern Architectural Design

THE AUTOCALL COMPANY has the pleasure of announcing new and distinctive designs in fire alarm boxes and fire alarm gongs developed to meet the demands of modern architecture.

Type "F" Benedict Nickel Fire Alarm Box

Type "F" Bronze Fire Alarm Box

Two popular designs are illustrated on this page. Above is a Type "F" fire alarm box in solid bronze; below, a box in solid Benedict nickel with border to harmonize with the architectural design carried out in the interior metal decorations.

Boxes in all grades of bronze, Benedict nickel, monel metal or aluminum are furnished to correspond to the building fixtures.

Oxidized processes are employed for special effects when desired. Border design suggestions, in full scale, are furnished without obligation.

Attractive Features

The conventional "hammer and chain" formerly required on fire boxes as a means of breaking the glass, are no longer employed. The hammer has been replaced by an attractive "knocker" that is in keeping with the design and, furthermore, eliminates the possibility of defaced walls so common where swinging "hammers" are attached to the base of the fire alarm box.

Another desirable detail is found in that the entire station extends only 3/8-in. from the finished wall line, the door and trim being flush and the "pull lever" recessed.

Autocall Fire Alarm Gongs

Fire alarm gongs are available in both surface and semi-flush types and in sizes ranging from 4 to 12 in. For all standard requirements, the gongs are of steel with cast iron fittings. When bronze, Benedict nickel and similar metals are used in the fire box construction, the gongs are then cast of bell metal and finished to match the alarm box and the gong fittings are of the same materials or finish as the box.

A semi-flush bronze gong to harmonize with the bronze box is illustrated.

Autocall Fire Alarm Control Panels, Etc.

While many Autocall designs of individual character are employed in the construction of control panels, recording and time printing fire alarm recorders and other accessories essential to a complete fire alarm system, the practices approved by the leading fire prevention and protective agencies are carried out thruout.

All Autocall fire alarm equipment is listed and approved by the Underwriters' Laboratories, Inc.

Bronze Fire Gong

Autocall Products

A Pioneer—The Autocall Company, a pioneer in the electrical signaling field, has, for more than twenty years, been a leader in the development, manufacture and sale of signaling devices as well as complete individual and combination systems. Following are the principal products of the Company:

Calling Systems—Audible Code Calling or Paging Systems: Combination Audible and Visual Code Calling Systems; Combination Code Calling and Intercommunicating Telephone Systems; Combination Code Calling and Fire Alarm Systems (Dual); Program and Dismissal Systems.

Signals—Heavy Duty Single Stroke and Vibrating Gongs in Surface, Semi-Flush and Weatherproof Types for all voltages and currents; Light Duty "Tapper" Single Stroke and Vibrating Bells with all types of bell shells including saucer bells, tea bells, cow bells, sleigh bells, etc. for all voltages and currents; Light and Heavy Duty Motor and Vibrating Horns; Electrically Operated Air Whistles.

Fire Alarm Systems—Non-code Fire Alarm Systems; Straight Code Fire Alarm Systems; Pre-signal Coded Fire Alarm Systems; Group Type Fire Alarm Systems; Automatic Fire Alarm Systems; Combination Code Calling and Fire Alarm Systems (Dual).

Supervisory Systems—(Proprietary Type): Watchman's Supervisory Systems; Combination Fire Alarm and Watchman's Supervisory Systems; Water Flow Alarm Systems for Automatic Sprinklers; Sprinkler Supervisory Systems for Automatic Sprinkler Controls.

Protective Systems—Special Recording Protective Systems for banks, department stores, silk mills, etc., Vault Supervisory Systems, etc.

Engineering Services and Special Literature

While Autocall signaling and protective systems have been developed to almost a standard for schools, hospitals, industrial plants, office buildings, warehouses, railroad and dock properties, the problems of individual efficiency and special local risks are so pronounced that a survey by a signaling engineer is recommended for the individual problem.

A competent staff of sales engineers for all signaling problems is permanently located in the larger cities; in addition to this, consulting engineers from the factory are constantly in the field. At the Home Office at Shelby, Ohio, a staff of designing and experimental engineers is maintained.

Engineering service is, therefore, available to architects, contracting and consulting engineers and property owners at all times. This service is furnished without obligation to the inquiring persons.

A. I. A. folders and especially prepared catalogues for permanent files sent on request.

THE BRYANT ELECTRIC COMPANY

Manufacturers of "Superior Wiring Devices" Since 1888

1421 State Street
BRIDGEPORT, CONN.

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SAN FRANCISCO, CAL., 149 New Montgomery Street (Office and Warehouse)

For Our Other Products, see Manufacturers' Index

BRYANT HOSPITAL SIGNALING DEVICES

The Bryant Electric Company manufactures a complete line of Hospital Signaling Devices. Switches may be operated either magnetically or by pull cord.

Calls may be registered at as many points as may be desired, but *can be cancelled only at the bedside of the patient.*

These devices are listed and fully described in separate bulletins.

The dependability of Bryant Hospital Signaling Devices is evidenced by the fact that there are now more than 40,000 stations in successful operation in more than 700 hospitals.

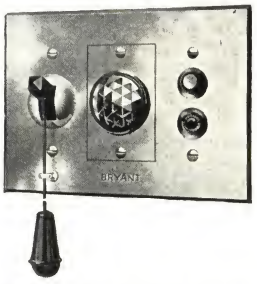
The Bryant name is, in itself, a guarantee of quality, but the popularity of this equipment is augmented by the fact that the devices operate on standard voltage, eliminating the necessity of installing transformers or other auxiliary apparatus. This reduces both first cost and maintenance expense, and, what is most important, increases the reliability of the service.

A few Hospital Devices are illustrated on this page, but, for complete information, write our nearest office for bulletins.

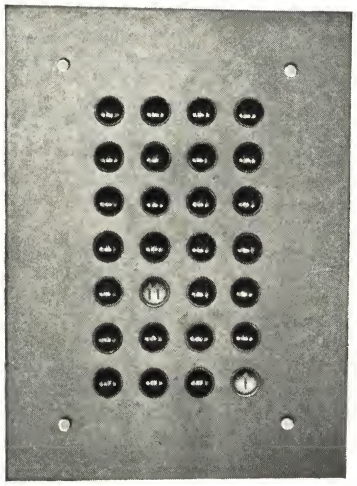
In addition, our engineering department will be glad to co-operate with you in drawing up your specifications.

Dome Signal Light

Calling Station



Combination Calling Station, Bullseye and Switch



Twenty-eight Station Annunciator

Combination Calling Station, Bullseye, Doctor's Emergency Switch and Duplex Receptacle

CONNECTICUT TELEPHONE & ELECTRIC CORPORATION

Hospital Signaling and Telephone Systems

MERIDEN, CONN.

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COMPLETE SYSTEMS MADE BY CONNECTICUT

Low Voltage Nurses' Call System
Pull Cord Toggle Switch System
Telephone and Annunciator Systems for Nurses' Homes
High Voltage Night Light System
Doctors' and Staff "In and Out" System
Door and Ambulance Signaling System
Doctors' Paging Systems
Interior Telephone Systems for Hospitals
Combined Nurses' Call and Emergency Telephone System
Combined Nurses' Call and Telephone System
Apartment House Telephone Systems
Intercommunicating Telephone Systems

A List of Installations in Some of the Foremost Hospitals in the Country Furnished on Request.

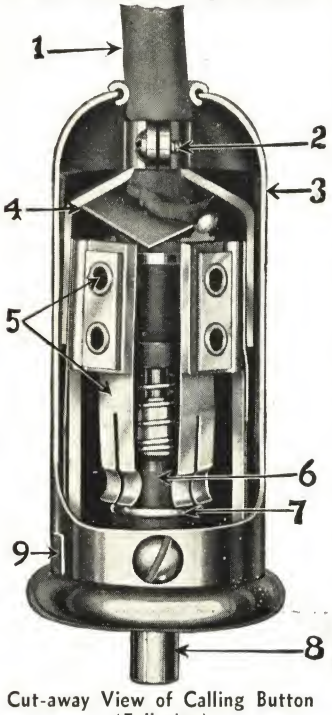
LOW VOLTAGE AUTOMATIC NURSES' CALL SYSTEM

For 12 Volts A-c. or D-c.

Automatic Calling Button

The calling button is the heart of the System—as it is from this point that all calls emanate.

The button is foolproof, withstands severe usage and practically eliminates replacements due to breakage. This assures positive operation at all times. It is equipped with cord and five point plug, which form a unit that is detachable for use at any calling station.



Cut-away View of Calling Button (Full size)

1. Tyrex Rubber cable
2. Improved Clamp for fastening cable
3. Heavy gauge brass shell, chromium plated, fibre insulated
4. All-metal mounting frame
5. Contact springs riveted to frame
6. Bakelite plunger body
7. Solid brass contact ring
8. Chromium plated plunger
9. Finger or key release

When the patient presses the plunger of the button, it mechanically closes a circuit switch and the call is flashed automatically to bedside pilot of ward stations, corridor lamp, duty stations and master annunciator. The flashing on all lamps may be made intermittent at the button to attract attention. The button also operates a buzzer when desired.

When a call has been made and the lamps lighted, they can only be extinguished and the call cancelled at the bedside by the nurse. This is accomplished by the nurse operating either a finger or key release located on the button. Both types of release are foolproof—the patient being unable to operate the finger release by accident, and if the key which operates the key release is lost, a small dull instrument may be used. Should the plug be accidentally pulled out of the receptacle, all lights on system are at once lighted as in case of regular call.

The mechanical operation of this calling button eliminates the need of relays, magnetic switches, solenoids, or other similar devices, thus reducing the cost of installation and maintenance.

Calling Station Equipment

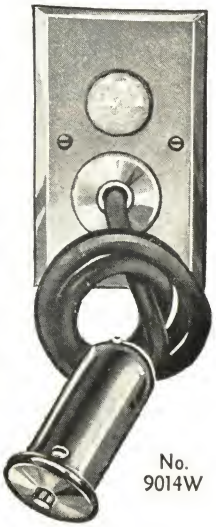
Includes all equipment usually installed in the wall, at the bedside or at any other point to which it may be necessary or desirable to summon a nurse or doctor in case of emergency. The unit comprising the previously described push button, cord and plug is a detachable part of many of these stations.

Receptacles are made of moulded bakelite for 4 or 5-way plugs. Contact springs of bronze insure perfect contact and long life—there is nothing to come loose and cause trouble.

A special feature is the double plate, consisting of sub-mounting plate and a finished plate. The sub-plate permits the installation of complete equipment, including making all connections, before the final finish is put on the walls. This protects the mechanism and wiring from damage during the finishing of the walls, after which the finishing plate is installed.

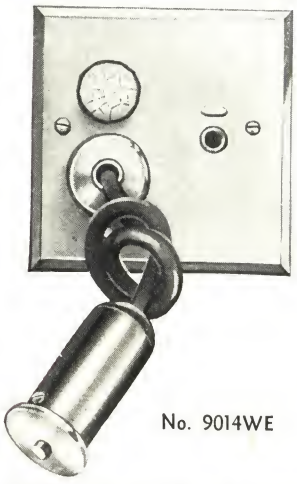
Nurses' Calling Stations—***No. 9010W Private Room Calling Station***—The simplest type, consisting only of a receptacle for the plug connected to the calling button. Intended for use in private and semi-private (2-bed) rooms. May be used in wards if no bed pilot lamps are required. Fits any standard 1-gang switch box or outlet box cover; extreme depth, 1⅜ in.

No. 9014W Ward Calling Station with Bull's-eye Signal—Similar to No. 9010W with the addition of a bull's-eye signal above the receptacle. This signal indicates at once to the nurses entering the ward, which bed is calling. The bull's-eye is removable for easy replacement of lamps. Lamp socket is equipped with tension spring to prevent lamp jarring loose. Fits any standard 1-gang switch box or outlet box cover; extreme depth, 1⅝ in.



No. 9014W

Emergency Calling Stations—For use wherever the maximum in service is desired. Should the nurse answering a call find the patient in critical condition, these stations enable her to send in a call for the doctor and additional nurses without leaving the bedside or delaying such emergency measures that she may be able to take before the arrival of the doctor.



No. 9014WE

The equipment is the same as the stations previously described with the addition of an emergency button mounted on the wall plate. This button operates a system of green lights distinctive from the white lights of the Nurses' Call, and starts the ringing of emergency bells in the doctors' rooms, nurses' rooms, etc. The bells continue ringing until the button is reset at the bedside.

No. 9010WE Private Room Station with Emergency Call—Similar to No. 9010W but with emergency button.

No. 9014WE Ward Station with Emergency Call—Similar to No. 9014W but with emergency button.

Calling Stations with Service Light—When calls are answered at night, these stations provide sufficient light for the nurse to attend the ordinary wants of the patient, without brilliantly illuminating the entire room or ward. The hood of the service lamp may be rotated to throw the rays to the point desired.

No. 9059W Ward Calling Station with Service Light—Similar to No. 9014W with addition of a service lamp with hood and toggle switch.

No. 9059WC Ward Calling Station with Service Light and Extension Cord Jack—Similar to No. 9059W, but fitted with extension cord jack receptacle for service light.

No. 9059WE Ward Calling Station with Service Light and Emergency Call—Similar to No. 9059W with the addition of the emergency button.

No. 9059WEC Ward Calling Station with Service Light, Emergency Call and Extension Cord Jack—Similar to No. 9059W with the addition of an extension cord jack receptacle for service light.

No. 9060W Extension Lamp—For use with No. 9059WC and No. 9059WEC calling stations. Equipped with plug, 6-ft. rubber cord and 12-volt lamp enclosed in chromium plated brass shell with clear lens.

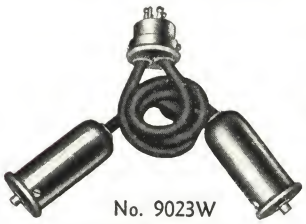
Calling Stations for Special Locations—***No. 9038 Contageous Room and Ward Station***—Operated by pulling cord which lights lamps and sounds buzzers. Signals reset by trigger on plate. Furnished with or without bull's-eye.

No. 9020W Wall Calling Station for Bathrooms, Toilets, Operating Rooms, etc.—Operated by push button. Reset by trigger.

No. 9039W Operating Room Calling Station—For foot or elbow operation. Pressure on lever operates station until reset by reverse operation.

No. 9018W Weatherproof Calling Station for Solariums, Balconies, Porches and Exposed Locations—The equipment and functions are same as No. 9010W. Hinged cap on plate keeps out moisture when not in use. Cord 15 ft. long.

Extra Equipment—It is always advisable to have on hand extra equipment in case of accident or emergency.



No. 9023W

No. 9022W Single Cord—For use with Nos. 9010W and 9014W.

No. 9023W Double Cord—For stations serving two adjoining beds.

No. 9024W Single Weatherproof Cord—For use with No. 9018W.

No. 9057W Blank Plug—Prevents signals from a calling station when the regular plug is removed. A number of these are furnished with each system.

No. 9060W Extension Lamp for Throat Examination—For use with Nos. 9059WC and 9059WEC.

Extension Lamp Receptacles—For this feature on any calling station, add letter "C" to style number.

Corridor Lamp Stations

Generally used in the corridor above the doors to private rooms and wards to locate the patient calling. Often used in corridors of large hospitals at the end of branch corridors to indicate whether call is to the right or left. Also used for emergency calls and at Duty Quarters as a central pilot station with from one to four lamps. It is therefore considered one of the most important signals in the system.

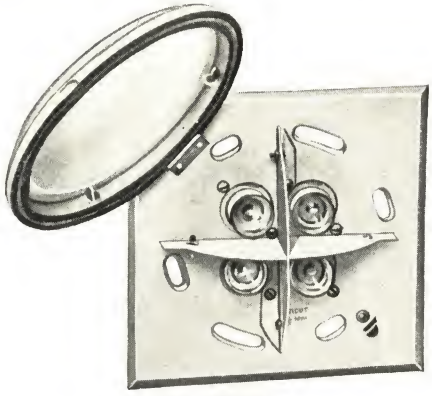
To overcome the possibility of the station being out of service due to the burning out of a single lamp, two lamps wired in multiple are recommended as a safeguard. These are arranged on opposite sides of a barrier so that only one half the dome will be lighted if one lamp burns out. Double barriers are for emergency service with clear lamps on one side and green on the other. Domes are fitted for one, two, three or four lamp outlets, and with single or double barrier or without barrier depending on circuit and service requirements.

No. 9025W—Two lamps, single barrier.

No. 9025WE—Four lamps, double barrier.

No. 9026W—Add suffix 1, 2, 3 or 4 to indicate number of lamps, no barrier.

No. 9035W Corridor Exposed Lamp Station—Consists of exposed frosted bulb in standard size switch plate. May also be supplied for two bulbs.



No. 9025WE
View with hinged dome raised showing double barrier feature

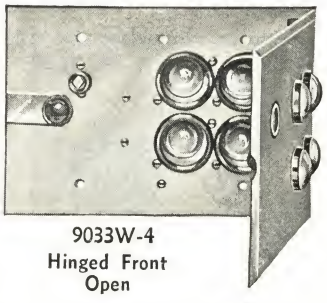
Buzzer Station

No. 9032W Flush Buzzer Station—Equipped with silencing switch for use where it is desirable to have buzzer independent of pilot station or annunciator.

Duty Stations

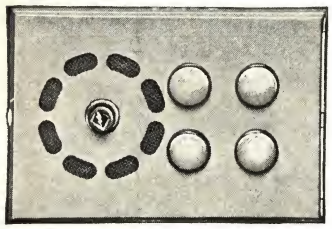
These stations are for use in duty rooms, diet kitchens, utility rooms, etc., to indicate a group of private rooms, wards or sections, or any combination of them.

No. 9033W Bull's-eye Indicating Duty Station—Equipped with low-tone buzzer and silencing switch. Letter or numeral is engraved on the inner surface of each opal lens and is readily discernible even when viewed from the side. Furnished for 2, 4, 6, or 8 lamps; larger units are built to order.



9033W-4
Hinged Front Open

No. 9028W Dome Type Duty Station—For use where a common signal is desired and identification signals are not required. Consists of an opalescent glass dome held by means of a cast frame to a hinged front plate. Beneath this single dome are from one to four lamps, each lamp operating on a respective sectional wire. Buzzer and cut-off switch provided for audible signal.



No. 9031WE

No. 9031WE Bull's-eye Duty Station With Emergency Call—Similar to No. 9033W with the addition of a permanently connected bell behind screen openings. Used only on systems equipped with the emergency call feature. Furnished with 1, 2, 3 or 4 lamps.

No. 9034WE Emergency Bell and Buzzer Station—Similar to No. 9031WE except for the lamps. The nurse on hearing the buzzer or bell must go to the corridor or duty room to ascertain the source of the call.

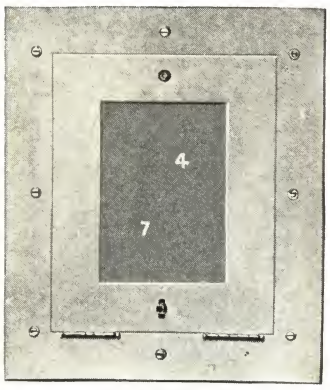
Supervisory Equipment

This equipment includes lamp annunciators for head nurses' and superintendents' office and elapsed time recorders. In every complete system such means of supervision is essential.

No. 9029W Flush Type Lamp Annunciator—Equipped with lamps covering from 10 to 50 stations. When a lamp lights, a letter or number becomes illuminated on the glass front. Each lamp is shielded to prevent cross lighting of adjacent numbers. A buzzer mounted inside the case sounds momentarily when a lamp lights. The buzzer may be cut out of service when desired.

No.9009W Surface Type Lamp Annunciator—Operates same as No. 9029W but has hardwood case in which the glass front is mounted.

No. 9030W Elapsed Time Recorder—Automatically records every call and the time each is made and answered.



No. 9029W

Additional Nurses' Call Equipment

Equipment additional to that previously described is also available—heavy duty type transformers, motors, generators, batteries, charging panels and extra gang plates for stations. In connection with the latter, all stations can be arranged for duplex receptacles, radio and telephone, or other special service.

NURSES' CALL EQUIPMENT FOR PSYCHOPATHIC HOSPITALS

For 12 Volts A-C. or D-C.

Equipment for an entire Nurses' Call System for Psychopathic Hospitals is available for low voltage operation. This equipment contains all the foolproof and constantly reliable features necessary for such an emergency system. For information covering this equipment, send for bulletin.

THE PULL CORD TOGGLE SWITCH SYSTEM

For 110 Volts or 12, 18 or 24 Volts A-C. or D-C.

This system consists of complete equipment for nurses' calling stations, corridor lamp stations, duty room and diet kitchen stations and supervisory annunciators. The performance of this system, as well as the circuit and method of operating the mechanism, is identical with that accomplished by the automatic locking button with the exception of the method of operation. With the toggle switch system, the patient pulls a cord which is attached directly to the handle of the switch of the calling station.

Nurse's Calling Stations—*No. 9130W Private Room Calling Station with Momentary Buzzer*—Buzzer contact may be disconnected with key.

No. 9130WE Private Room Calling Station with Continuous Bell Emergency Call—Extra toggle switch operates emergency call.

No. 9140W Bath or Toilet Station—Equipped with short cord and momentary buzzer.

No. 9130W

No. 9131W Ward Calling Station with Bull's Eye Pilot—Also equipped with momentary buzzer.

No. 9131WE Ward Calling Station with Emergency Call—Similar to No. 9131W with extra toggle switch.

Corridor Lamp Stations—*No. 9133W*—Single dome.

No. 9132W—Exposed lamp.

No. 9141W—Double dome for emergency calls.

Duty Room and Diet Kitchen Stations—

No. 9136W Dome Type Duty Station—Equipped with buzzer.

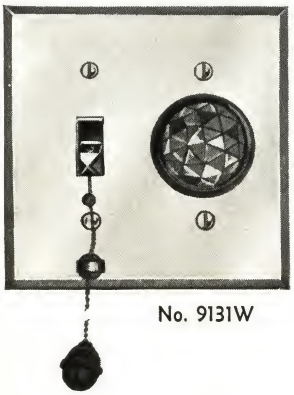
No. 9135W Bull's-eye Indicating Duty Station—Equipped with four lamps and buzzer.

No. 9137W Bull's-eye Duty Station with Emergency Call—Similar to No. 9135W with permanently connected bell.

No. 9134W Buzzer Station—Equipped with silencing switch.

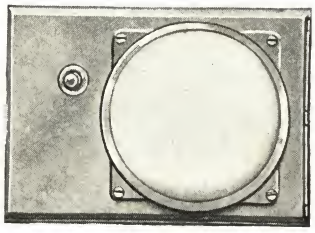
No. 9138W Emergency Bell and Buzzer Station—Similar to No. 9134W with addition of emergency bell.

Supervisory Annunciator—Same as No. 9029W shown at the top of this page except for high voltage operation.

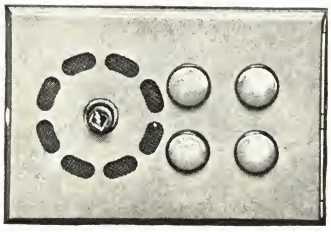


No. 9131W

No. 9133W



No. 9136W



No. 9137W

SIGNALING EQUIPMENT FOR NURSES' HOMES

Annunciator Telephone System

The equipment of this system is for use in Nurses' Homes and wings in hospitals for communication between the nurses' room and head nurse or attendant at the switch board. Annunciator can be equipped for intercommunication between outlying stations, group ringing either in sections or in whole, for general assembly or for emergency service. A special code of rings may be arranged for this signal.

System No. 30—Calls are made either from annunciator to room or vice versa by ringing buttons at either points.

No. 7500W Type T Telephone Annunciator—Consists of individual jacks, target type drops and operator's set. May be equipped with cross connecting cords for intercommunication between rooms.

No. 600W Connectophone for Nurses' Rooms—Equipped with built-in mouthpiece, watchcase receiver, concealed bell, enclosed hook switch mechanism and single push button.

No. 7500W

No. 600W

Return Call Annunciator Systems

These systems are for signaling only, either by buzzer or buzzer and lamp.

System No. 97—Operator presses button on annunciator which sounds buzzer in nurses' room. Nurse acknowledges presence by button which indicates on annunciator and then goes to floor phone for instructions.

No. 7400W Type R Annunciator—Consists of individual calling buttons and target type drops. May be furnished for individual reset, group calling in sections or in whole for general assembly or emergency.

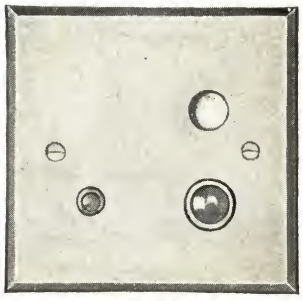
No. 305W Flush Type Return Call Station—Consists of concealed buzzer and answering button on flush wall plate.

System No. 98—Operates similar to System No. 97 but also indicates call on room station by visual target signal in case nurse is absent. Upon hearing or seeing the call, the nurse resets the drop and follows same course as in System No. 97.

No. 7400W Type R Annunciator—Same as described above under System No. 97.

No. 304W Flush Type Return Call Station with Indicator—Consists of concealed buzzer, answering button and reset button for target type drop, all on flush wall plate.

No. 305W



No. 304W

CONNECTICUT NIGHT LIGHTS

Designed to operate on 110 volts to provide subdued illumination in corridors, wards, private rooms or wherever a guide light is required for service at night. When used near beds, they are installed at the same height as the calling station. When used in the corridor, they are located about 18 in. from the floor.

Dome Type

No. 9049W Dome Night Light—For corridors, wards, private rooms and guide lights. Similar in appearance to corridor lamp station except upper half of glass dome is covered with metal hood, confining light to required level. Equipped with 10-watt lamp.

No. 9075W Roto Night Light—For bedside use. Similar to No. 9049W, but is designed so that metal hood can be rotated so as to throw the light right or left to the position desired. Furnished wih toggle switch or chain pull switch if desired. Equipped with 10-watt lamp.

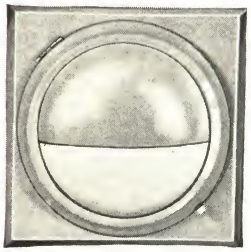
Louvred Type

No. 9074W, Vertical Type—Indicates direction and affords sufficient illumination for moving about without lighting up the whole corridor or room. Usually placed 18 to 24 in. above the floor, flush with wall. Consists of a louvred front plate with louvres at an angle so that light is directed to floor. Equipped with 15-watt lamp.

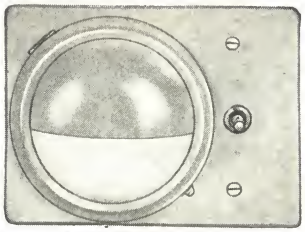
No. 9080W, Horizontal Type—Similar to No. 9074W but for horizontal mounting.

No. 9091W, Horizontal Type—Designed for corridor or room lighting and affords sufficient illumination for moving about when regular lights are not lit. White enameled louvres are mounted behind flush glass panel, reflecting light at proper angle. Suitable for 15 or 25-watt lamps. Lamps not included.

No. 9092W, Horizontal Type—Similar to No. 9091W but much larger. Particularly adapted for corridor lighting. Suitable for lamps from 15 to 60 watts.

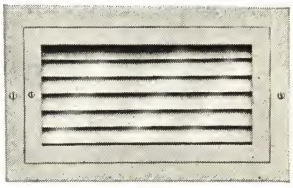


No. 9049W



No. 9075W

No. 9074W



No. 9091W

DOCTORS' AND STAFF "IN AND OUT"—ALSO AMBULANCE SIGNALING SYSTEM

Flush Type Indirect Lighted Annunciators

No. 9062W Master Annunciator—Upon entering the building the doctor throws a toggle switch "on," illuminating his name compartment and thereby registering "in." On leaving the building the switch is thrown "off," extinguishing the light. These switches also operate secondary annunciators.

No. 9063W Secondary Annunciator—Similar to No. 9062W but without toggle switches. Records operation of No. 9062W for telephone operator or others.

No. 9084W Master Annunciator for Doctors' Recall Service — Similar to No. 9062W but equipped with recall lamp at each name to notify doctor to get in touch with telephone operator.

No. 9081W Secondary Annunciator for Doctors' Recall Service — Similar to No. 9063W but equipped with a switch beside each name to permit telephone operator to light the recall lamp in No. 9084W.

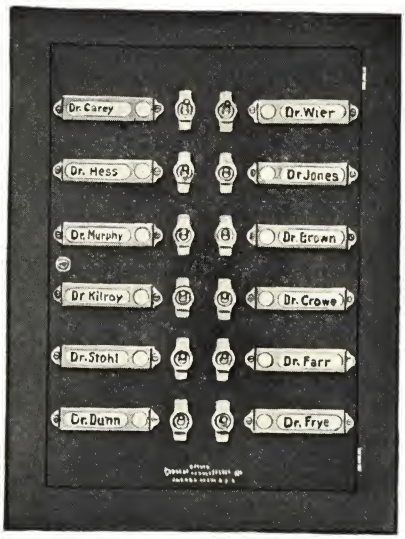
No. 9062W-12

Nurses' or Maids' Location System

A nurse or maid, upon entering a room, operates toggle switch No. 9085W which lights pilot No. 9086W in corridor and indicates the room number on annunciator No. 9029W located at supervisor's or matron's station.

Keyboards for Doctors' "In and Out" System

Located at entrance other than main entrance. Doctors or staff operate toggle switches which light or extinguish corresponding lamps on the keyboard and master and secondary annunciators.



No. 9067W

No. 9067W—Flush type keyboard.

No. 9066W — Surface type keyboard.

No. 9082W—Flush type keyboard similar to No. 9067W but with extra pilot lamp for doctors' recall service.

No. 9083W — Surface type keyboard similar to No. 9066W but with extra pilot lamp for doctors' recall service.

Door and Ambulance Signaling System

Efficient means of signaling from front door and ambulance entrance to attendant after doors have been locked at night.

No. 7002W Push Button—Solid bronze and weatherproof.

No. 9033W—A Bull's-eye Indicating Station—Used at both information desk and orderly's room. Push button at entrance sounds buzzer and lights bull's-eye signal, indicating source of call. Signals remain lighted until reset at annunciator.

DOCTORS' PAGING SYSTEMS—WITH SILENT AND AUDIBLE CALL

System No. 90 for Large Hospitals

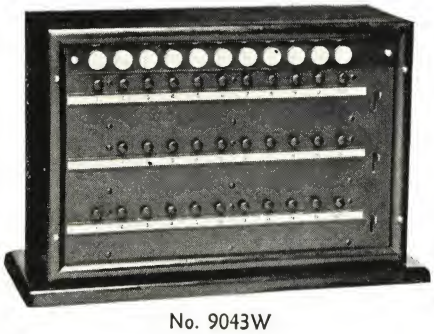
Consists of a code selector, contactor unit and as many annunciators as may be required. Three calls may be set up simultaneously by the operator at the selector and flashed alternately on each annunciator.

No. 9043W Code Selector—Illustration shows three rows of buttons which permit the making of three simultaneous calls. A special button at the end of top row starts the motor to flash the call. Switch at right of each row cancels the call. Switch in lower corner controls audible signal, a momentary buzz.

Annunciators—175 calls are possible, using one, two or three digits. Lamps are placed in compartments which prevent light shining through adjacent numbers. Audible signals may be cut off or adjusted for volume at any annunciator.

No. 9045W—Double face for wall mounting.
No. 9045WC—Double face for ceiling suspension.
No. 9064W—Double face for pipe suspension.
No. 9048W—Single face for flush wall mounting.
No. 9056W—Double face for corner mounting.
No. 9047W—Single face for surface wall mounting.
No. 9046W—Double face for partition mounting.

No. 9044W Contactor Unit—Controls operation of the system.

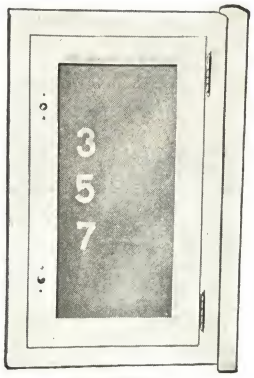


No. 9043W

System No. 91 for Small Hospitals

A modification of System No. 90 permitting but one call at a time. No contactor unit is required.

No. 9070W Flush Type Selector Keyboard—Each number has toggle switch which is thrown according to code. Starting switch lights lamps.



No. 9045W

No. 9045W Annunciators—Same as used in System No. 90.

System No. 92 for Individual Calls

Used where it is necessary to call a number of doctors or members of staff simultaneously for conferences, operations, etc.

No. 9076W Flush Type Keyboard—Contains corresponding toggle switches, number-plates and bull's-eye lamps.

No. 9077W Annunciator—Similar to previous annunciators but with one lamp for each call.

System No. 93 for Audible Calls

Used wherever not more than 30 codes are required, where musical tone of chimes is not objectionable, and where expense is an important item. Operates direct from 110-volt a-c. circuit.

No. 9078W Code Transmitting Machine—The operator sets a code dial on front and presses plunger down which sounds call on all signals three times. Call may be repeated by again pressing plunger.

No. 9079W Transformer—Supplies current from service wires. Signals controlled by heavy duty relay.

Bell and Chime Signals—*No. 9058W*—Soft tone bell.
No. 9056W—Mellow tone bell.
No. 9040W—Flush type sounder.
No. 9042W—Surface type sounder.
No. 9061W—Chime signal.

System No. 94 for Manual Calls

Simplest and least expensive, similar to System No. 93 except that code is transmitted by standard telegraph key, No. 9041W. All other equipment same as System No. 93.

INTERIOR TELEPHONE SYSTEMS FOR HOSPITALS

Instruments described in these systems may be located at convenient points, in the corridors, at head nurses' desk, telephone switchboard, superintendent's office, nurses' home, and other important locations. Any hospital having a special service requirement may consult our Engineering Department, which will be glad to furnish complete data.

No. 600W

Diet Kitchen System 12 A-O

For service between main and diet kitchens. A common talking, selective ringing system which permits the main kitchen to selectivity call each diet kitchen. Diet kitchen phones have one button for calling main kitchen. Communication between diet kitchens is possible only through main kitchen.

Main Kitchen Equipment—*No. 5400W Flush Phone*—Consists of brass plate with required number of calling buttons and card holders, double gong bell, standard transmitter and watchcase receiver.

***No. 620W Surface Type Phone*—**Similar in equipment to No. 5400W but with long type receiver. Furnished in metal case.

Diet Kitchen Equipment—*No. 600W Connectaphone*—Equipped with built-in mouthpiece, watchcase receiver, concealed bell, enclosed hook switch mechanism, single push button and bakelite case.

No. 6000W

House System

For service between main office or head nurse's station and various floors, the above system and equipment is applicable, but a standard desk or cradle phone is suggested for the center phone.

No. 5210W Desk Phone—Furnished with standard transmitter and receiver, buttons in base engraved from 1 up and directory card holders mounted on pedestal.

No. 6000W Cradle Phone—Buttons are mounted in base. Supplied in 4, 6 and 8-button sizes.

COMBINED NURSES' CALL AND EMERGENCY TELEPHONE SYSTEM

This common talking system is an auxiliary to the regular Nurses' Call System, using the same wiring with the addition of one extra common wire looped to all bedside stations. This service is possible by means of the fifth contact on the station which is an exclusive feature with Connecticut and supplied on all wall stations.

Used for emergency service, usually at night when there are but few nurses on duty, and enables assistance to be called without leaving patient.

No. 2500W Desk Phone—For nurses' station. Furnished with standard transmitter and receiver and push button for calling.

No. 6000W Cradle Phone—May be used instead of desk type.

No. 649W Portable Aluminum Hand Phone—For calling only. Equipped with calling button in handle.

No. 648W Portable Aluminum Hand Phone—Similar to No. 649W, but equipped with buzzer, permitting nurses' station to call back.

COMBINED NURSES' CALL AND TELEPHONE SYSTEM

A non-interfering system that combines both visual and audible service between the patient and duty station. Bedside equipment consists of the regular wall station with cord and locking type button with extra receptacle for telephone plug, and a separate cabinet type, loud speaking telephone which is mounted on bedside table or bracket. Hand phone may be substituted to prevent conversion disturbing patients.

Patient signals nurse at her station by pressing button which operates corridor door lamp, master telephone signal, annunciator, pilot and section lamps and buzzers. Nurse plugs in and talks with patient. Voice is clearly heard and patient need make no special effort or change of position to talk. Nurse disconnects plug at close of conversation. Signals are cancelled at bedside.

No. 8000W Portable Bedside Station—Contains sensitive transmitter and receiver and signaling button. May be built into table or supplied with mounting brackets.

No. 648W-T Portable Aluminum Hand Phone—Equipped with locking type switch and "Press to Talk" button in handle.

No. 8001W Portable Master Station—Consists of cabinet with jack for each room, operators' plug, soft tone buzzer with cut-out switch, pilot lamp and No. 2500W or No. 6000W phone.

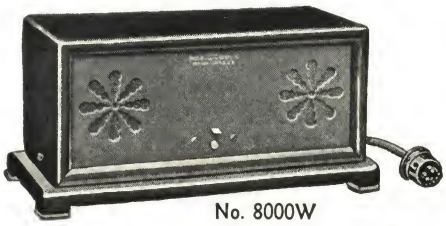
No. 9010W-T Private Room Wall Station—Same as shown on page 1, but with extra telephone jack.

No. 9014W-T Ward Station—Same as shown on Page 1 but with extra telephone jack.

No. 9025W-T Corridor Lamp—Same as shown on Page 2 with one amber light for telephone signal and one white light for nurses' call.

No. 9033W-T Duty Station—Same as shown on Page 2 but with amber lamp for telephone signal.

No. 9029W Annunciator—Same as shown on Page 3.



No. 8000W

No. 9014W-T

APARTMENT HOUSE TELEPHONE SYSTEMS WITHOUT SWITCHBOARD SERVICE

In many classes of apartment houses, the service required is for communication between vestibule, suites, janitor and tradesmen, and for the operation of door openers at entrances.

Vestibule telephones are of the armored cord, swivel arm and cordless types and are furnished separately or grouped with mail boxes.

Suite telephones are furnished in artistically designed bakelite or steel cases of the surface or flush types.

Where attendant service is required in main halls to announce callers, notify tenants when car is waiting and furnish communication between apartments, it is necessary to have a switchboard or annunciator with an operator.

This company will directly, or through sales engineers, cooperate with architects and engineers to determine the most practical installation to meet requirements. They will furnish without cost, specifications, layouts and estimates based on conditions and covering the installation of any service within the scope of manufacture.

Vestibule Telephones

Common Talking Equipment

No. 84W Armored Receiver, Cord Type—Designed to prevent theft of receivers. Cord encased in flexible brass tubing. Cap is reinforced to prevent breakage. Consists of plate with calling buttons, card holders and built-in transmitter with mouthpiece.

No. 87W Swivel Arm Type—Meets similar requirements as No. 84W in that receiver is attached to swivel arm. Raising arm automatically cuts in talking battery.

No. 86W Cordless Type—Eliminates theft of receivers and cords, also possible bending and breaking of switch hooks. Flush plate contains card holders, buttons and combination transmitter and receiver.

No. 87W-12

Non-interfering Equipment

No. 85W Armored Receiver, Cord Type—Similar to No. 84W but equipped with automatic switch for non-interfering service. This permits the use of any combination of stations at the same time.

One and Two Family House Equipment

No. 70W Cord Type Phone—With flush transmitter.

No. 77W Cordless Type Phone—Similar to No. 86W.

No. 71W Mail Box—For use with No. 70W phone.

No. 72W Mail Box—Equipped with speaking tube and button.

No. 73W Mail Box—Equipped with push button only.

Vestibule Mail Boxes and Telephone Equipment

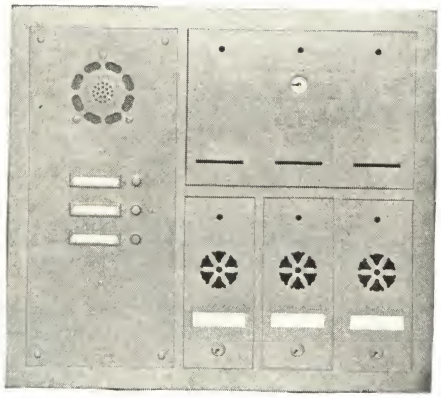
Connecticut Mail Boxes are approved by the U. S. Post Office Department and are furnished in gangs of 3, 4, 5, 6, 7 and 8 units. Master door opens to horizontal position. Lower or tenants' doors are perforated to disclose mail and give plenty of clearance when open. Provided with cylinder locks, telegram and calling card slot.

Combined Mail Boxes and Telephones

No. 686W-3-3—Consists of a No. 86W-3 Cordless Type Telephone built in with three mail boxes Style 6. Telephone occupies the space of two boxes. Nos. 84W, 85W and 87W telephones may also be combined with mail boxes.

Additional button capacities and gangs of mail boxes may be supplied upon specifications.

Government Mail Boxes Only—Government approved mail boxes can be supplied without vestibule telephones but with push button and mouthpiece as required. The boxes are available in units as described above.



No. 686W-3-3

Suite Telephones

Connectaphone Types

No. 600W Connectaphone—Designed to harmonize with any style of modern architecture. Equipped with built-in mouthpiece, watchcase receiver, concealed bell, enclosed hook switch mechanism and one to three push buttons.

No. 600WL Connectaphone with Pilot Lamp—Similar to No. 600W with the addition of a lamp with bull's-eye jewel. Lamp illuminates only when door opener button is depressed and vestibule door is opened.

Surface Wall Type

No. 41W—Consists of metal hinged case, standard transmitter, long receiver, double gong bell and one button for door opener or calling janitor.

Janitors' and Tradesmens' Equipment

Janitors' Equipment

No. 7000W Type D Telephone Annunciator—A surface wall instrument containing call button for each suite, annunciator drops, transmitter, receiver, and buttons for resetting drops and operating door opener.

No. 7100W Type J Telephone Annunciator—Similar to 7000W except that calls are made and received through cord and plug.

For Non-interfering Service

No. 7500W Type T Telephone Annunciator—Consists of drop and jack for each suite phone with provision for communication between suites.

No. 332W Janitors' Telephone—Common talking, selective ringing. Consists of button for each suite and door opener.

No. 333W Janitors' Telephone—Similar to No. 332W for flush mounting.

Tradesmens' Telephones

No. 330W—Similar to No. 332W, without bells, for calling any suite or janitor from dumbwaiter or rear entrance.

No. 331W—Similar to No. 330W for flush mounting.

No. 3502W—Selective talking, selective ringing, without bells and for use on non-interfering systems.

No. 3504W—Similar to No. 3502W for flush mounting.

INTERCOMMUNICATING TELEPHONE SYSTEMS

Complete Systems Are Made for Apartments, Residences, Schools, Banks, Hospitals, Industrial Plants, Offices and Theatres

Switchboard Equipment

No. 9350W Floor Type Switchboard—With common battery lamp signals. Equipped with double supervisory signals, operators' set, night alarm, ringing and listening keys.

If desk type switchboard is desired, specify No. 9450W; if wall type, No. 9550W.

Types J and T Annunciators, shown on the previous page, are used with the above switchboards.

Station Telephone Equipment

The following equipment is for use where no switchboard is necessary. Designed for either common talking, selective ringing (No. 6008W to No. 62W) or selective talking, selective ringing (No. 3501W to No. 4003W).

No. 6008W—Cradle set furnished with bakelite hand phone.

Felt covered base contains 4, 6 or 8 buttons for selective ringing.

No. 620W—Surface wall telephone with standard transmitter and receiver.

No. 627W—Same as No. 620W with watch case receiver.

No. 5200W—Desk telephone with buzzer and terminal button block.

No. 5220W—Desk telephone with combination button pad and terminal box with concealed buzzer.

No. 5210W—Desk telephone with buttons in base of stand, directory cards on pedestal, and buzzer and terminal block connected to base.

No. 5270W—Aluminum hand microphone with hanger connected to terminal block. Operates with "Press to Talk" button.

No. 5400W—Flush telephone with standard transmitter, watch case receiver and double gong bell.

No. 6250W—Flush telephone with aluminum hand microphone, concealed buzzer and "Press to Talk" button.

No. 6270W—Surface type similar to No. 6250W.

No. 62W—Surface wall telephone equipped with standard transmitter and receiver. Is made up only in 5 button size.

No. 3501W—Surface wall telephone with standard transmitter and receiver.

No. 3503W—Similar to No. 3501W but for metallic circuit.

No. 5601W—Similar to No. 3501W but with "foreign type" hand microphone.

No. 5603W—Similar to No. 5601W but for metallic circuit.

No. 9350W

No. 3801W—Desk telephone with button box attached.

No. 3803W—Similar to No. 3801W but for metallic circuit.

No. 4101W—Aluminum hand microphone and button box with "Press to Talk" button.

No. 4103W—Similar to No. 4101W but for metallic circuit.

No. 4601W—Combination button box and cradle phone with the latter mounted on the former.

No. 4603W—Similar to No. 4601W but for metallic circuit.

No. 5901W—Flush telephone with standard transmitter, watch case receiver and double-gong bell.

No. 5903W—Similar to No. 5901W but for metallic circuit.

No. 6008W-8

No. 62W

No. 4201W—Flush telephone with "foreign type" hand microphone and concealed buzzer.

No. 4203W—Similar to No. 4201W but for metallic circuit.

No. 4001W—Similar to No. 4201W but with standard desk phone and concealed buzzer.

No. 4003W—Similar to No. 4001W but for metallic circuit.

Dial Telephones for Intercommunicating Systems

A New Telephone That Eliminates Central Control Equipment

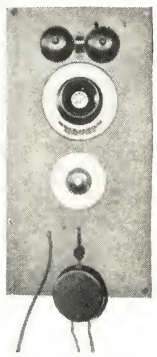
This group of dial phones has been developed to meet the demand for a compact, up-to-date, intercommunicating system that would take care of installations up to 20 stations. By means of a new circuit, expensive central control equipment has been eliminated, and selective calling and selective talking is permitted without interference.

Each phone is arranged with movable dial which may be turned so that the indicator representing the station desired is in line with the arrow engraved on the dial base. The call is then made by pressing button in center of dial knob.

It is not necessary to turn dial back to "home" in order to receive incoming calls. System operates from standard batteries or eliminator. Dial is furnished with 8, 12, 16 or 20 indications.

No. 6901W Flush Type

Heavy gage brass front plate equipped as illustrated. Finished in dull satin black. Front plate, 12x6¼ ins.; steel outlet box 4⅝ ins. deep.



No. 6901W

No. 2501W Desk Type

Dial is mounted in base and fitted with standard type transmitter, receiver and terminal block.

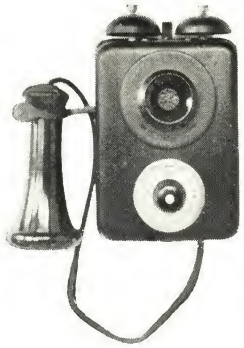
No. 6010W Cradle Type

Standard design, commercial type cradle phone with dial mounted on base. Terminal block, with all necessary connections and buzzer attached by 6-ft. flexible cord.

No. 6010W

No. 42W Surface Type

Heavy gage steel case has dial mounted on front, double-gong bell and standard transmitter and receiver. All terminals for outgoing wires are mounted on hinged back for convenience in installing. Backs are drilled for mounting on single gang box or cover. Finished in dull satin black.



No. 42W

EDWARDS AND COMPANY, INC.

Electrical Signaling Apparatus

140th and Exterior Streets, NEW YORK, N. Y.

ATLANTA, GA. CHICAGO, ILL. DENVER, COLO. MINNEAPOLIS, MINN. ST. LOUIS, MO.
BALTIMORE, MD. CLEVELAND, OHIO DETROIT, MICH. NEW ORLEANS, LA. SAN FRANCISCO, CAL.
BOSTON, MASS. DALLAS, TEX. LOS ANGELES, CAL. PHILADELPHIA, PA. SEATTLE, WASH.
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EXPORT DEPARTMENT—77 Warren Street, NEW YORK, N. Y.

Products

ELECTRIC SIGNALING SYSTEMS, which include:

Annunciators, Bells, Buzzers, Push Buttons, Door Openers, Transformers, Fire Alarm Systems, Hold-up Alarm Systems, Burglar Alarm Systems, Calling Systems and all Visible and Audible Electric Signals, Standpipe Alarm Systems, Sprinkler Alarm Systems, Hospital Signaling Systems, Telephone Systems.

1872 EDWARDS

TRADE-MARK

Detailed Descriptions

Believing the architect is assisted best by clear, concise information, all superfluous descriptive matter is omitted from this and following pages.

Detailed bulletins will be furnished on request.

The sixty years' experience and reputation of this Company is positive assurance of the utmost quality, efficiency and guarantee.

FIRE ALARM SYSTEMS

General

All systems described below are listed as standard by the Fire Underwriters, which is positive assurance of highest protective value. Fire alarm systems are only 50% efficient if they do not locate the fire by coded alarms. This is almost an essential in schools, hospitals, etc., where those in authority must know the fire location to avoid panics. The Underwriters list none but closed circuit systems. Stations should be located at natural paths of exit (stairs, not elevators), at least two per floor. Gongs must be sufficient in size and number to be heard from any location. Lighting circuits, alternating or direct current, are used as source of energy. If the district is such that lighting circuit is not dependable, storage battery is used.

Systems

Coded Closed Circuit Systems

For Industrial Plants, Apartments, Schools, etc.—This type gives maximum protection since the complete system is supervised by a small, continuous flow of current at all times. Any interruptions due to failure of the system current supply, grounds, or line breakage causes a trouble bell of distinctive tone (usually a cow gong as shown on opposite page) to ring continuously. Code type stations are used and operation of any station causes single stroke bells to sound a general coded alarm of fire, giving location of station operated.

The most common practice is to operate the system directly from the lighting circuit but battery operated systems can be provided. Battery operated systems use electro-mechanical bells to reduce the current consumption. Statistics over the past few years have shown that there is less trouble and less chance of failure with systems operated from the lighting circuit than with battery operated systems. The batteries must be watched and cared for by some thoroughly competent person. Charging apparatus must be provided.

Systems—*E. M. B.* for battery operation.
Systems—*S.S.* for operation on 110-volt, d-c.
Systems—*S.S.A.* for operation on 110-volt, a-c.

Pre-Signal Coded Closed Circuit Systems

For Hospitals, Hotels, Institutions, etc.—A pre-signal fire alarm system is one in which two separate operating and wiring systems are combined as one having the same stations, alarm bells and control panel common to both. It is recommended for use where it is not advisable to sound a general alarm of fire until an investigation has been made and such action is deemed necessary. This system is designed for use only where a sufficient number of building employees are available to respond promptly to a pre-signal alarm at all times.

Any person may turn in an alarm from any station. The operation of a station causes the code number of that station only to sound four times on those bells which comprise the pre-signal or first group. These bells are located in emergency elevator shafts, the chief engineer's office, building officials' office, etc. As each station is coded differently the source of the alarm is clearly designated. The fire must be investigated immediately and, if it is serious, a general alarm can be turned in from any station by an authorized person possessing a key. The key is inserted in a station, turned to the position marked "Gen. Alarm" and the station operates in the usual way which causes a general coded alarm to sound on all bells including both the pre-signal alarm and the general alarm groups. As many "Gen. Alarm" keys as necessary are furnished by the manufacturer.

The entire system, including stations, bells, control panel and wiring, is supervised at all times by a very small continuous flow of current. Any interruption due to failure of the system current supply, ground or line breakage, causes a trouble bell of distinctive tone (usually a cow gong as shown on opposite page) to ring continuously.

Double Supervision may be provided for on both Coded Closed Circuit Systems and Pre-signal Coded Closed Circuit Systems. When double supervision is specified, two trouble bells are furnished operating from separate sources of current. Failure of current supply for the first trouble bell causes the second trouble bell to operate from the main source of current that operates the station's boxes and gongs.

Connection of local systems to the city system is not generally recommended by fire alarm authorities, but can be provided for, if required, by the addition of contacts on one of the control panel relays. Additional binding posts are supplied for connection to the auxiliarized station so that the operation of any local station automatically operates the city station.

Systems—*P.E.M.B.* for battery operation.
Systems—*P.S.S.* for operation on 110-volt, d-c.
Systems—*P.S.S.A.* for operation on 110-volt, a-c.

Standpipe Fire Line Signal and Telephone Systems

As required under the provisions of Rules Number 49 and 53, Standpipe Line Fire Rules of the Board of Standards and Appeals of the City of New York.

A bulletin illustrating and describing approved Edwards Fire Line Signal and Telephone Equipment necessary for installation in all new buildings erected in the City of New York requiring variable speed control of fire pump motors will be sent you immediately upon request.

Open Circuit System

For use in Small Factories, Office Buildings and wherever protection is required at minimum expense—

This system consists of simple break glass stations and standard vibrating bells. Various types of bells are adaptable to fire alarm systems, the choice depending on the type and quality of bell desired and the operating current to be used.

If open circuit systems, the operation of a station causes the bell to sound continuously until the system is turned off, and thereby gives a general alarm of fire only. These systems must be tested regularly. A fire alarm annunciator may be used to show the location of the station operated; but if this feature is desired, the closed circuit coded alarm system is much more efficient and very little higher in price when the cost of the annunciator and necessary wiring for it is considered.

Systems—***V.O.B.*** for battery operation; ***V.O.T.*** for transformer operation; ***V.O.D.*** for operation on 110-volt, d-c; ***V.O.A.*** for operation on 110-volt, a-c.

Apparatus

Coded Signal Stations

The mechanical movement is simple in design; gear wheels are cut, not stamped. Separable conduit attachment. Code signal sounded four times at each operation. When lever is released it automatically disengages so that successive pulling cannot interfere with proper operation. No winding necessary. Cover of box provided with spring hinges. Silent or bell tests may be made using key supplied with station.

Standard finish: Red enamel with raised aluminum tipped letters.

No. 1275 or 1275DO

No. 1276 or 1276DO

No. 1275-2 or 1275-2DO

No. 1276-2 or 1276-2DO

For General Alarm—No. 1275 for surface conduit; No. 1276 for concealed conduit. No. 1275-2 and No. 1276-2 same as No. 1275 and No. 1276 respectively only of the break glass, open door and pull lever type.

For Pre-Signal Alarm—No. 1275DO; No. 1275-2DO and No. 1276DO; No. 1726-2DO. Same as corresponding number of general alarm stations only that pre-signal alarm is sounded four times at predetermined places only by first operation. After investigation of the pre-signal alarm, a general alarm can be sounded by inserting key, turning to position marked "Gen. Alarm" and pulling lever. As many "Gen. Alarm" keys as are necessary are furnished.

No. 2240

Non-Code Signal Stations

Made in a variety of styles and types depending upon the requirements of the system and service intended. No. 2240 shown at the left is for concealed conduit mounting; made for 110-volt, alternating current, direct current or battery operated systems. Standard finish, red enamel.

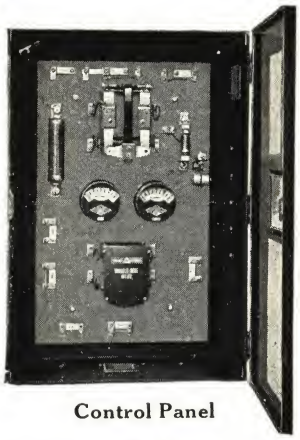
Control Panels

All instruments, connections, etc., mounted on a panel of suitable insulating material which is enclosed in heavy steel cabinet of sufficient size to allow easy wiring. Door is secured with lock and has glass panel for observation of meters. Trouble bells is standard equipment. Knockouts provided on two sides and bottom of case for conduit. Standard control panels are 60 cycles. Can be made for any frequency.

Type S.S. or P.S.S. Control Panel—For operation directly from d-c lighting service mains.

Type S.S.A. or P.S.S.A. Control Panel—For operation directly from a-c lighting service mains.

Type E.M.B. Control Panel—For operation on primary battery.



Control Panel

Bells

Alarm Bells—For transmission of coded signals. Solenoid single stroke. Entire mechanism is under the gong. For surface conduit a separable box having knockouts on all sides is supplied. The same box can be installed flush and the bell mounted on an extension cover provided for that purpose.

No. 23F—d-c type for S.S. system or P.S.S. system.

No. 24F—a-c type for S.S.A. system or P.S.S.A. system.

Electro mechanical type. Operated by strong spring mechanism which is released by small flow of current. Mechanism will permit 500 blows per single winding.

No. 1331 Conduit type for EMB and PEMB Systems. Made in sizes with 6, 8, 10 and 12-inch gongs.

Trouble Bell—Weather, bug and dustproof. Has conduit attachment. Patented plunger type movement and carbon contacts. A reliable, rugged bell for alarm service. Finish is red enamel with gong of gun metal.

No. 1001T—For S.S. or S.S.A. systems, P.S.S. or P.S.S.A. systems.

No. 1001T Trouble Bell

No. 23F (d-c)
No. 24F (a-c)

Code Ringing Bell for Battery Systems

No. 1331, conduit type. Sizes, 6, 8, 10, 12 in.

TELEPHONE SYSTEMS

Apartment House Systems

For communication between entrance, vestibule, apartments, janitor, tradesmen, etc. Vestibule telephones can be furnished built into mail box group or for mounting apart from mail boxes.

Vestibule telephone units can be equipped with concealed cordless loud speaking receivers or armored cord watchcase receivers. Standard finishes: satin, brass or black.

Apartment telephones are furnished in steel cases with enclosed bells in surface or flush mounting types.

Standard finish: dull black.

Janitors' telephones can be furnished with or without annunciator drops to register calls from vestibule or apartments.

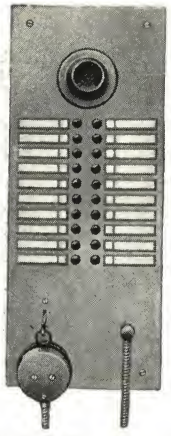
Types of Service

Three general types of service are available in apartment house systems as follows:

(1) Common Talking—For buildings where there is a single street entrance and the vestibule and all apartment telephones are connected to a common talking circuit.

(2) Sectional Talking—For buildings having two or more street entrances or where a group of buildings have a central janitor service. Each entrance vestibule telephone, with its associated apartment and tradesmen's telephones, are connected to common talking circuits, so that a conversation from one vestibule to one of its associated apartments will not interfere with a conversation simultaneously taking place from another vestibule to one of its associated apartments. The janitor may communicate with all vestibules and apartments.

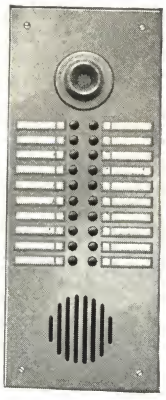
(3) Selective Talking—Used generally where an attendant is maintained to operate a telephone switchboard, through which intercommunication is established between all apartment or other substation telephones.



No. 321. Telephone and Call Button Vestibule Unit with Armored Cord Receiver

No. 396. Mail Box and Telephone Combination with Cordless Loudspeaking Receiver

No. 397. Mail Box and Telephone Combination with Armored Cord and Watchcase Receiver can be furnished



No. 322. Telephone and Call Button Vestibule Unit with Cordless Loudspeaking Receiver

No. 3322 or 3352

No. 3322 or 3353; No. 3332 or 3362; No. 3342 or 3372—Apartment telephones, wall mounting types. Furnished in surface and flush mounting types having well proportioned steel cases, hinged doors, raised metal mouthpiece, raised center call buttons, enclosed adjustable bells and bakelite terminal strips. The complete interior assembly is mounted on a sub-plate which is readily removable from the case for inspection and test, without dismounting the set from the wall. All units, including switchhook, bell, receiver and transmitter, completely insulated from the case.

Standard finish: dull black.

3322, 3332 and 3342—For systems using armored cord vestibule telephones.

3352, 3362 and 3372—For systems using cordless loud speaking vestibule equipment.

No. 3562 or 3582; No. 3572 or 3592—Desk mounting types. Base of the stands are equipped with raised center buttons and 6-ft. flexible cord leading to a surface mounting wall box containing the bell and terminal strip.

Standard finish: dull black.

3562 and 3572—For systems with armored cord vestibule telephone.

3582 and 3592—For systems using cordless loud speaking vestibule equipment.

No. 3451 or 3452—Surface wall type telephone for tradesmen's calling service. For installation at dumbwaiters, rear entrances, etc.

Standard finish: dull black.

3451—For systems with armored cord vestibule telephone.

3452—For systems with cordless loud speaking vestibule equipment.

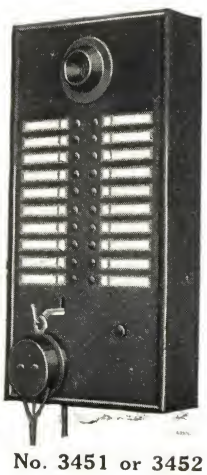
Write for Edwards' Apartment Telephone Systems Catalog No. 200 for additional service and wiring information, or call our nearest branch office.

No. 3332 or 3362

No. 3342 or 3372

No. 3572 or 3592

No. 3562 or 3582



No. 3451 or 3452

Intercommunicating Systems

For Factories, Hotels, Hospitals, Institutions, Residences, Clubs, etc.

No. 3601

System No. 4—*Selective Ringing, Common Talking*—For use where conversations between stations may be limited to one at a time. Pressing the button opposite the name of the station desired rings that station only.

Telephones can be surface or flush wall mounting type, or desk stand type with buttons in base.

System No. 5—*Selective Ringing, Selective Talking*—For use where several conversations may take place simultaneously. Operation similar to system No. 4 above.

Number of buttons	Catalogue numbers				
	Surface wall type	Flush wall type	Pedestal desk type	Cradle desk type	Handset type
4	360–4	3601–4	362–4	365–4	364–4
8	360–8	3601–8	362–8	365–8	364–8
12	360–12	3601–12			364–12

No. 360

No. 365

No. 362

No. 364

Central Station and Private Exchange Switchboard Systems

Central Station Systems 6A and 6B—*Common Talking*—Each is a system of central and outlying telephones particularly adapted for use in schools, banks, hotels, etc., where the majority of conversations emanate from a central station.

The central, or master station, can selectively call any of the outlying stations. Outlying stations can call the master station only. When desired, the outlying stations may talk to each other by first calling the central station. The latter will then call the station desired. Only one conversation may be held on the system at a time. System 6B is equipped with an annunciator to register calls when central is unattended. System 6A is not equipped with an annunciator.

No. 3890 Central Station Annunciator System No. 6C

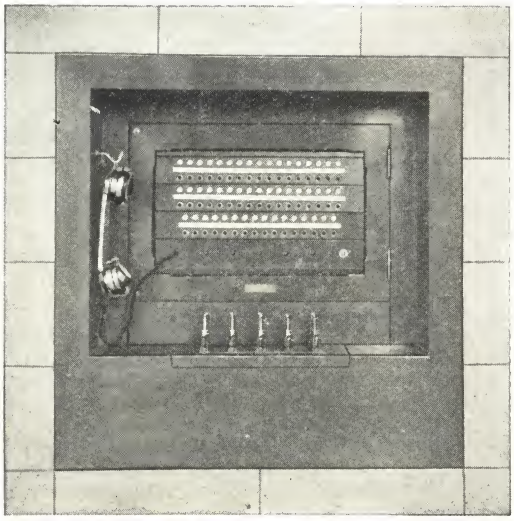
Master Annunciator Telephone System No. 6C—This system comprises a combination central telephone annunciator, usually located in the office or entrance hall, and outlying station telephones in apartments, guest rooms and similar locations. The annunciator is equipped with an electrically reset signal and line jack for each outlying station, a single operator's answering and calling cord and plug and ringing button.

Calls to outlying stations are made by inserting the plug in the line jack of the desired station and pressing the ringing button. Calls from outlying stations to the annunciator are made by pressing a button on the outlying station telephone which signals the operator by operation of the associated drop on the annunciator and the sounding of a buzzer. The signal drop remains visible until restored by means of a reset button. Annunciators are furnished in capacities ranging from 16 to 100 stations.

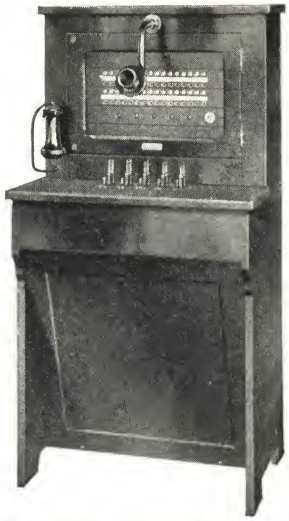
Private Exchange System No. 50—*Selective Ringing, Selective Talking*—A complete private exchange telephone system providing intercommunication between any number of outlying station telephones through a lamp signal switchboard. Switchboards furnished in various types in capacities ranging from 20 to 200 lines.

Write for Edwards Telephone System Catalogue No. 200 Additional information or call our nearest branch office.

No. 3853. Desk Mounting Type System No. 50



No. 3851. Flush Wall Type System No. 50



No. 3852. Floor Mounting Type System No. 50

HOSPITAL SIGNALING SYSTEMS

General

The selection, makeup and arrangements of hospital signaling systems and equipment is a complex problem. Every hospital has characteristics peculiar to itself. An arrangement of equipment which may be suitable for one institution will fall far short of requirements in another.

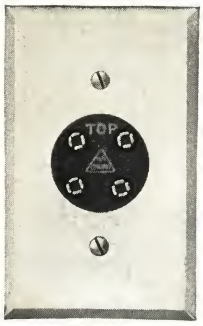
Our experienced engineering department is at the service of architects, engineers or those desiring assistance, in the selection of units, arrangement or wiring diagrams best suited to any particular condition.

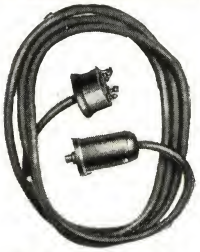
Systems and Equipment

Edwards Systems comprising complete equipment embrace: nurses' call; doctors' paging; doctors' "in and out"; maids' or nurses' location; door bell and ambulance entrance; telephones; nurses' home return call; watchman's time detector; fire alarm and tank alarm.

All Edwards devices are designed to give *positive* and efficient service, are thoroughly tested before leaving the factory, are designed for simplest possible installation and are unconditionally guaranteed.

Nurses' Call Equipment

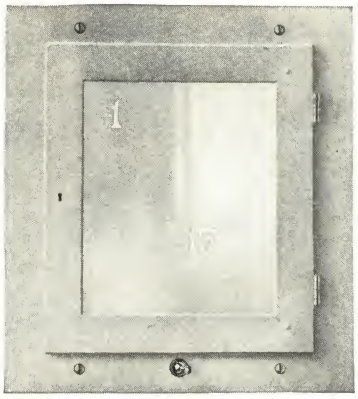




No. 7001. Calling Station, Single Cord Serves One Bed

Private Rooms Only—Pressing patient's button lights lamp over door in corridor, also lights lamp and momentarily sounds buzzer in duty and supervisory stations as desired. Nurse resets call at bedside, extinguishing all signals controlled by that station.

Emergency Feature—With this addition a nurse may summon assistance by pressing an emergency locking button at calling station, which lights red lamp over room door in corridor, lights red lamp and rings bell in duty and supervisory stations as desired. Call is reset at calling station in room calling.

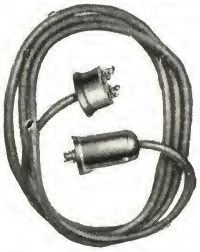


No. 7041. Nurses' Supervisory Annunciator

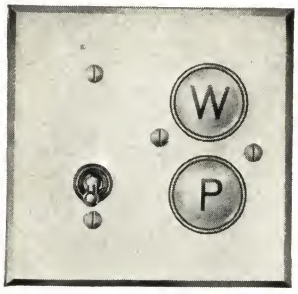
Private Rooms and Wards—Combines private room and ward calling stations within one system. Pressing patient's button in a ward lights ward lamp, lights lamp over door in corridor, lights lamp and momentarily sounds buzzer in duty and supervisory stations as desired. Call is reset at patient's bedside, cuts out all signals controlled by that station if no other call has been sent in from that ward.

Private room station is same operation as for private rooms only.

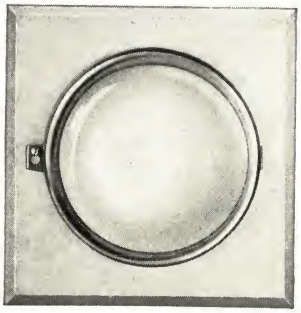
Emergency Feature—Same as for private rooms only.



No. 7011. Ward Calling Station, Single Cord Serves One Bed



No. 7035. Bullseye Type Lamp and Buzzer Station with Switch

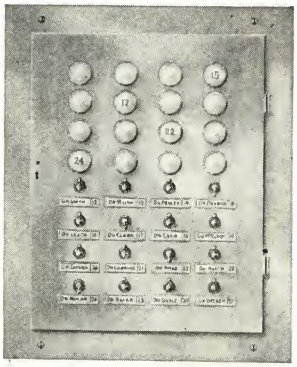


No. 7031. Dome Corridor Station

No. 7091. Adjustable, Double, Metal Dome Type Night Light

No. 7311 (Single Cord), No. 7312 (Double Cord) Ward Calling Station

Doctors' Paging Equipment



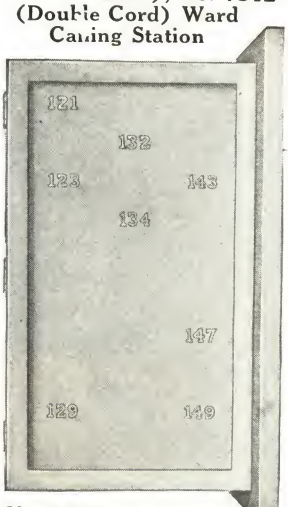
No. 7173. Selector Keyboard with Pilot Lamps. Flush Mounting with Hinged Door

Flashing, Lamp Type, 3-Circuit—Telephone operator pages doctor by setting up a code on a selector board. Code flashes on all 10-lamp annunciators in the system. Doctor responds by nearest telephone. Three doctors may be paged at the same time, thus making this the ideal system for large hospitals.

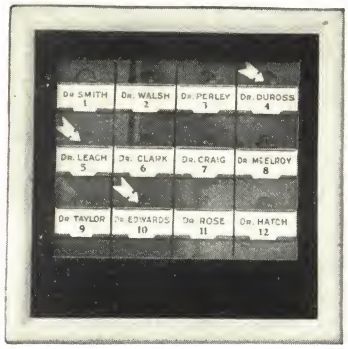
Number of codes possible—120. System operates on 110 volts, d-c. or a-c.

Non-flashing, Lamp Type, 1-Circuit—Telephone operator pages doctor by setting up code on keyboard which lights lamp in all annunciators, no flasher supplied. Only one code can be shown at a time; 10-lamp annunciators are used. Doctor responds by nearest telephone. Number of codes possible—120. System operates on 110-volt a-c. or d-c.

Non-flashing, Individual Lamp Type—Operator pages doctor by operating switch on keyboard, thus lighting individual lamp. System non-flashing. System operates on 110-volt d-c. or a-c.



No. 7165. Individual Code, Double Face, Wall Mounting Annunciator

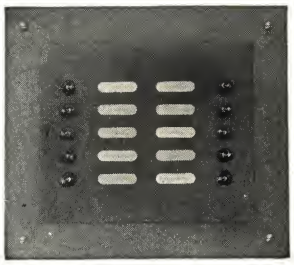


No. 7403. Electric Reset "In" and "Out" Annunciator
Located in telephone operator's office

Doctors' "In" and "Out" Equipment

Push-Button — Annunciator Type — Doctor registers himself "in" by pressing "In" button on push button-plate at entrance or cloak room. "In" signal registers on annunciator in telephone operator's office (see No. 7403). Doctor registers "out" by pressing "Out" button on button-plate at entrance or cloak room. "Out" signal resets annunciator. Low voltage operation. Multiple button boards or annunciators may be used.

Lamp Annunciator Type—Service the same as annunciator type above, except using indirect lamp type master annunciator with key switches and recessed card holders at entrance or cloak room (see No. 7460) and lamp type sub-annunciator with recessed card holders at telephone switchboard. Capacity as required. Low voltage operation. Specify finish of annunciators desired.



No. 7460. Flush "In" and "Out" Master Annunciator with Recessed Lamps and Switches
Located at main entrance or cloak room

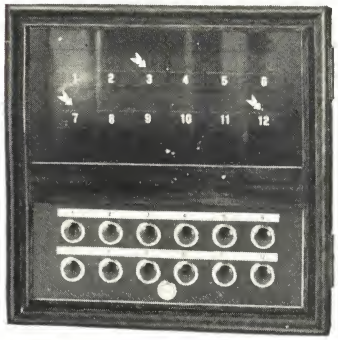
Nurses' Home Return Call Equipment

An efficient means of signaling between the main desk and the nurses' rooms. Attendant at main desk, by pressing room button on return call annunciator (see No. 415), sounds a buzzer in nurses' room station (see No. 137). Call is acknowledged by pressing buttom in room station which indicates on annunciator. Room stations may be provided with visual signal indicating call from office during nurses' absence.

Maids' or Nurses' Location Equipment

This system is designed to permit the supervisor to see at a glance, by means of visual signals, in which room or rooms, a nurse or maid is in attendance.

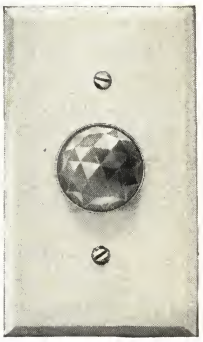
A nurse upon entering a room operates a swich (see No. 7305) which lights a lamp station located just outside the door in the corridor (see No. 7036). The system is generally so arranged that an additional signal is transmitted to a centrally located annunciator.



No. 415. Electric Reset, Return Call Annunciator

No. 137. Flush Type Room Station

No. 7305. Wall Toggle Switch



No. 7036. Room Location Station

Edwards Tank Sentinel

A closed circuit supervised audible and visible alarm for use in connection with gravity or pressure type water supply tanks. Operates directly on alternating or direct-current lighting service mains.

Equipment—Control Panel, Alarm Bell, Trouble Bell, Gravity Tank Switch and Ball Float, and Pressure Tank Gauge and Switch.

Operation—When supervisory current is flowing in the system and the water level in the tank is at its normal height, three designating relays on the Control Panel are energized and the control switch thrown to the "low" or normal position. Should the water in the tank reach the "low" level, the tank switch operates opening the circuit to the *low* relay which becomes de-energized and exposes the designation *low*. This also closes a circuit lighting a red lamp and ringing the trouble bell which continues to sound until the control switch is thrown to the up or "high" position. Red lamp and relay designation continue to indicate that the tank is "low" until pump is started and water reaches the normal level when the lamp is extinguished and the *low* relay restored. Relay indications marked *high* and *tank trouble* operate similarly to indicate any deviation from normal conditions in the system.

Standpipe Alarm Control Panel

Intercommunicating Telephone System

Edwards Intercommunicating Telephone System No. 6A described on the second preceding page is particularly adapted for hospital service between the main and diet kitchens, supervisor's and nurse's stations, etc.

Fire Alarm Systems

The Pre-signal type described on our first page has been designed to meet conditions peculiar to hospitals where it is essential to allow for a prelminary alarm at certain places and permitting investigation by the operating staff before a general alarm is given.

"Modern Hospital Signaling," Bulletin No. 16

We believe this is the most usable, the most valuable and the most complete bulletin in the entire field of hospital signaling.

Favorable comment from architects who are using "Modern Hospital Signaling" assure us of the usefulness of the information it contains. Edwards' fifty-nine years experience in the manufacture of electric signaling devices guarantees the quality of each device to be the best. If every device is Edwards' the entire system is guaranteed. For anyone engaged in planning a hospital this bulletin will be an invaluable aid in choosing an efficient signaling system.

GENERAL KONTROLAR COMPANY, INC.

TELECHIME DIVISION

200 East First Street, DAYTON, OHIO

WESTERN REPRESENTATIVES

LOS ANGELES, CALIF., Otto K. Olesen Illuminating Co., 1560 No. Vine Street

SALT LAKE CITY, UTAH, Intermountain Electric Co., 69 East 4th South Street

NEW YORK REPRESENTATIVE: Telechime Sales Company of New York

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Telechime

Product

TELECHIME for residences, apartments, churches, schools, banks, hospitals, clubs, lodges, executive offices, institutions, etc., representing a new era in Signal Systems by replacing discordant bell and buzzer systems with harmonious electric chimes of unsurpassed tonal beauty.

Experience

Telechime is a product of the Research Laboratories of the GENERAL KONTROLAR COMPANY, INC.—world-famed for its inventive skill and rigid principles of craftsmanship in the manufacture of precision-built electrical instruments.

Service to Architects

The Engineering Service Division of the GENERAL KONTROLAR COMPANY, INC., is maintained to serve the architect, contractor and home owner in the selection and installation of the various Telechime models. Write for file size catalogue and specifications. A. I. A. File No. 31-i-13.

Telechime Advantages

(1) The Aristocrat model combines in one central unit a door chime, a dinner chime, and a code calling system. Musical keyboard and a specially composed book of Telechime melodies furnish morning and evening calls, dinner chimes, vesper calls, and serve as a splendid family entertainment.

(2) Push buttons may be placed wherever desired and individually connected with each chime, sounding a repetition of one or more notes for a code paging system. For the main door a new and different Westminster refrain is played for each new caller, furnishing a harmonious variety of chime melodies that never grow stale.

(3) Ingenious electrical interlock (one of the many patented Telechime features) prevents interference between front door and other call stations.

(4) Repeated operation of the push button cannot interfere with the stately rhythm of the chime refrain.

(5) Beautifully carved bakelite walnut-grained chime cabinet covers all unsightly tube supports—another exclusive, patented Telechime feature.

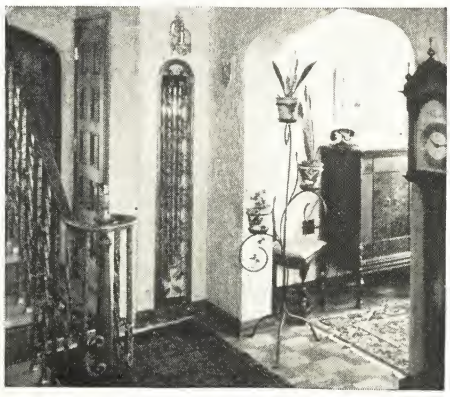
(6) Unit cabinet construction eliminates all wiring between controller and electric chime actions—a great saver in installation cost, another patented Telechime feature.

(7) Full length chime tubes of a specially fine bell metal, and tuned to an exact musical note by tuning experts employing a master tuning device and electrical tuning means, guarantee an unsurpassed beauty of tonal quality. Telechime tubes for the lowest note are 58 in. long and 1¼ in. in diameter, sounding deep, mellow cathedral chime notes impossible with shorter tubes or smaller diameter.

(8) Installation is simplicity itself—only one duplex cord of No. 18 bell wire is required from the transformer and the push button to the Telechime. All operation is on only 16 volts, alternating current, obtained through the signal transformer furnished with each Telechime from the 110-volt house current. Operates on 60 or 50 cycles.

(9) The Telechime mechanism is a triumph of precision manufacture—ample reserve power is furnished by the General Kontrolar antifriction ball bearing motor of the induction disk type, instead of a small clock motor. There is no troublesome oil to congeal, nothing to get out of order, and nothing to service. Motor is designed for 16-volt a-c. operation—eliminating 110 volts from low voltage controller.

(10) Telechime electric hammer action is unique in that its patented action insures clear, undampened tones even though the circuit is still closed, making the hammer stroke independent from the timing of the electrical contacts. Only gears cut from heavy brass, polished and plated, are used instead of stampings. Instead of a plate



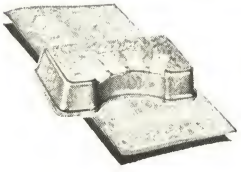
Above:

The Aristocrat Model, Class 400

This model, with its variety of different melodies, its electrical interlock, its remote electrical control keyboard, its instantaneous electrical release, its beautifully carved wall cabinet, and its beautiful cathedral true-tone chimes, is a triumph of precision electrical manufacturing

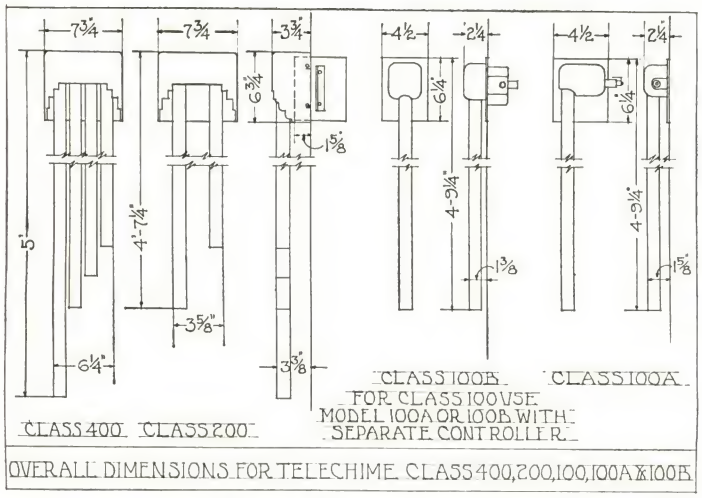
Left:

De Luxe Recessed Telechime Installation with Hand-finished Bronze or Aluminum Grille

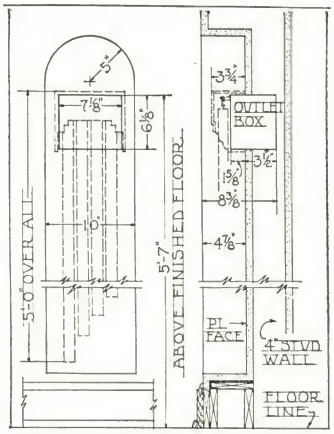


Telechime Music Book

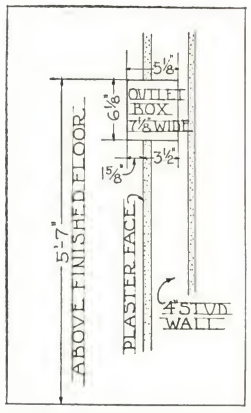
This book of specially composed Telechime music and the musical keyboard of exclusive design are supplied with each Class 400 Aristocrat Model, providing a remote control method of playing and signaling with the instrument



OVERALL DIMENSIONS FOR TELECHIME CLASS 400, 200, 100, 100A & 100B



ARISTOCRAT OR DUO-CALL IN RECESS WITH OR WITHOUT GRILLE



FOR ARISTOCRAT & DUO-CALL MOUNT BOX WITH EXACTLY 1⅝" PROJ FROM FINISHED PL. FACE

studded with large number of brass contacts, timing steel, insuring quick break, cams are used which are milled to an exact degree and hardened, while contacts are made of platinum-iridium—the finest contact metal procurable. All parts are rustproofed by udyliting and wire brushed for pleasing appearance.

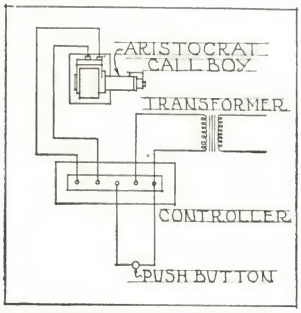
Specifications

Furnish and install, at location where shown on drawing, one complete Telechime Electrical Chiming System, Class (number of class to be inserted). The above Telechime to be connected to the push buttons and the heavy-duty signal transformer as specified. Telechime to be installed in strict accordance with the manufacturer's printed instructions. Under the above specifications the following equipment is included:

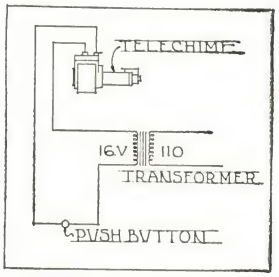
The Aristocrat, Class 400

Function—Serves as a residential door chime, dinner chime, code call, musical entertainment, and is ideal for church altar service. Plays a new and different Westminster melody for each new caller, repeating itself only once in 7 times. Musical keyboard and book of Telechime melodies furnish electric remote controlled dinner chime, musical entertainment, and church altar service. Auxiliary contacts make each chime independently available for code calling system and church ceremonies. *Electrical interlock prevents signal interference.*

Equipment—Complete Telechime instrument, carved bakelite walnut-grained wall cabinet with four chromium plated chime tubes, heavy-duty 110-16 volt signal transformer, musical keyboard, book of specially composed Telechime melodies, five-prong wall receptacle with plug and a 5-ft. 5-wire silk covered cable for attaching musical keyboard in dining room.



REPEATER CLASS 100



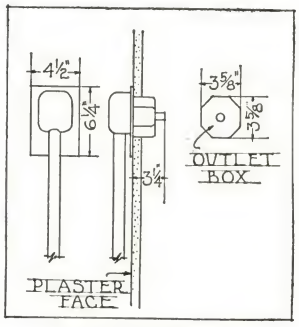
WIRING DIAGRAM FOR CLASS 100A & 100B CALL BOY

Complete Unit in One Cabinet

This makes wiring very simple, eliminating costly wiring between controller and electric hammers

Duo-Call Class 200

Function—As a door chime and an individual code calling system. Sounds four harmonious, deep-toned cathedral chime notes on two tubes in the following order: E♭-G-G-E♭. Auxiliary contacts available for each chime for code calling system. *Electrical interlock prevents signal interference.*



CLASS 100A MOUNT OUTLET BOX FLUSH WITH PL. FACE

Equipment — Complete Telechime instrument, carved bakelite walnut-grained wall cabinet with two chromium plated chime tubes and heavy duty signal transformer.

Repeater Class 100

Function—As a door chime, lodge chime, or code call. Especially useful for lodges. Can be furnished to sound any number of calls on one chime tube, as, for instance, 11 or 12 notes for lodges, etc. For residential use is furnished with four automatically repeated calls on one chime tube. Auxiliary contact available for individual call system. *Electrical interlock prevents signal interference.*

Equipment—Telechime, Class 100B. Consisting of one electric hammer action with volume control mounted on a bakelite plate, one aluminum cover with handsome finish, one full length chromium plated chime tube and complete Telechime instrument in separate cabinet with heavy duty signal transformer. Chime unit mounts flush against wall and requires no recess. Class 100A is used for recessed installations.

Call-Boy Class 100A and 100B

Function—Sounds single chime note every time push button is pressed. Used as auxiliary chime in large mansions or remote outbuildings or where an inexpensive door chime and individual code calling system is desired. Installed exactly like a bell. Either type available for Class 100, Repeater.

Equipment—Class 100B, flush wall mounting, as described under Repeater, minus the Telechime instrument. Class 100A similar to 100B, except for recess mounting.

Extra Equipment Available

Swedish hand-finished aluminum or bronze cast grille for recess of Aristocrat or Duo-Call can be furnished.

THE HOLTZER-CABOT ELECTRIC CO.

Manufacturers of Electric Signaling and Protective Systems

EXECUTIVE OFFICES AND FACTORY

125 Amory Street, BOSTON, MASS.

BRANCH OFFICES AND AGENCIES

*ATLANTA, GA., H. Douglas Stier, 101 Marietta St.
BALTIMORE, MD., 1410 Standard Oil Bldg.
CHICAGO, ILL., 6161 So. State St.
CINCINNATI, OHIO, 1133 Chamber of Commerce Bldg.
CLEVELAND, OHIO, 1836 Euclid Avenue
DETROIT, MICH., 509 Lincoln Bldg.
KANSAS CITY, MO., 301 Security Bldg.
*LOS ANGELES, CALIF., 1553 No. Commonwealth Ave.
*MINNEAPOLIS, MINN., L. H. Cooper, 442 Builders Exchange Bldg.
NEW YORK, N. Y., 101 Park Ave,
*OMAHA, NEB., D. H. Braymer, 923 W. O. W. Bldg.
PHILADELPHIA, PA., 900 Otis Bldg.
PITTSBURGH, PA., 508 American Bank Bldg.
ST. LOUIS, MO., 1529 Arcade Bldg.
SAN FRANCISCO, CAL., 939 Larkin St.
*SEATTLE, WASH., N. K. Staggs, 4618 Genesee Street
SYRACUSE, N. Y., 144 Winthrop Road
*MONTREAL, CANADA, Century Electric Co., 691 St. Paul St., West

***Agencies. All Other Offices Listed Are Strictly Company Maintained and Operated with Sales Engineers in Charge to Render Complete Engineering Service.**

The Company and Its Facilities

From a small beginning in 1875, the growth of The Holtzer-Cabot Electric Co. has been steady and solid.

Today the Holtzer-Cabot plant is a modern factory of about 150,000 sq. ft. of floor space, equipped with the latest machinery and equipment.

In the field of low voltage signaling systems, Holtzer-Cabot have long been pioneers.

Executive Offices and Factory

Products

The signaling systems described in these pages are some of the more standardized systems furnished. Due to the large number and great variety of systems manufactured it is impractical to include all of them. Many systems are of a special nature to meet special requirements.

For systems listed in the index and not described here, we will gladly furnish literature on request. For special systems not listed, drawings and specifications will be made up to meet any requirement.

Guarantee

We guarantee all materials and apparatus to be in strict accord with specification requirements, and free from all electrical and mechanical defects to the complete satisfaction of our clients.

We reserve the right to authorize and direct any charge for labor involved in the replacement of materials and unless so authorized by us, no charge will be accepted.

SYSTEMS USUALLY FURNISHED FOR VARIOUS TYPES OF BUILDINGS

BANKS—Hold-up Alarm, Fire Alarm, Watchman's Report, Telephone, Stenographer and Messenger Call, Emergency Lighting.

COLLEGES—Fire Alarm, Telephone, Laboratory Distribution, Emergency Lighting.

COURT HOUSES—Fire Alarm, Watchman's Report, Telephone.

HOSPITALS—Nurses' Call, Doctors' Paging, In-and-Out Register, Fire Alarm, Telephone, Emergency Lighting, Night Lights.

HOSPITALS FOR INSANE—Fire Alarm, Watchman's Report, Telephone and Night Lights.

HOTELS—Fire Alarm, Watchman's Report, Annunciator.

OFFICE BUILDINGS—Fire Alarm, Watchman's Report.

POLICE STATIONS—Fire Alarm and Telephone.

PRISONS—Fire Alarm, Watchman's Report, Prisoner's Cell Register.

RAILROAD STATIONS—Remote Control Train Announcing, Fire Alarm, Watchman's Report.

RESIDENCES—Telephone and Annunciator.

SCHOOLS (GRADE)—Fire Alarm, Telephone, Program Bells.

SCHOOLS (HIGH)—Fire Alarm, Telephone, Program Bells, Laboratory Distribution, Emergency Lighting.

STORES—Fire Alarm, Telephone, Executive's Paging, Watchman's Report.

NURSES' SILENT CALL SYSTEMS

The Holtzer-Cabot Nurses' Call System is the development of over fifty years of experience in manufacturing signal systems of various types for hospitals. Our first "silent call" or lamp signal system with locking button was installed in 1910 in Grace Hospital, Detroit, Mich. A patent was immediately applied for and granted in 1916. Its advantages over existing systems were so great that its adoption has been almost universal and since that time it has been installed in over 2000 hospitals throughout the country, including such representative institutions as the Boston City Hospital, Johns Hopkins of Baltimore; Kings County Hospital, Columbia University, Presbyterian Medical Center, New York Hospital, Cornell Medical Center, New York, N. Y.; Baylor University Hospital, Dallas, Texas; St. Vincent's Hospital, Los Angeles.

(Patients' Signal Telephone System can be combined with Locking Button System. See page 6)

LOW VOLTAGE SYSTEM

Experience gained through the installation of many systems has shown that the Low Voltage (12 volt) System is generally more satisfactory. The component parts of the system are described in the following pages. The combination of these parts into a complete system to suit the needs of any particular institution is almost unlimited.

Simple and Complete Operation

The system is set in operation by the patient. A slight pressure on the locking button, which lies on the bed and is connected to a wall station by means of a plug and cord, establishes contacts which light lamps in annunciators and various types of signaling stations installed throughout the hospital. These signals consist of units which can be assembled in different groups on gang plates to fill a wide variety of signaling requirements. Once the locking button is depressed, the signals set up are maintained until the nurse reaches the patient's bedside and resets the calling button. The signals cannot be restored in any other way.

The time elapsing between the patient's call and the nurse's arrival may be recorded on an elapsed time recorder which is designed for the purpose of providing a permanent record of the service given to every patient. On the paper chart included in this device is shown the exact time the call was made and the time required for the nurse to answer.

Holtzer-Cabot Improved Locking Button

This is the heart of the Holtzer-Cabot System. First manufactured in 1910, it has been constantly improved and strengthened and is today one of the simplest, most durable and most positive device of its kind. All contact springs have a current carrying capacity of 10 times the maximum load and are backed up by heavy brass stop plates, positively preventing any loss of spring tension. The plunger is operated by a separate piano wire spring. It does not depend on any action of the contact springs for its restoration. Resetting collar has a separate spring for restoring and does not depend on plunger spring.

The mechanism is assembled on a heavy bakelite moulding enclosed in a heavy bakelite shell. Plunger is of bakelite reinforced for its entire length. The button is practically unbreakable. Due to the fact that no riveted or permanently fastened parts are used, worn parts may be readily replaced, instead of buying a new button each time.

Allegheny General Hospital, Pittsburgh, Pa.
York & Sawyer, Architects, New York, N. Y.
Electrical work by Lord Electric Co.
Clyde R. Place, Construction Engineer

Note: The description of the component parts of this system is in the form of a specification, each paragraph illustrated by a cut of the device specified. By selecting those devices required for a particular system, architects and engineers will find this a most convenient method of compiling specifications for any type of system.

Paragraphs printed in italics cover devices to be used in systems where an emergency signal is to be provided in addition to the regular signals.

ARCHITECT'S SPECIFICATIONS

General—Furnish and install a Holtzer-Cabot Nurses' Call System as covered by these specifications, system to be wired and connected and left in first-class operating condition.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

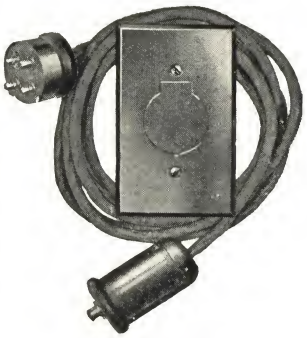
Operation—At each bed there shall be a station having a cord with a locking call button attached. A patient desiring a nurse shall press the locking call button, which shall cause a lamp signal to light at the following locations: over patient's room door, corridor side; in the annunciator at nurses' desk, in duty room and in diet kitchen. (In addition stations in public wards shall light a bull's-eye in wall plate behind patient's bed.) At the same time there shall sound momentarily a buzzer in the annunciator, in duty room and in diet kitchen. The locking

Nurses' Low Voltage Silent Call Systems—Cont'd

call buttons shall be so designed as to permit of the audible signal (buzzer) being sounded repeatedly, if necessary, in order to attract attention, but all lamp signals must remain lighted until the call is reset by the nurse at the patient's bed.

An additional emergency call shall be provided by means of a second locking call button mounted on wall plate of calling station to summon assistance. Nurses, by pressing this button, shall ring a bell in duty room, diet kitchen and in superintendent's office and light a lamp indicator (red) over door of room or ward and in superintendent's office. All signals, both bells and lamps, shall remain on until help arrives and resets the calling button.

Install in each porch or airing balcony where indicated on plans a nurses' call station No. 162010. This station shall be the same as private room stations but in addition shall have a lift cover for receptacle, a rubber gasket between station plate and wall and cord shall be 15 ft. in length. Station shall be located 5 ft. above floor line.



No. 162010

No. 162010 will fit the same boxes and fittings as No. 162002. Install 5 ft. to center above the floor.

No. 162002

Calling Stations—Install at each bed in private rooms where indicated on plans a nurses' call station No. 162002. The station shall consist of a single gang brass plate with receptacle mounted on separate yoke and having a detachable plug with 6-ft. cord and locking call button. Station shall be located 18 in. above the floor line.

No. 162002 will fit any standard single-gang switch box cover having a clear opening 1 47/64 in. wide by 2⅞ in. high. For surface mounting use National Metal Molding fitting No. 439 or Wiremold fitting No. 5748.

Install 2 ft. to center above the floor.

No. 162004

Install at each bed in private rooms where indicated on plans a nurses' call station No. 162004. The station shall consist of a single gang brass plate with receptacle mounted on separate yoke and having a detachable plug with 6 ft. cord and locking call button, and an additional locking call button for emergency calls mounted directly on yoke.

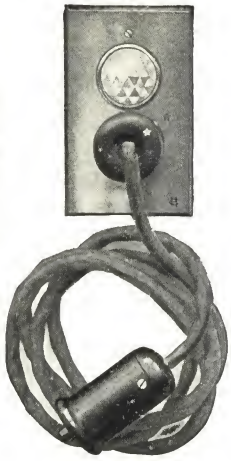
No. 162004 will fit the same boxes and fittings as No. 162002.

Install 5 ft. to center above the floor.

Install at each bed in public wards where indicated on plans a nurses' call station No. 162003. This shall be the same as the private room calling station with the addition of a bull's-eye on the wall plate located 5 ft. above floor line.

No. 162003 will fit the same boxes and fittings as the No. 162002.

Install 5 ft. to center above the floor.

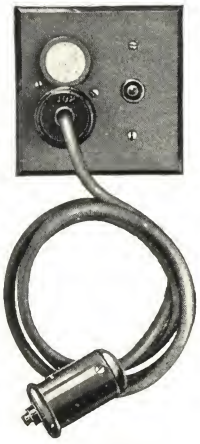


No. 162003

Install at each bed in public wards where indicated on plans a nurses' call station No. 162005. This shall be the same as the private room calling station with the addition of a bull's-eye on the wall plate located 5 ft. above floor line.

No. 162005 will fit any standard deep type box with two-gang cover having a clear opening 3 35/64 in. wide by 2⅞ in. high and at least 2¾ in. deep. For surface mounting use 2 Gem XS boxes, and National Metal Molding No. 442 or Wiremold No. 5752 fittings.

Install 5 ft. to center above the floor.



No. 162005

No. 162006

Install in toilets and bath rooms where indicated on plans a nurses' call station No. 162006. The station shall consist of a single gang brass plate with a locking call button mounted on a separate yoke. There is to be no cord or detachable plug. Station to be located 3 ft. above floor line.

No. 162006 will fit any standard deep type outlet box with single-gang cover having a clear opening 1 47/64 in. wide by 2⅞ in. high and at least 2¾ in. deep. For surface mounting use Gem XS box and National Metal Molding No. 441 or Wiremold No. 5751.

Install 5 ft. to center above floor.

No. 162007

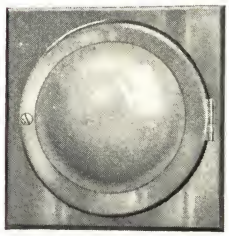
Install in toilets and bath rooms where indicated on plans a nurses' call station No. 162007. This station shall consist of a single gang brass plate with two locking call buttons mounted on a separate yoke. One button shall be black for regular calls and the other button red for emergency calls. There is to be no cord or detachable plug. Station to be located 3 ft. above floor line.

No. 162007 will fit the same boxes and fittings as the No. 162006.

Install 5 ft. to center above the floor.

Nurses' Low Voltage Silent Call Systems—Cont'd

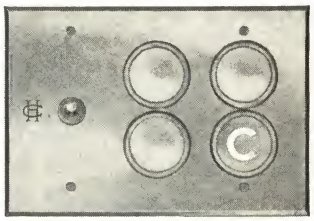
Corridor Lamp Stations—Install in the corridor over the door of each ward and private room, at points indicated in the plans, a dome type corridor lamp station, list No. 162026. The station shall consist of a two-gang brass plate having mounted thereon a hemispherical glass dome covering a candelabra base receptacle and lamp. The glass dome shall be frosted white inside so as to give marked contrast between lighted and unlighted condition. This station shall fit any two-gang outlet box or cover.



No. 162026

No. 162026 fits standard outlet box with two-gang cover having a clear opening 3 35/64 in. wide by 2⅞ in. high, and not less than 2¾ in. deep. For surface mounting, one and two-lamp, furnished to fit National Metal Molding No. 365 or Wiremold No. 5738 fixture box. Three and four-lamp furnished to fit National Metal Molding No. 440 or Wiremold No. 5747 two-gang fittings.

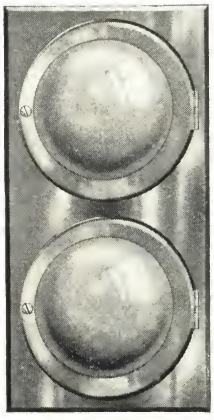
(To be used in place of preceding paragraph when there are public wards and private rooms on the same floor or section.) Install in nurses' duty rooms and diet kitchens where indicated on plans a nurses' bull's-eye pilot and buzzer station No. 162028. Station shall consist of a brass plate having one bull's-eye indication for each ward on the floor and one indication for all private rooms and in addition a concealed buzzer with cut-off switch on front of plate. Station shall be located 7 ft. above floor line.



No. 162028

No. 162028 standard 2-lamp station fits standard outlet box with two-gang cover having clear opening 3 35/64 in. wide by 2⅞ in. high and not less than 2¾ in. deep. Additional pairs of lamps increase the size of the outlet box and plate by one gang up to 8 indications. Above 8 lamps the arrangement will be such as to make the plate as nearly square as possible. A special outlet box is furnished with each station over 8 lamps. For surface mounting a special mat is required.

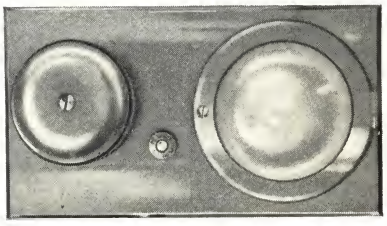
Install in the corridor over the door of each ward and private room, at points indicated on the plans, a dome type corridor lamp station list No. 162026X. The station shall consist of a brass plate having mounted thereon two hemispherical glass domes one above the other, each dome covering candelabra base receptacle and lamp. One glass dome shall be colored white for patients' calls and the other dome shall be red for emergency calls.



No. 162026X

No. 162026X will fit any four-gang outlet box with cover having a clear opening 7 11/64 in. high by 2⅞ in. wide. For surface mounting a special mat is required.

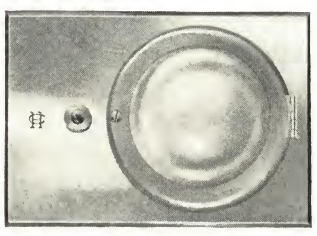
Install in nurses' duty rooms and diet kitchens where indicated on plans a nurses' pilot light, buzzer, and emergency bell station No. 162030. Station shall consist of a four-gang brass plate having a dome light similar to that specified for corridor lamp stations, a concealed buzzer with cut-off switch on front of plate and an emergency bell. Stations shall be located 7 ft. above floor line.



No. 162030

No.162030 fits and standard outlet box with four-gang cover having a clear opening 7 11/64 in. wide by 2⅞ in. high, and at least 2¾ in. deep. For surface mounting a special mat is required.

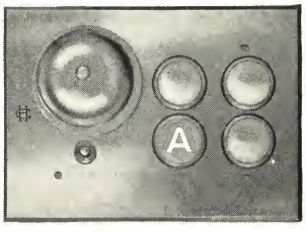
Nurses' Pilot Stations—Install in nurses' duty rooms and diet kitchens where indicated on plans, a nurses' pilot light and buzzer station No. 162027. Station shall consist of a three-gang brass plate having a dome light similar to that specified for corridor lamp stations and in addition a concealed buzzer with cut off switch on front of plate. Station shall be located 7 ft. above floor line.



No. 162027

No. 162027 fits standard outlet box with three-gang cover having a clear opening 5 23/64 in. wide by 2⅞ in. high, and not less than 2¾ in. deep. For surface mounting a special mat is required.

(To be used in place of preceding paragraph when there are public wards and private rooms on the same floor or section.) Install in nurses' duty rooms and diet kitchen where indicated on plans a nurses' bulls-eye pilot and buzzer station with emergency bell No. 162029. Station shall consist of a brass plate having one bull's-eye indication for each ward on the floor and one indication for all private rooms and a concealed buzzer with cut-off switch on front of plate. In addition there shall be an emergency bell for sounding emergency calls. Station shall be located 7 ft. above floor line.

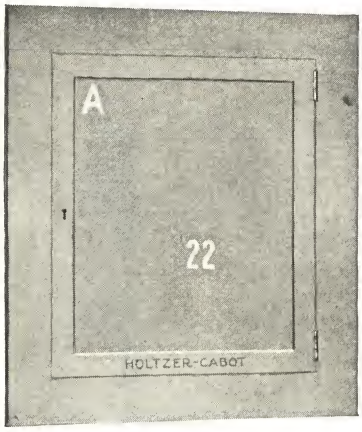


No. 162029

No. 162029, the 4-indication size illustrated, fits standard outlet box with four-gang cover having a clear opening 7 11/64 in. wide by 2⅞ in. high, and at least 2¾ in. deep. Additional pairs of lamps increase the size of the outlet box and plate by one gang up to eight indications. Above 8 lamps the arrangement will be such as to make the plate as nearly square as possible. A special outlet box is furnished with each station above 8 lamps. For surface mounting a special mat is required.

Nurses' Low Voltage Silent Call Systems—Cont'd

Nurses' Annunciator—Install at nurses' desk on each floor where indicated on plans, a nurses' lamp annunciator No. 162052. This annunciator shall be flush type with brass trim and door with lock and concealed hinges. Annunciator shall have the necessary number of lamps to provide one indication for every ward or private room on the floor. This annunciator shall have concealed markings which shall be visible only when lighted. Space for each indication shall be 1½ in. square and there shall be included a concealed buzzer with cut-off switch on face of trim.



No. 162052

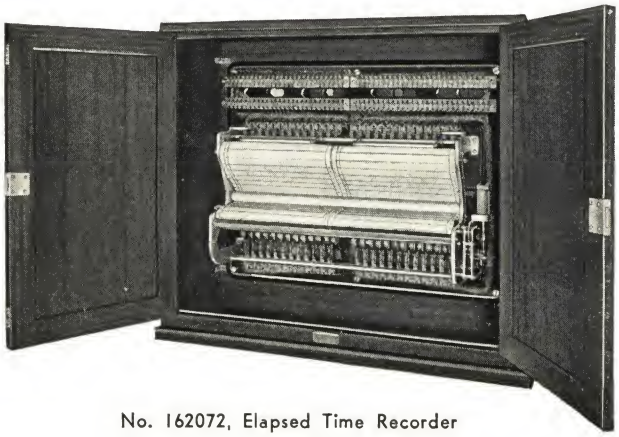
DIMENSIONS OF STANDARD LAMP ANNUNCIATORS

No. of stations	Dimensions, in.				
	List No. 162052 flush type, trim size		List No. 162050 surface type		
	High	Wide	High	Wide	Deep
6–9	9¾	9¾	8⅞	8⅞	4¼
10–16	11¼	11¼	10⅜	10⅜	4¼
17–20	11¼	12¾	10⅜	11⅞	4¼
21–25	12¾	12¾	11⅞	11⅞	4¼
26–30	12¾	14¼	11⅞	13⅜	4¼

Note: When emergency bell is ordered, annunciator cases are 1½ in. higher. On flush type outlet box is 1 in. less each way.

SUPERINTENDENT'S ANNUNCIATOR—Install in superintendent's office where indicated on plans a lamp annunciator No. 162052. This annunciator shall be similar to that specified for nurses' annunciator except there shall be a concealed bell without cut-off switch instead of buzzer. This annunciator shall have one indication (red) for each floor of the hospital and is for emergency calls only.

Elapsed Time Recorder—Install in superintendent's office where indicated on plans, an elapsed time recorder which shall record the exact time of each patient's call and time elapsing before it is answered. This recorder must be of the type in which the record is made by punching a series of holes in a paper tape and the records must show the number of the station calling, the time at which call is made, and the elapsed time required by nurse to answer call. Calls from each individual bed, whether in private room or in public ward must register individually on the recorder.



No. 162072, Elapsed Time Recorder

CABINET DATA

No. stations	Type	Dimensions, inches		
		High	Wide	Deep
50	Wall	27¾	21⅞	12¾
100	Wall	27¾	32½	12¾
150	Floor	66	32¼	14¾
200	Floor	66	32¼	14¾
250	Floor	66	62¼	14¾
300	Floor	66	62¼	14¾
350	Floor	66	62¼	14¾
400	Floor	66	62¼	14¾

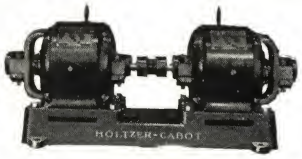
Recorder shall be furnished in mahogany cabinet of neat and substantial design and must include 1 year's supply of recorder rolls. Recorder rolls shall be in units of 50 stations on each roll and shall be continuous for 15 days of 24 hours each with provision for conveniently detaching each day's record for inspection and filing.

Operating Current—The system shall operate on 10 volts. Current shall be taken from the regular lighting mains and reduced to the proper voltage.

Install where indicated on plans in basement a No. 162080 (—) watt transformer having a separate insulated primary and secondary winding and having sufficient capacity to operate one-half the entire lamp load of the system for one hour without overheating.

No. 162080

(Alternate in place of above paragraph where DC only is available.) Install where indicated on plans in basement duplicate motor generator sets No. 162320 having separate motors and generators direct connected by flexible couplings on cast iron bases. Bases to be mounted on concrete foundation 24 in. in height and insulated by cork mat 2 in. in thickness. Motor generators to have sufficient capacity to operate ⅓ of the entire lamp load of the system continuously without overheating.



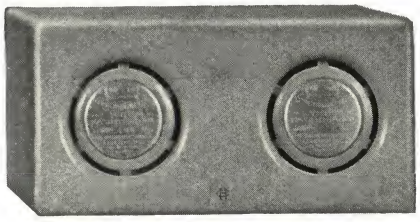
No. 162320

Wiring—All wiring used in this system must be run in approved iron conduit in the same manner as for lighting service. All wires on each floor shall be No. 14 B&S rubber covered, and all risers shall be No. 10 B&S rubber covered. The system shall be wired in accordance with the wiring diagram to be furnished by the manufacturer of the system.

NURSES' SIGNAL PHONE SYSTEM

Important Announcement—We are pleased to announce that by special arrangement we are prepared to furnish a Nurses' Signal Phone System consisting of Holtzer-Cabot Locking Button Calling System combined with Dictograph sensitive telephone instruments specially manufactured for us. This system provides in addition to the customary signal features of lamps and buzzers an unique telephone connection between patient and nurse.

The patient is not required to hold a receiver or talk into a mouthpiece, or even raise the head from the pillow; in fact the entire telephone contact between patient and nurse is as clear and satisfactory and as effortless for the patient as if the nurse were actually present in the room. In the patient's room the nurse's voice is heard through a "soft speaker" as clearly and distinctly as if the nurse were standing at the patient's bedside, while a super-sensitive microphone picks up and transmits to the nurse the faintest sounds of the patient's voice.



Patient's Signal Phone Cabinet

Description—To call a nurse the patient calls in the usual way, lighting lamps over door and in duty rooms and at nurses' desk, and sounding audible signals wherever located. The nurse instead of going at once to the patient to ascertain what is wanted, operates a key on her signal phone corresponding to that room and speaks to the patient through the signal phone. The patient answers the nurse indicating his or her wants in an ordinary tone of voice without arising from pillow.

Nurse coming to room complying with patient's request restores call by resetting locking button. Thus the signal phone enables the nurse to give in one visit to patient's room the same service that would ordinarily require two visits.

Patient's Signal Phone Installed in Bedside Table

Nurses' Signal Phone Switchboard

Calling Button Cord and Plug

ARCHITECT'S SPECIFICATIONS

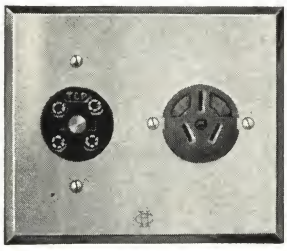
General—Provide and install a combined nurses' call and nurses' signal phone system in accordance with these specifications furnishing all equipment and wiring the system complete. The system desired is that of the Holtzer-Cabot Electric Company, Boston, Mass., but bids on other apparatus of equal quality will also be considered, providing contractors name such apparatus in their bid, and state the amount to be added or deducted for same. Bids with no alternate will be considered as binding to furnish equipment in exact accordance with specifications.

Operation—At each bed there shall be a station having a cord with a locking call button attached. A patient desiring a nurse shall press the locking call button which shall cause a lamp signal to light at the following locations: over patient's room door, corridor side; in the annunciator at nurses' desk; in duty room and in diet kitchen. (In addition, stations in public wards shall light a bull's-eye in wall plate behind patient's bed.) At the same time there shall sound momentarily a buzzer in the annunciator, and in duty room and diet kitchen. The locking call buttons shall be so designed as to permit of the audible signal (buzzer) being sounded repeatedly, if necessary, in order to attract attention, but all lamp signals must remain lighted until the call is reset by the nurse at the patient's bed.

Nurses' Signal Phone System—Cont'd

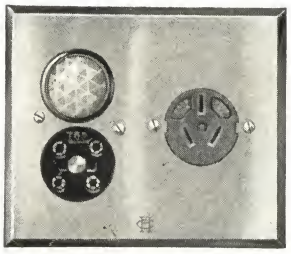
In addition at each station there shall be a second cord terminating in a patient's signal phone cabinet fitted with a supersensitive microphone and a soft speaker of such characteristics that patient may talk with and receive messages from nurse without effort and without lifting head from pillow. Systems requiring patient to hold transmitter or hand set will not be considered.

Calling Stations—Install at each bed in private rooms where indicated on plans, a nurses' calling and signal phone station No. 162602. This station shall consist of a 2-gang plate with 2 receptacles mounted on separate yokes. One receptacle shall be furnished with a detachable plug with 6 ft. Tyrex cord and locking call button. The other receptacle shall be equipped with detachable plug and cord terminating in patients' signal phone cabinet. Calling plug shall be not interchangeable with signal phone plug. This station shall be located 5 ft. above floor line.



List No. 162602

Install at each bed in public wards where indicated on plans, a nurses' call and signal phone station No. 162603. This shall be the same as the private room station with the addition of a bull's-eye signal on wall plate. Station to be located 5 ft. above floor line.



List No. 162603

Corridor Lamp Stations—Identical with stations on standard nurses' call system. Copy specifications page 4.

Nurses' Pilot Stations—Identical with stations in standard nurses' call system—copy specifications, page 4.

Nurses' Signal Phone Switchboard—Install at each nurses' station where shown on plans a No. 162652 Nurses' Signal Phone Switchboard consisting of a high grade mahogany cabinet containing one combined target indicator and listening key for each patients' calling station on the floor. There shall be a sensitive microphone on front of the cabinet and a high grade watch case type receiver. A concealed buzzer shall be included with cut-off switch. Cabinet shall be equipped with 6 ft. flexible cord which shall be connected to suitable terminal block placed in outlet box in wall having a cover plate with bushed hole for cable.

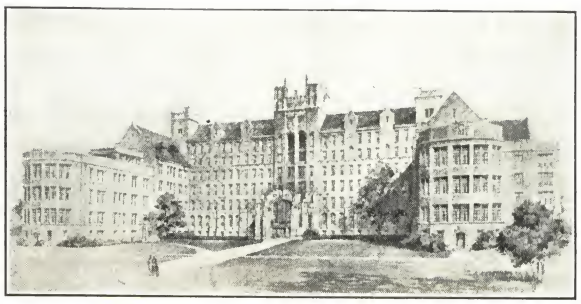
List No. 162652

Power Supply—Furnish and install where indicated in basement an approved transformer of sufficient capacity to operate without undue heating 50% of all lamps on the system. This transformer is for operating all lamps and buzzers.

Furnish and install where shown, near each nurse's station, 3 standard dry cell batteries for talking current.

Wiring—All wiring used in this system must be run in approved iron conduit in the same manner as for lighting service. All wires on each floor shall be No. 14 B&S rubber covered, and all risers shall be No. 10 B&S rubber covered.

The system shall be wired in accordance with the wiring diagram to be furnished by the manufacturer of the system.



Springfield Hospital, Springfield, Mass.

Stevens & Lee, Architects, Boston, Mass.

Fred T. Ley & Co., Inc., General Contractor, Springfield, Mass.

Interstate Construction Corp., Springfield, Mass., Electrical Work

Alfred Kellogg, Boston, Mass., Consulting Engineer

DOCTORS' "IN-AND-OUT" REGISTER SYSTEM

A system by which the staff and visiting doctors can conveniently register and so keep the telephone operator and others informed of their presence or absence. It is an exceedingly simple system yet one of the most necessary and useful in any hospital regardless of size. Experience has shown that an electrically operated system is the most satisfactory.

The Holtzer-Cabot System consists of an individual keyboard located at one or more entrances operating in conjunction with one or more indicators placed near the main entrance, at the telephone switchboard, or other location. The doctor registers his arrival by the throw of a toggle switch in the entrance register conveniently placed in the wall near the door.

The signal is transmitted to the office indicator where the individual's presence remains registered until his departure is signaled by the reverse operation of the toggle switch when he leaves the building.

ARCHITECT'S SPECIFICATIONS

General—Furnish and install an "In" and "Out" register system as covered by this specification. The system to be completed, connected and tested for satisfactory operation.

The manufacturers' names and catalogue numbers specified herein are the type and quantity of apparatus desired. Bids of any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—This system is to operate as follows: Doctors on entering the hospital will throw a switch opposite their names on the entrance register and indicator which will light a lamp behind their names both on the entrance register, indicator, and on the office indicator. On leaving the hospital, reverse operation of the switch will extinguish the lamps.

Entrance Register and Indicator—Shall be Holtzer-Cabot No. 150601. Shall consist of a steel outlet box having a bronze trim with hinged doors fitted with locks and keys. There shall be provided for each name a rectangular opening so designed that doctor's name may be inserted behind it. The arrangement must be such that neat and readable markings may be made up and inserted by the hospital staff. Apparatus requiring names to be printed or painted by hand will not be accepted.

Behind each opening shall be mounted a series burning candelabra base Mazda lamp of sufficient candle power to illuminate the markings properly and beside each opening shall be located an approved lever switch for controlling the lamp.

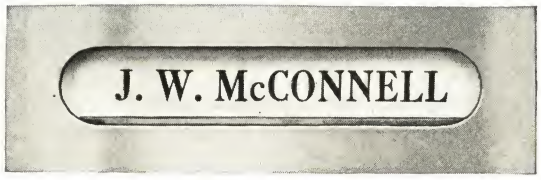
Entrance register and indicator shall have a capacity of .... names and shall be installed in the wall near the main entrance where directed.

Office Indicator — Shall be Holtzer-Cabot No. 150605 and shall consist of steel outlet box with bronze trim and doors equipped with locks and keys. This indicator shall be an exact duplicate of the entrance register and indicator with the exception that no lever switches are required as it is to operate in series with the entrance register and indicator.

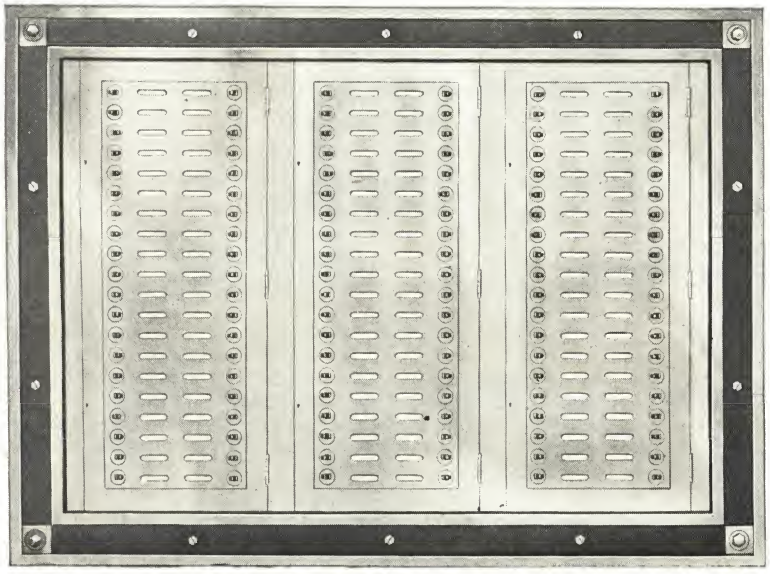
Office indicator shall have a capacity of .... names and shall be installed in office near telephone switchboard.

Wiring—System shall be wired complete in rigid iron conduit and individual indication wires between office register and entrance register shall be not less than No. 16 rubber covered. Common wires between office indicator and entrance register and feed wire to transformer shall be of such size so as to carry 50% of the total load with no more than 10% drop in voltage. Corresponding lamps in Entrance Register and Office Indicator shall be wired in series.

Current Supply—This system shall operate on an approved type step down transformer having a secondary winding rating of 24 volts.



Standard Opening for Name Card
Actual size



Entrance Register and Indicator, No. 150601

Transformer shall be of insulated type and shall be installed in steel box with blank cover where directed in office. Transformer shall have total output of not less than 50% of the entire load for one hour without undue heating and with not more than 5% drop in voltage.

CAPACITY AND DIMENSIONS OF ENTRANCE REGISTER AND INDICATOR

No. of indications	No. 150601 Trim size, in.		No. 150605 Trim size, in.	
	Height	Width	Height	Width
20	20 5/8	16 1/2	18 3/8	15
30	20 5/8	30 1/4	18 3/8	27 1/4
60	28 1/2	31 1/2	25	28 1/2
80	37 3/8	36 1/4	30 5/8	28 1/2
120	37 3/8	50 1/2	32 5/8	45 1/2
160	37 3/8	64 3/4	32 5/8	58
200	37 3/8	79	32 5/8	70 1/2

Note: Dimensions of Outlet Box 1 in. less either way for all types.

PAGING SYSTEM NO. 1

To meet the need for a system for quickly locating doctors or executives in hospitals, department stores, and similar institutions where noise is objectionable, Holtzer-Cabot has developed and patented the Flashing Lamp Type Paging System. This system was first developed and patented in 1922 by Holtzer-Cabot and stands today as the one system proven by the test of time to best meet the requirements of such service.

List No.	Description	Height	Width	Depth
162300	Portable desk type keyboard..	19½	12¼	8¾
	*Connector panel box for above	14	11	4¼
162301	*Flush wall type keyboard.....	20½	12½	4¼
162302	Surface wall type keyboard...	19¾	11¾	3¾

*Outlet box 1 in. smaller each way than trim dimensions.

ARCHITECTS' SPECIFICATIONS

General—Furnish and install a complete Paging System of the silent flashing lamp type with an audible signal for emergency calls. The system to be wired and connected complete and left in satisfactory operating condition. This system shall have a maximum capacity for calling 120 different doctors.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or reduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—Each doctor shall be assigned a code number of 3 digits, such as—3-5-7, etc., and directory charts listing the various doctors and the code numbers assigned to them is to be kept at telephone operator's switchboard and at each nurse's station.

To call a doctor, the telephone operator will set up the 3 digits comprising that doctor's code call on the keyboard, which shall cause the 3 digits of that code to flash out simultaneously and repeatedly on annunciators located in the corridors throughout the hospital. The code number set up shall flash repeatedly until the call is reset by telephone operator. System must be so arranged that the operator may set up simultaneously on keyboard 3 distinct and separate doctors' code numbers, which must flash in rotation until all are reset by the operator.

In cases where a doctor is urgently needed the operator may by means of a special key on the keyboard sound audible signals located in corridor near each annunciator—audible signals operating in unison with the flashing of the lights.

Selector Keyboard—Operating keyboard shall be Holtzer-Cabot No. 162300 and shall consist of an inclined front mahogany finished cabinet suitable for mounting alongside of telephone operator's desk.

Selector Keyboard No. 162300

This cabinet shall contain three rows or sections of keys so arranged and numbered that in each section there are 10 keys numbered 1-9 and 0, together with any other keys necessary to control starting and stopping of code calls individually in each section. This keyboard shall be equipped with a 6-ft. flexible cable connected to suitable terminal board which shall be mounted in a flush steel outlet box with cover to be located in the wall near base board. Keyboard shall operate on not more than 24 volts.

Flasher Control Unit—Shall be Holtzer-Cabot No. 162305 and is to be installed in basement where directed. This shall consist of a steel outlet box with door and trim and shall contain a motor driven flasher arrangement, together with all necessary relays, fuses, terminals, etc., to control the flashing of the doctors' codes set up on the keyboard. The mechanism is to be so arranged that all 3 digits of any one code will flash simultaneously, and that when more than one code is set up on the keyboard the codes will flash in rotation. Codes shall light for a period of 1 second and there shall be ½ second between codes. Control unit shall operate from the 115-volt lighting circuit.

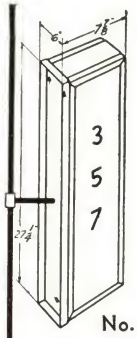
Annunciators—Can be furnished with either double-row or single-row markings and in various types of cases, both single and double face.

Double face annunciators are furnished for mounting on side wall of corridor, on ceiling, or in partitions with one face showing on each side of partition. Single face annunciators are furnished for flush or surface mounting, as required.

Double row annunciators are furnished to read from the top downwards, regardless of the type of case or mounting. Single row annunciators, however, on account of space limitations, must be arranged to read vertically when mounted on sidewalls and horizontally when mounted on ceilings or in partitions. Single face single row annunciators are arranged to read vertically. The various types of annunciators with dimensions and specification for each are shown on page 10.

Installation in R. H. Macy & Co., Inc., Department Store, New York, N. Y.

Paging System No. 1—Cont'd

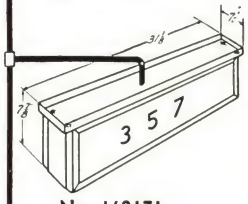


No. 162161

Install on side wall in corridors where indicated on plans a Holtzer-Cabot No. 162160 double face wall mounting lamp annunciator having 2 vertical rows of 5 indicators numbered 1 to 9 and 0. Annunciator shall have one face opening on concealed hinges. Finish, lacquer; color as directed.

Install on ceiling in corridors where indicated on plans a Holtzer-Cabot No. 162170 double face ceiling mounting lamp, annunciator having 2 vertical rows of 5 indications numbered 1 to 9 and 0. Annunciator shall have one face opening on concealed hinges. Finish, lacquer; color as directed.

Suspend on ceiling in corridors where indicated on plans a Holtzer-Cabot No. 162170-C double face suspended lamp annunciator having 2 vertical rows of 5 indications numbered 1 to 9 and 0. Annunciator shall have one face opening on concealed hinges. Annunciator shall be suspended by two 1¼-in. pipes from two 4-in. octagonal outlet boxes, furnished by manufacturer, welded together on steel spacer strips to insure that center distances of boxes and annunciators will agree. Outlet boxes to be covered with suitable canopy. Finish, lacquer; color as directed.

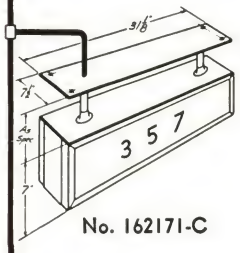


No. 162171

Install in partitions where indicated on plans a Holtzer-Cabot No. 162190 partition type annunciator having 2 rows of 5 indications numbered 1 to 9 and 0. Annunciator shall have one face with hinged door opening on concealed hinges. Annunciators shall be mounted on special rabbeted type outlet boxes to be furnished by manufacturer. Outlet boxes shall be made the full width of thickness of finished wall (to be ascertained later) and plaster to be finished up to edge of outlet box. Annunciator faces to be fastened to rabbets inside of outlet box. Finish, lacquer; color as directed.

Install in doctors' rooms where indicated on plans a Holtzer-Cabot No. 162200 flush type lamp annunciator having 2 vertical rows of 5 indications numbered 1 to 9 and 0. Annunciator shall have hinged door opening on concealed hinges. Finish, lacquer; color as directed.

Install where indicated on plans a Holtzer-Cabot No. 162210 surface mounting single face lamp annunciator having 2 vertical rows of 5 indications numbered 1 to 9 and 0. Front of annunciator shall open on concealed hinges. Finish, lacquer; color as directed.

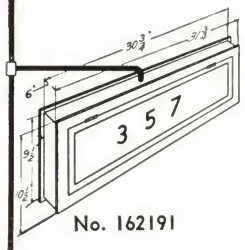


No. 162171-C

Install inside wall in corridors where shown on plans, a Holtzer-Cabot No. 162161 double face wall mounting lamp annunciator having one vertical row of 10 indications numbered 1 to 9 and 0. Annunciator shall have one face opening on concealed hinges. Finish, lacquer; color as directed.

Install on ceiling in corridors where indicated on plans, a Holtzer-Cabot No. 162171 double face ceiling mounting lamp annunciator having one horizontal row of 10 indications numbered 1 to 9 and 0. Annunciator shall have one face opening on concealed hinges. Finish, lacquer; color as directed.

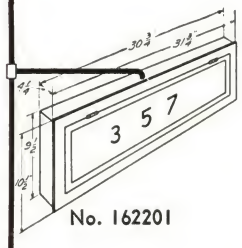
Suspend on ceiling in corridors where indicated on plans a Holtzer-Cabot No. 162171-C double face suspended lamp annunciator having one horizontal row of 10 indications marked 1 to 9 and 0 and having one face opening on concealed hinges. Annunciators shall be suspended by two 1¼-in. pipes from two 4-in. octagonal boxes furnished by manufacturer welded together on steel spacer strips to insure that center distances of boxes and annunciator will agree. Outlet boxes to be covered with suitable canopy. Finish, lacquer; color as directed.



No. 162191

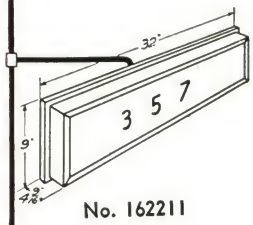
Install in partitions where indicated on plans a Holtzer-Cabot No. 162191 partition type lamp annunciator having one horizontal row of 10 indications numbered 1 to 9 and 0 and to have one face opening on concealed hinges. Annunciator shall be mounted on special rabbeted type outlet box to be furnished by manufacturer. Outlet box to be full width of the thickness of finished wall (to be ascertained later) and plaster to be finished up to edge of outlet box. Annunciator faces to be fastened to rabbets inside of outlet box. Finish, lacquer; color as directed.

Install in doctors' rooms where indicated on plans, a Holtzer-Cabot No. 162201 flush type lamp annunciator having one vertical row of 10 indications numbered 1 to 9 and 0 and to have front opening on concealed hinges. Finish, lacquer; color as directed.

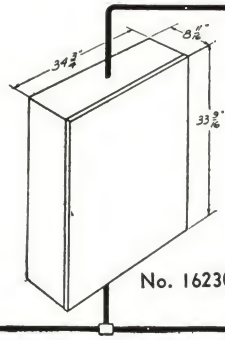


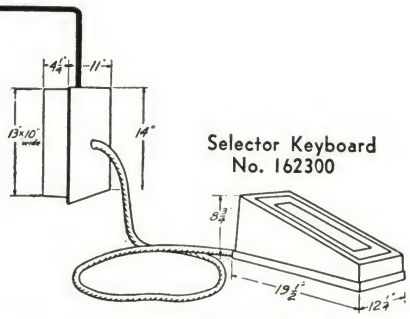
No. 162201

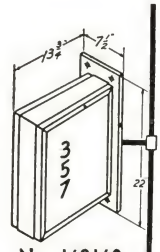
Install where indicated on plans, a Holtzer-Cabot No. 162211 surface mounting single face lamp annunciator having one vertical row of 10 indications numbered 1 to 9 and 0. Front to open on concealed hinges. Finish, lacquer; color as directed.



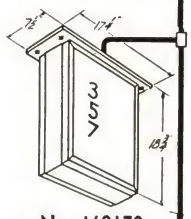
No. 162211


No. 162305

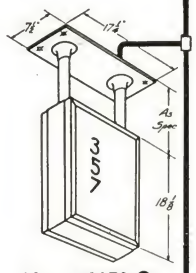




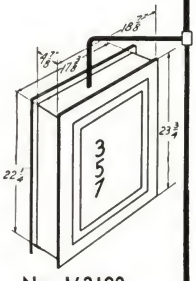
No. 162160



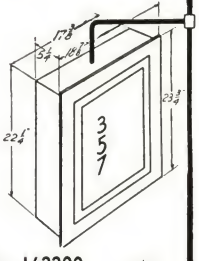
No. 162170



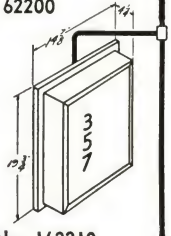
No. 162170-C



No. 162190



No. 162200



No. 162210

Paging System No. 1—Cont'd

No. 151178 Musical Bar Signal

Audible Signals—(Optional; to be specified where an emergency signal is required). Install at each annunciator location where indicated on plans a Holtzer-Cabot No. 151178 Xylophone type musical bar signal mounted over standard 2 gang outlet box. Finish lacquer, color as directed.

Wiring—System is to operate from 115-volt house lighting (or power) circuit. From the flashing control panel run to all annunciators in multiple eleven No. 14 wires (with 1 extra wire to audible signal if specified). From the operator's keyboard to the flasher control panel run 44 No. 16 wires. All wiring must be run in rigid iron conduit to meet all requirements for power and light wiring.

Directory Charts—With the system there shall be furnished 50 Directory charts of cardboard on which shall be printed a total of 120 3-digit code calls with a blank space for inserting a doctor's name opposite each code call.

ALTERNATE SYSTEMS

In large institutions where it is deemed necessary to call more than 120 persons or to page more than 3 individuals at once we recommend a double system as above with double keyboard card control panel and 20 indication annunciators.

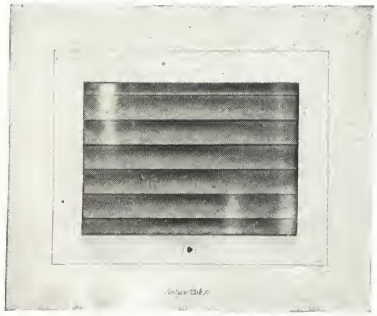
In small institutions where it is not necessary to page 3 individuals at once, we furnish the system as specified above but with a simplified keyboard and flasher control panel to page one individual at a time.

Descriptive literature on either of the above alternate systems on request.

NIGHT LIGHTS

For illumination in hospitals, hotels, theatres and similar institutions the modern practice is to place these in corridors, rooms, wards and other desired locations about 18 in. above the floor. By means of transverse louvre openings in the front, the light is directed downward thus giving sufficient visibility without the necessity of full illumination. Night lights are preferably operated from the regular lighting currents controlled by standard lighting switches located where most convenient. In hospital corridors they are generally controlled in groups for each section, but in private rooms or wards are controlled by individual switches.

It is recommended that lamps having a rated voltage of about 10% over building voltage be used to insure long life.



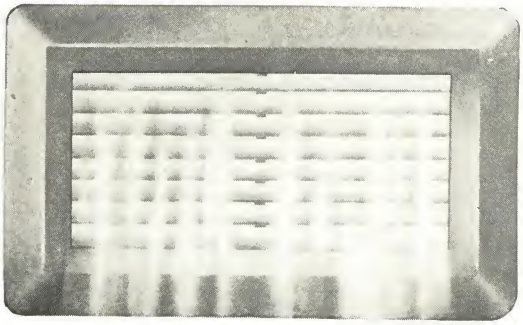
No. 162155 Type "FL" Night Light

ARCHITECT'S SPECIFICATIONS

Install at locations in corridors, rooms and wards where indicated on plans a Holtzer-Cabot No. 162155 hinged front night light. Front to be flat flush type with hinged door having concealed hinges and flush lock. Door to have glass panel of shatter-proof glass with louvre type reflector to direct light downward. Front must fasten to outlet box without the use of screws visible on the front and must have lateral adjustment to compensate for errors in outlet box setting. Joint between door and trim must have suitable light stop or flange to prevent light showing through.

Install in rooms in Psychopathic Building where indicated on plans a Holtzer-Cabot No. 162152 type VB night light, front to be of cast bronze with heavy louvres in front of glass and to be fastened to outlet box from back. Back of outlet box to be removable from other side of wall to allow for replacement of lamps.

Night lights to be wired as shown on plans to control switch in each corridor or individual room switches and to be lamped with 25 watt Edison base Mazda lamps.



No. 162152 Type "VB" Louvre Night Light

SIGNAL SYSTEMS FOR EDUCATIONAL INSTITUTIONS

LABORATORY PANELS AND EQUIPMENT

The conducting of electrical experiments in present day High School and College laboratories requires adequate equipment properly installed and connected if best results are to be attained and the time of students and instructors is to be conserved. Since 1900, we have been manuacturing and supplying schools and colleges with electrical equipment for laboratories. In this as in many other lines, Holtzer-Cabot has been the pioneer, originating equipment and improving the apparatus wherever possible.

The laboratory equipment listed herein when properly installed and connected will provide a most practical and convenient system for quickly connecting to work tables and instructors' benches the various voltages of alternating and direct current required for electrical experiments.

All equipment is listed and approved by the Underwriters' Laboratories

ARCHITECTS' SPECIFICATIONS

General—Furnish and install a control and distribution system for supplying to the instructors' desks and students' tables in laboratories, and elsewhere as shown on plans various voltages and currents required for electrical experiments. System as covered by these specifications to be wired, connected and left in first-class operating condition.

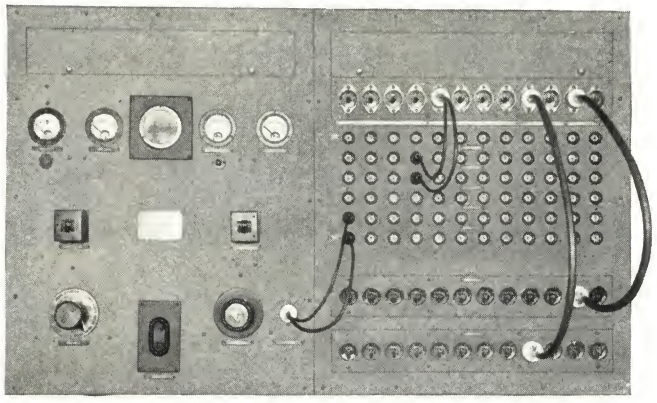
The manufacturers' names and catalog numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Apparatus—The apparatus required will be a main control and distribution panel in laboratory A with distribution panels only in laboratories B and C and a storage battery and motor generator in closet off laboratory A.

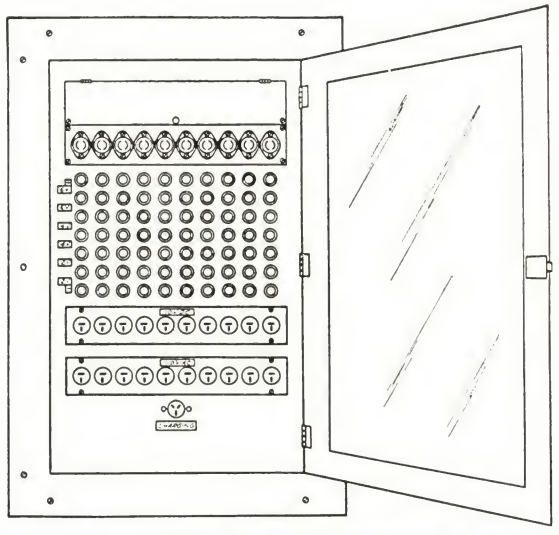
Main Control and Distribution Panel—Install in laboratory A where indicated on plans a Holtzer-Cabot No. 165025 control and distribution panel mounted in steel cabinet set into wall with back of cabinet opening into battery closet. Cabinet to have removable back and hinged doors in front with glass panels and suitable lock with two keys. Finish of trim and doors cabinet green.

The control section of this panel is to contain the following apparatus: A voltmeter and ammeter with remote control switch and rheostat for starting, stopping, and controlling voltage of motor generator; a voltmeter, ammeter, switch, rheostat, and Tungar charger for controlling charging of storage battery, a supply switch for connecting and disconnecting supply from school lighting circuit and a recessed fuse compartment covered by hinged door. Fuse compartment to have a plug type fuse for each incoming line from lighting service, motor generator, and battery.

Distribution section of this panel to provide feeder circuit to each of 10 students' work benches and 2 circuits to instructors' table. Each feeder circuit to benches and tables to be fused with 15 ampere plug type fuses in recessed compartment at top of panel covered by hinged door. Panel to contain for each outgoing circuit to work benches and instructors' table the following receptacles: One heavy duty 20 ampere twistlock receptacle connected to outgoing circuit; seven single pole battery jacks mounted in heavy moulded bakelite shells connected to storage battery taps.



List No. 165025. Type CM Combined Control and Charging, and Distribution Panel



List No. 165027. Type "CS" Distribution Panel

DATA, COMBINED CONTROL AND DISTRIBUTION PANELS

No. of distribution panel circuits	Wood cabinet, width, in.	Steel cabinet, width, in.
6	51	45
10	59	53
14	67	61
20	79	73
24	87	81
.....	Height 72	Height 36¾
.....	Depth 24	Depth 18

Trim size 2 in. greater each way for flush or partition type.

NUMBER OF CIRCUITS AND WIDTH OF CABINET

Distribution panel No. circuits	Width of metal cabinet, in.
6	30
10	30
14	38
20	50
24	58
Cabinet height	45
Cabinet depth	16

Trim size 2 in. greater each way for flush or partition mounting.

Laboratory Panels and Equipment—Cont'd

one polarized receptacle connected to school lighting circuit and one polarized receptacle connected to motor generator output. By means of the above apparatus it shall be possible to connect to each outgoing circuit any of the following voltages: any battery voltage from 2 to 24, 110 volt, 60 cycles, and motor generator output.

It shall be possible to connect various voltages to different circuits or one voltage to all circuits as required.

A full complement of suitable plugs and cords shall be included. Cords to be Tyrex and plugs must be of such types that it is impossible to create short circuits by connecting one circuit to another, etc. A special charging receptacle shall be included in panel and special plug and cord unit furnished for charging through the battery receptacles on panel any section of the battery requiring charge.

Distribution Panels Only—Install in laboratory B a distribution panel only for feeding ten work benches with two circuits to instructors' table and in laboratory C a distribution panel for feeding six work benches with two circuits to instructors' table. These panels shall be similar to distribution section of main panel except for number of outgoing circuits and that no charging receptacle is to be provided. Each panel shall also include a remote control push button switch for motor generator with bull's-eye indication and a tumbler switch for control of feed from school lighting circuit. These panels to be furnished in steel cabinets to be set into wall where indicated on plans. Cabinets to have hinged doors with glass panel and suitable lock. Finish of trim and door cabinet green.

Motor Generator—Install in battery closet off laboratory A, a Holtzer-Cabot No. 165035 motor generator. Motor to operate from 220 volt, 3 phase power circuit and generator to deliver 125 volts direct current at 1500 watts. Generator to be compound wound with a voltage variation of not over 5 volts from no load to full load at full voltage. Motor generator shall be furnished with magnetic starting switch for remote control with safety switch for manual operation. Motor generator shall be direct connected type on cast iron subbase and shall be mounted on cork mat not less than 1½ in. in thickness.

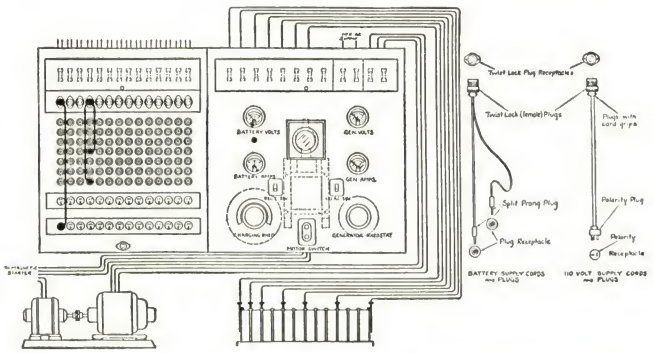
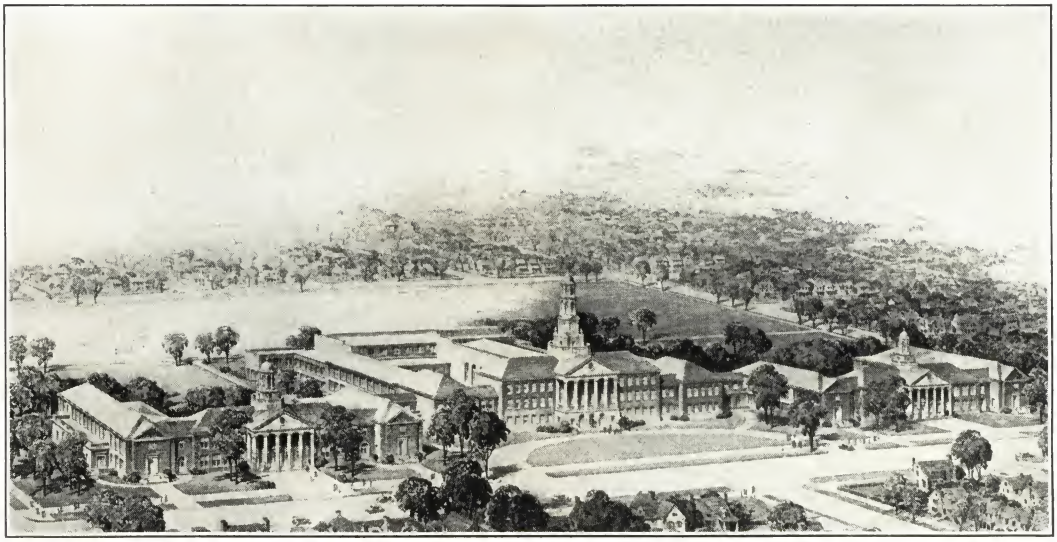


Diagram of Wiring and Arrangement of Combined Control, Charging and Distribution Panel

Storage Battery—Install in battery closet off laboratory A a 12-cell Electric Storage Battery Company type DMGO-5 storage battery. Battery to be furnished completely assembled and charged.

Wiring—Each circuit from work tables or instructors' bench to distribution panel shall be 2 No. 12 B. & S. wires. From storage battery run 7 No. 8 B. & S. wires to control panel and from motor generator run 6 No. 12 wires to control panel. From single phase lighting circuit run 2 No. 12 wires to control panel and from 3 phase power circuit run 3 No. 12 wires to motor generator magnetic starter and safety switch. From main panel to distribution panels in laboratories B and C run 7 No. 8 wires for battery and 7 No. 12 wires for single phase AC and motor generator output and control.



Trenton High School, Trenton, N. J.

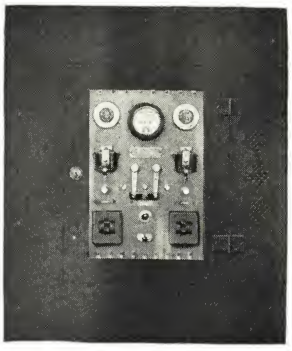
Ernest Sibley & Lawrence C. Licht, Architects Runyon & Carey, Newark, N. J., Consulting Engineers
Walter Kidde Constructors, Inc., Electrical Contractors

FIRE ALARM SYSTEMS

These two systems for schools are standard. The SA, with or without city box connection, answers all requirements for the largest schools. The ETS system is recommended for buildings where it is necessary to meet limited appropriations. Modifications to meet particular requirements are available and covered in detail in our complete catalog.

SA SYSTEM

This system has all features and advantages of modern up-to-date fire alarm practice. It is coded, closed circuit, with double supervision, that is the operating current supply supervised as well as the current supply which rings the trouble alarm.

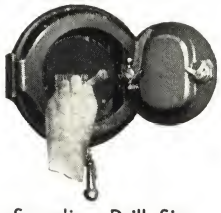


Control Panel Used on Type "SA" Fire Alarm System

A box when pulled for an actual fire operates the bells in the building and calls the city fire department to the school. Drills are given without disturbing the city connection. The city connection can be omitted if desired, leaving the balance of the apparatus to function as a local interior alarm only.

Current supply for fire alarm is most reliable when a suitably maintained storage battery equipment is installed. But reliable public service current can be used. Architects' specification on request.

Electro-Mechanical Bell



Sounding Drill Signal (Door Opened by Key)

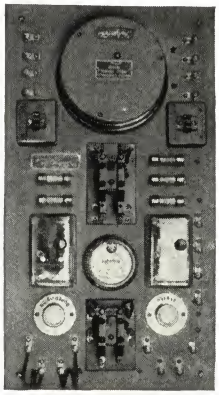
Pulling Lever Transmits Alarm to Both Local and City Systems

ETS SYSTEM

No. 163500

This system operates by breaking a glass, which in turn trips a master box and sounds a coded alarm on the gongs. It is not recommended or sold for a building which requires a municipal fire alarm connection. See SA system for current supply. Architects' specification on request.

No. 151121



No. 1631405

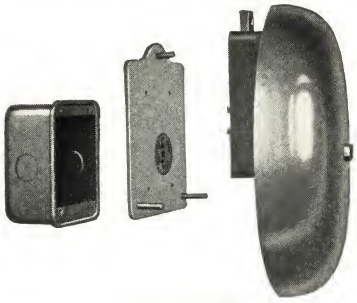
PROGRAM BELL SYSTEM
Architects' Specifications

General—Furnish and install a Holtzer-Cabot Program Bell System as covered by these specifications, system to be wired and connected and left in first-class operating condition.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Corridors

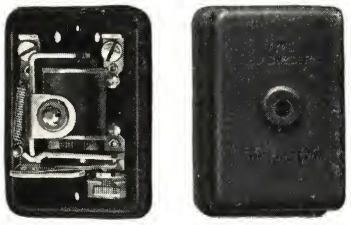
Install in corridors where shown in plans a No. 151018 type UD Bell with 8-in. gong mounted over 2-gang outlet box cover. This gong to be of the Under Dome Type, and so arranged that gong and mechanism may be readily detached from outlet box without disconnecting any wiring.



No. 151018
12, 24 or 110 volts

Classrooms

Install in each classroom a type HD Buzzer No. 151052 on single gang plate.

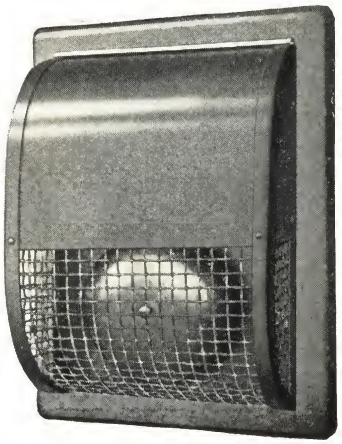


No. 151052

Yard Gongs

Install on outside of building where directed by architect a No. 151036 Type A Heavy Duty Yard Gong, mounted on wood mat with galvanized steel cover having wire screen in lower section.

Operation — Install where directed a No. 151019 transformer having separate primary and secondary windings, having an output of 125 watts at 24 volts.



No. 151036

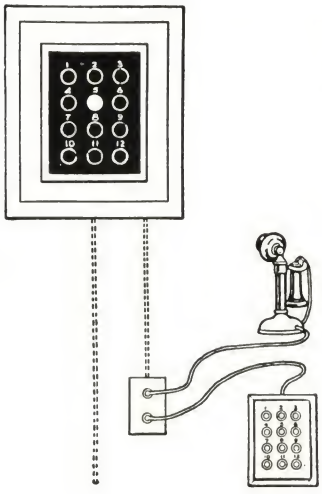
CLASSROOM TELEPHONE SYSTEMS

General—Furnish and install a Holtzer-Cabot Telephone System as covered by these specifications, system to be wired and connected and left in first-class operating condition.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—This is a master telephone system with indicating annunciator. A call from any class room shall register on the annunciator, in addition to ringing in the master's office.

Principal's Annunciator, Telephone and Button Pad



Install in principal's office a combined annunciator, telephone and button pad. Annunciator shall be Cat. No. 150022 electric reset, mounted on door of special low tension distribution cabinet, this cabinet to have a terminal strip with 4-way terminals and shall act as a junction box for entire system. Button pad shall be of the portable type, with 6 ft. cord and felt-covered base, and shall have one button for each classroom phone and one reset button for annunciator.

Principal's telephone shall be standard desk type telephone with long type receiver and sensitive transmitter and shall be equipped with 5 ft. cord.

Classroom Telephones

Any of the following telephones may be specified for this system:

Furnish and install in each classroom a No. 148015 dust and chalk proof wall telephone with adjustable transmitter mounted on semi-flush mat over suitable outlet box.

Furnish and install in each classroom a No. 148017 flush type wall telephone mounted over steel outlet box and having a concealed buzzer and watch case receiver.

Furnish and install in each classroom a No. 148969 surface type wall telephone with double gong bell and watch case receiver.

Furnish and install where indicated on plans a telephone battery eliminator No. 148901 to operate from 110 volts, 60 cycle lighting circuit, and to furnish a proper current for talking and ringing and for resetting annunciator on this system.

Wiring—This system shall be wired in accordance with diagram to be furnished by the manufacturer.

No. 148969 No. 148015 No. 148017-A

SYSTEMS FOR PUBLIC BUILDINGS

Federal, State, Municipal and Commercial

There are many systems available for buildings in this group. Fire alarm and Watchman's Boxes, combination stations and signaling devices can be selected from many standard types to meet the demand for complete protection.

Upon receipt of a description or plan of the project we will furnish detailed information with literature, and if desired the cooperation of an experienced engineer from our nearest branch office.

Watchman's Station

Automatic Punch Register

New Department of Commerce Building, Washington, D. C.
York & Sawyer, New York, Architects
Harry Alexander, Inc., Washington, D. C., Contractors

SIGNAL SYSTEMS

Banks, Offices, Hotels and Residences

Annunciators, Bells, Telephones and other devices for signalling and alarm systems have been made by Holtzer-Cabot for over 50 years. The cuts show modern types of apparatus for residences, banks, offices and hotels.

A complete catalog of Holtzer-Cabot Signalling Systems and devices is available and will be sent on request. Specifications, drawings, and estimates covering standard or special systems or devices to meet any requirements will be cheerfully furnished. For full details communicate with our nearest office.

Pinch Type Button

Furnished in two types, locking and non-locking. Locking type is released by a thumb latch shown in illustration. Its special feature of design is that contacts will not transmit a signal unless both buttons are pressed simultaneously.

Pinch Type Button

Midget Button

Furnished in either polished nickel or brushed brass rims with white pearl centers.

Midget Button

Also furnished with radialized center. No. 150182.

Solid Bronze Directory Type Button Pads and Plates

Button Pad

Portable Type Button Pad No. 150493—Consists of solid cast bronze mat with face plate, felt covered bottom and a 6-ft. cord.

Separable Connector

A multiple contact plug and receptacle for use in connection with portable cables for push button pads, annunciators, etc.

Separable Connector

Flush Counter Button

Flush Counter Button

Locking Type—Has four contacts and may be arranged to give momentary signal on one circuit and continuous signal on other circuits if required.

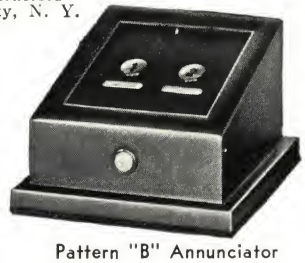
Waldorf Astoria Hotel, New York, N. Y.
SCHULTZE & WEAVER, Architects
18 E. 48th St., New York City
CLYDE R. PLACE, Mechanical Engineer
Graybar Building, New York, N. Y.
THOMPSON & STARRETT CO., INC., General and Electrical Contractors
Long Island City, N. Y.

Return Call Annunciator

This type of annunciator is used principally in small hotels, Y. M. C. A. and similar club houses and nurses' homes.

The annunciator serves to indicate calls from the different rooms and the push buttons are used for signalling to the rooms.

Return Call Annunciator



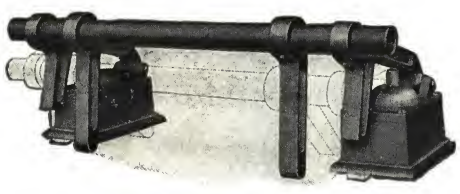
Pattern "B" Annunciator

Pattern "B" Annunciator, Desk Type

This type annunciator is furnished in solid cast bronze case with felt-covered bottom and includes 6 ft. silk-covered flexible cable for connecting.

Foot Switch, Rail Type

Heavy cast bronze construction with bronze tubing rail. For mounting on floor under counter.



Foot Switch, Rail Type

SIGNAL ENGINEERING & MFG. CO.

57 Seventh Avenue
(154 West 14th Street)
NEW YORK, N. Y.

DISTRIBUTORS

UNITED STATES

AMERICAN DISTRICT TELEGRAPH COMPANY,— and Controlled Companies
GRAYBAR ELECTRIC COMPANY, INC.,— and Other Leading Electrical Jobbers

CANADA

DOMINION ELECTRIC PROTECTION COMPANY
NORTHERN ELECTRIC COMPANY, LTD.

EXPORT

INTERNATIONAL STANDARD ELECTRIC CORPORATION, 67 Broad Street, NEW YORK, N. Y.

Offices in All Principal Cities of the World

RENTAL INSTALLATIONS

BELL TELEPHONE COMPANIES Will Install and Maintain Signal Code Call Systems on a Rental Basis

---

Products

SYSTEMS:

Fire Alarm — Tank Alarm
Code Calling or Paging — Special Signal
Special Control

SIGNALS:

Bells, Horns, Special Tone Signals.

MAGNETIC RELAYS.

Services

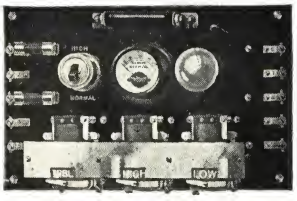
SIGNAL's Engineering Department and Laboratory services are offered in connection with developing circuits and apparatus for signaling and control systems through relays.

Approvals

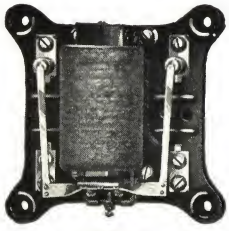
Underwriters' Laboratories, Inc.
Factory Mutual Association, Inc.
Investigating Committee of Architects and Engineers.

Signal Code Call System
For Complete Description, see following page

Fire Alarm System
For Complete Description, see fourth page following



Tank Alarm System
For Complete Description, see fifth page following



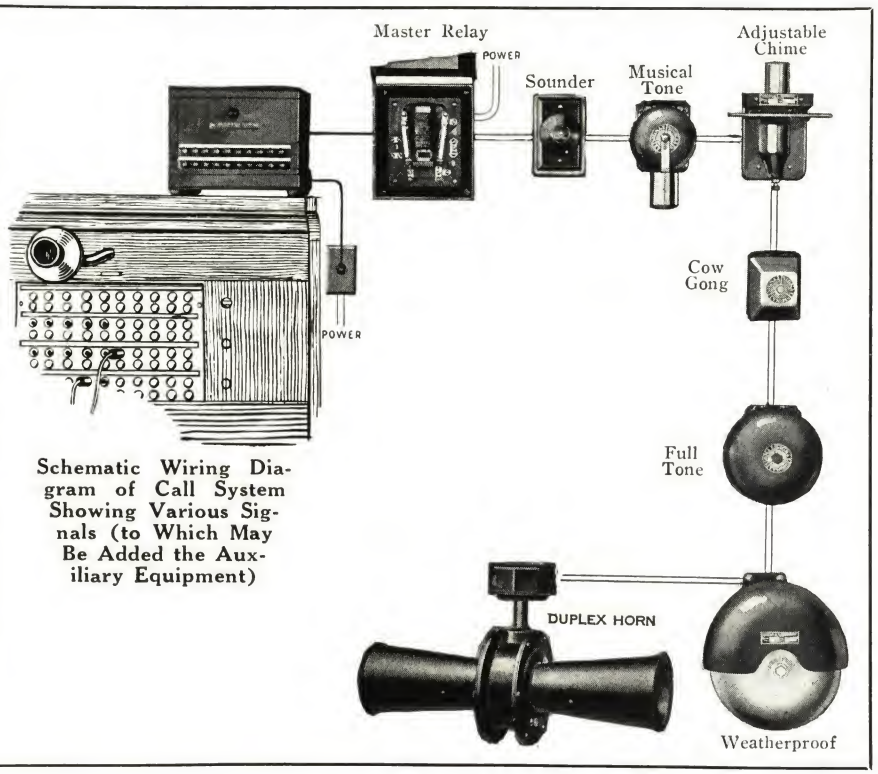
Relay
For Complete Description, see third page following

SIGNAL CODE CALL SYSTEM

More Calls Over Fewer Trunk Lines

The SIGNAL CODE CALL System is primarily a means for promptly completing telephone calls by automatically reaching members of an organization and calling them to nearest branch telephone; and for broadcasting special messages or emergency signals. SIGNAL CALL service is in general use in factories, hospitals, large offices, banks, schools, garages, department stores.

Code numbers are assigned to members of an organization. When one fails to answer his desk telephone, operator presses code button, which broadcasts his number three times on Signal devices so distributed as to be heard throughout the premises. The person called steps to nearest telephone and the call is promptly *completed.*



Schematic Wiring Diagram of Call System Showing Various Signals (to Which May Be Added the Auxiliary Equipment)

Sending Station

Sectional Units

May be placed directly on telephone switchboard. Free from noise or magnetic influence

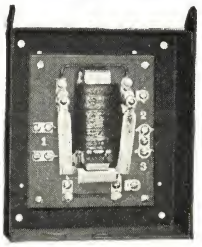
Driven by electro-magnet. Has jeweled bearings and centralized make and break. Case of solid brass finished in black enamel. (Special finish upon request.)

Furnished complete for 10, 20, 40 or 60 calls. To increase from 10 to 20, the first 20-call section is substituted for the 10-call section. To increase from 20 to 40, the second 20-call section is added. To increase from 40 to 60, the third 20-call section is added. All electrical connections are automatically made. This gives flexibility not ordinarily found in other apparatus. More than 60 calls, special.

Dimensions: 10 or 20-call stations, 7¾x6½x6¼ in. Additional section 1½ in. high. Two or more sending stations may be operated in multiple without interference by using SIGNAL CALL Relays. (Wiring diagram furnished.)

Signal Call Relay

The SIGNAL CALL Relay is our standard heavy duty type adapted to the requirements. The coil is operated by the sending station, the contacts closing the signal circuit. It is thus possible to use one voltage for sending station and another for signals. Each relay will carry from 10 to 25 signals. With additional relays in multiple or connected in signal lines, the system may be pyramided to any extent. The design, rating and method of wiring this relay insures positive and continuous operation.



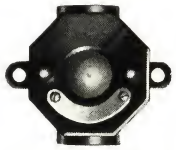
Signal Call Relay

Auxiliary Service

Automatic Time Sender

Automatic Time Sender—Operates 15 rapid signals automatically from clock or push button, to broadcast starting, stopping or other program signals.

Watchman's Call—Push button at main or other entrance broadcasts watchman's call over the system independent of the SIGNAL CALL, giving one ring for each push of button.



Weatherproof Watchman's Push Button

Night Telephone Relay—A special telephone relay furnished by local telephone companies.

When leaving switchboard at night, operator plugs into this relay line, leaving the key at a predetermined number on the SIGNAL CALL in operative position.

Telephone calls then actuate the SIGNAL CALL System to broadcast the call.

Night Telephone Relay

SIGNALS

For Specifications, see Fourth Page Following

The signals illustrated are used with Signal Call, Fire Alarm, Tank Alarm and Burglar Alarm Systems, Telephone Loud Ringing Sets and any other type of electrical signal device.

Furnished to operate on all commercial voltages and frequencies from 6 to 250 volts. Variety sufficient to meet all conditions.

Bells

Diameter, 4 to 20 in. Single stroke and vibrating for indoor or outdoor, multiple or series.

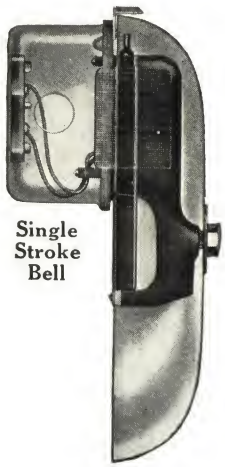
Bell shells made of hot pressed steel, parkerized; cast bell metal, or special non-corrosive alloy. Special finish if specified. Mechanism of solenoid type and underdome construction. Single stroke bells have but one moving part (plunger), hence maintenance free. Coils form wound, impregnated and moistureproof. No double tapping.

Weatherproof Bells

Have rustproof bell metal gongs and cast iron shields. For use on outdoor applications. Protective guards of heavy wire, rigidly secured are also furnished when specified

Vibrating Bell

Vibrating type of bell is primarily of single stroke construction (shown at right) with the addition of the vibrator unit shown above. Wired to operate either single stroke or vibrating, when specified



Single Stroke Bell

Universal Back Box

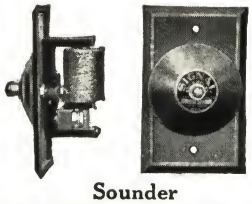
Fits all sizes from 4 to 12 in., of Signal Engineering Indoor Bells and Chimes. Permits completion of wiring in advance of bell mounting (flush or surface). Compact and sturdy.

Adapter Plate

Left:

For all bells. To attach to any standard outlet box

Special Tone Signals



Sounder

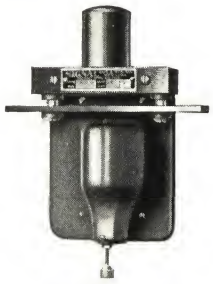
Suitable for locations where a faintly audible signal is desirable. Plate and cone are of bakelite, of standard switch-box dimensions. Choice of four different colors. Buzzer—Same as sounder, with vibrating tapper

Cow Gong

Standard 4-in. bell mechanism with special cast bell metal gong. Gives a particularly distinctive sound

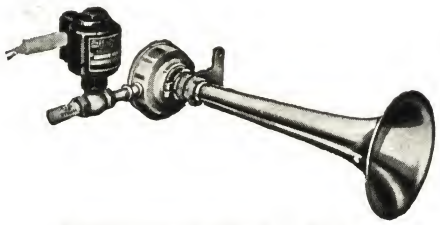
Musical Tone Bell

Same as 4-in. bell, with resonator chamber added, which mellows the tone. Suitable for hospitals, libraries and department stores, where a more musical tone is desired



Chime

Gives a distinctive musical tone of remarkable penetration. *Tone volume adjustable.* Suitable for banks, offices, stores, hospitals, etc. Olive green enamel finish. Chime bar and resonator nickelplated

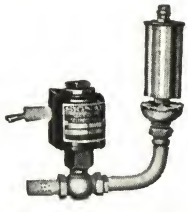


Air Horn with Electric Valve

Complete with electric valves for any pipe size and pressure. Standard projectors 15 or 24 in. long. For applications requiring sound to carry approximately one mile

Duplex Horn

Has two free vibrating diaphragms with but one moving part—a sturdy, self-lubricating plunger of great wearing quality. Free from springs, vibrating reeds or other delicate parts. May be mounted in any position. If a-c., 60 cycles only. Very effective for code signaling because of distinctive vibrant sound. Two projectors send sound in opposite directions with carrying capacity of two horns. Volume control adjustable by means of thumbscrews. Furnished w single, double, or without projector



Steam or Air Whistle with Electric Valve

For air or steam pressures up to 200 lb., complete with electric valve for any pipe size. Whistle chambers furnished for any diameter as specified. Particularly recommended in the small sizes for industrial installations

MAGNETIC RELAYS

SIGNAL ENGINEERING & MFG. CO. Relays, standard and special designs, serve in a wide variety of applications in automatic and remote control circuits.

Standard Relays

Class L
Light duty—front contacts. Operates on minimum current

Class E
Heavy duty—make and break on carbon contacts and maintain on copper contacts

Model 3
Front and back contact design

Three of the Standard Type Relays

Construction—

Coils—Form wound

Core—Laminated silicon steel, low iron loss.

Shading Coil—Copper in face of alternating current core, to insure quiet operation.

Bearings—Phosphor bronze.

Armature Shaft—Rustproof steel.

Pins—Non-freeze pins in armature, to insure quick release.

Mounting Base—Insulating material.

Contacts—Silver, copper and carbon as required to meet conditions.

Contact Arms—Phosphor bronze, design gives wiping action on contacts. Special construction reduces rebound after contact.

Housings—Three types—(1) Stamped steel with hinged cover and knockouts on four sides. (2) Weatherproof, cast iron, tapped at top and bottom for ¾-in. conduits. (3) Glass, fitted with gasket.

Metal Parts—All metal parts are plated to protect against corrosion.

Operation—

On alternating and direct-current circuits of any voltage and frequency.

Operating Energy—As low as 0.036 watt on the light duty types.

Contact Circuits—Capacity, 20 amperes maximum. One circuit or two circuits (one or two poles). One or two breaks per circuit on single circuit. Circuit closed when coil is energized (front contact design). Circuit open when coil is energized (back contact design). Circuit of front contacts closed and of back contacts opened when coil is energized (front and back contact design).

TYPE DESIGNATIONS AND RATINGS

Operating current, A-c. (**A**) or D-c. (**D**)	Class	Number of circuits	Model, according to contacts	Contacts: Capacity, amp. at 110 volts A-c	Contacts: Capacity, amp. at 110 volts D-c	Contacts: Material Silver (S) carbon (C)	Housing Steel (**G** or **H**) Weatherproof (**W**)
A or **D**	Light duty **L**	One **J**	Front **1**	5	4	S	**G** or **W**
A or **D**	Light duty **L**	One **J**	Back **2**	5	3	S	**G** or **W**
A or **D**	Light duty **L**	One **J**	F & B **3**	F5, B5	F4, B3	S	**G** or **W**
A or **D**	Light duty **L**	Two **U**	Front **1**	5	4	S	**H** or **W**
A or **D**	Light duty **L**	Two **U**	Back **2**	5	3	S	**H** or **W**
A or **D**	Light duty **L**	Two **U**	F & B **3**	F5, B5	F4, B3	S	**H** or **W**
A or **D**	Power 10 amp. **P**	One **J**	Front **1**	10	10	C	**G** or **W**
A or **D**	Power 10 amp. **P**	One **J**	F & B **3**	F10, B15	F10, B6	F-C, B-S	**G** or **W**
A or **D**	Power 10 amp. **P**	Two **U**	Front **1**	10	10	C	**H** or **W**
A or **D**	Power 10 amp. **P**	Two **U**	F & B **3**	F10, B15	F10, B6	F-C, B-S	**H** or **W**
A or **D**	Power 15 amp. **R**	One **J**	Front **1**	15	8	S	**G** or **W**
A or **D**	Power 15 amp. **R**	One **J**	Back **2**	15	6	S	**G** or **W**
A or **D**	Power 15 amp. **R**	One **J**	F & B **3**	F15, B15	F8, B6	S	**G** or **W**
A or **D**	Power 15 amp. **R**	Two **U**	Front **1**	15	8	S	**H** or **W**
A or **D**	Power 15 amp. **R**	Two **U**	Back **2**	15	6	S	**H** or **W**
A or **D**	Power 15 amp. **R**	Two **U**	F & B **3**	F15, B15	F8, B6	S	**H** or **W**
A or **D**	Power 20 amp. **E**	One **J**	Front **1**	20	10	C	**H** or **W**
A or **D**	Power 20 amp. **E**	Two **U**	Front **1**	20	10	C	**H** or **W**
A or **D**	Thermostatic **M**	One **J**	Front **1**	20	5	C	**H** or **W**
A or **D**	Thermostatic **M**	One **J**	F & B **3**	F15, B15	F5, B5	F-C, B-S	**H** or **W**
A or **D**	Thermostatic **M**	Two **U**	Front **1**	20	5	C	**H** or **W**
A or **D**	Thermostatic **M**	Two **U**	F & B **3**	F15, B15	F5, B5	F-C, B-S	**H** or **W**

TELEPHONE EXTENSION RINGING RELAYS AND SETS

Operating on 16 to 20 cycles, 75 to 90 volts; contact capacity: 5 amp. on 110 volts d-c., 4 amp. on 110 volts, a-c.

Type designation: Relay	Type designation: Housing	Operating coil, ohms	With condenser in series
ATJ-1	**G** or **W**	1000	
ATJ-12	**G** or **W**	1700	
No. 1	**G** or **W**	1000	1 mf.
No. 2	**G** or **W**	1000	2 mf.
No. 3	**G** or **W**	1700	1 mf.
No. 4	**G** or **W**	1700	2 mf.
***DTJ-1**	**G** or **W**		

*Operates on storage battery, specify volts.

TELEPHONE LOCKING RELAY SETS FOR POLICE AND TAXICAB SIGNALING

(Data in LP-28 price list, furnished on request)

Notes

Operating Current: When ordering, specify voltage and, if alternating current, the cycles, i.e.: "Type **ARU3-W,** 110 v. 60 cycles."

Number of circuits: Corresponds to number of poles of a switch.

Model according to contacts:
1—Front contacts, closed when coil is energized.
2—Back contacts, open when coil is energized.
3—Front and back contacts.

Contacts: Ratings apply to non-inductive load. Ratings on two-circuit relays apply only when right and left control the same circuit.

Housing: Outside dimensions—Steel **(G)** 5x7x3 in.; Steel **(H)** 6½x8x3 in.; Weatherproof **(W)** 6¼x9½x3½ in. If housing is not required, omit letter **G, H** or **W,** i.e. **ARU3,** 110 v. 60 cycles.

Thermostatic relays operate from temperature control thermostats, 3-wire (common, high and low), on minimum of current and eliminate sparking at contacts of control instrument.

Special Relays

Many designs of special relays, including combinations, with mercury tubes, condensers, resistors, time relay devices and amplifier tubes—results of long experience in this field of engineering, are available for a great variety of circuit control applications. Our Engineering Department studies circuit and relay problems and offers solutions.

FIRE ALARM SYSTEMS

For Schools, Hotels, Hospitals, Public and Office Buildings, Factories, Garages and Airports

Systems are listed by Underwriters' Laboratories, Inc., Fire Prevention Bureaus, and also have the approval of The Investigating Committee of Architects and Engineers.

Specification writers may use "Signal Engineering Fire Alarm System" as a standard of quality and efficiency; and with the assurance that contractors can readily obtain estimates through any of our distributors and through any of the clock, telephone or signal manufacturers whose products are being specified.

The three stages of service—engineering, selling and maintenance—are provided and will be found particularly satisfactory. A "Signal Engineering" specialist is always near and always available.

Type of Systems

Two general types of systems are provided: (1) selective code systems using pull-lever coded stations; (2) general alarm and master code systems using non-code break-glass stations.

Selective Code Systems—Are furnished in two forms—

(CA) The *Standard System,* for schools and for other buildings, where the occupancy is such that it is desirable to immediately evacuate the building in case of fire or other emergency; and

(CAD) The *Pre-Signal System,* for hospitals, hotels and other buildings where a fire squad or an emergency force is always available to respond to the first alarm sounded on signals located in their quarters, and who can sound a general alarm throughout the premises if the emergency warrants the clearing of the buildings.

In either the *Standard* or the *Pre-Signal* Selective Code System, the location of the station which has been operated is indicated by its special code sounding on the signals.

A Selective Code System consists of a control panel with trouble bell, coded pull-lever stations (break-glass type if in schools or hotels) and single stroke bells (or horns).

General Alarm Systems Are Furnished in Two Forms—

(G) The *Continuous General Alarm System,* in which the breaking of glass or opening of door of station automatically sends out, through the control panel, a continuous series of single strokes on all bells or signals, until glass is replaced and station door closed. Timing is adjustable to march time, quickstep or slow-measured signals. No winding or resetting of sender is required.

(T) The *Master Code System,* in which the breaking of the glass or opening of the door of station automatically sends out, through the control panel, four rounds of a code signal—such as 2-3 or 4-4 (state which, or order special code as required). No winding or resetting of code sender is required.

City Fire Alarm Connection—Is provided with either of the Selective Code Systems, through the use of the Signal Engineering Sentinel Panel. This panel is a small safeguard device, mounted on ebony asbestos and inclosed in a locked housing. Connection from the interior system to the municipal fire alarm box is made through this Sentinel Panel; which prevents any alarm going through to the City, except one regularly sent from a coded station of the interior system. An open or ground or other disarrangement of the interior system will not sound the City alarm.

Supervision—All systems are closed circuit type and fully supervised. Double supervision, to guard against failure of trouble bell supply, can be furnished on any system when so specified.

Control Panels—Panels are ½ in. Ebony Asbestos and equipped with milliammeters, supervisory and contactor relays, balancing resistors, time delay cutout and terminals. Regularly made in sizes from 1 to 5 signal circuits. In cases where provision is to be made for a larger system in future, the ultimate number of circuits may be provided and strapped out.

Housings—Four types are furnished, as follows:
Type F, Flush—Small window.
Type L, Flush—Full glass.
Type K, Surface—Small window.
Type M, Surface—Full glass.

Housings are constructed of code gauge steel, with removable trims, fitted with Yale locks. Finish is flat gray, to permit refinishing on the job if required.

Capacity—Any number of stations may be used, and terminals will be provided on the panel on a basis of approximately one circuit for each twenty (20) stations. Panels are regularly furnished up to five (5) signal circuits. Capacities beyond five (5) signal circuits may be supplied on special order.

The number of signal circuits required is determined on the following basis:

110 volts, 60 cycles—10 Bells or 8 Horns to each circuit.

24 volts, d-c.—5 Bells to each circuit.

Trouble Bells—A rectangular trouble bell (FAV-4-4) is furnished for exterior mounting, and may be attached directly to the surface type housing. *Dome type* trouble bells are furnished, mounted on panels, instead of the exterior type, when so ordered. Trouble bells may be for 12 volts to 110 volts, a-c., 60 cycles, or 6 volts to 110 volts, d-c.

Stations—For *Selective Code* systems, use code-type pull-lever stations, giving four rounds of the particular code number assigned to that station. Stations may be surface or flush type; and either break-glass to open door, or plain door with handle. (See next page for types.)

For *General Alarm* and *Master Code* systems, use plain non-code break-glass types. (See following page for description and illustration.)

Signals—Single stroke bells, or horns, series-connected, as follows:

Bells—On 110 volts, a-c., 60 cycles, a series circuit of not more than ten 11-volt Bells, type FAS-(size).

On 24 volts, d-c., a series circuit of not more than five 4-volt Bells, type FBX-(size).

Horns—On 110 volts, a-c., 60 cycles, a series circuit of not more than eight 12-volt Horns, type FAC-1.

FIRE ALARM PANELS

CLASS CA - SELECTIVE SYSTEMS (USING CODED STATIONS) - ALTERNATING CURRENT
CLASS CD - " " " " - DIRECT CURRENT
CLASS G - GENERAL ALARM SYSTEMS (CONTINUOUS REPEATED SIGNALS)
CLASS T - MASTER CODE SYSTEMS (4 ROUNDS OF A FIXED CODE)
(NOTE NON-CODE STATIONS USED WITH CLASSES 'G' & 'T')

TYPE OF SYSTEM		NUMBER OF SIGNAL CCTS	SINGLE SUPERVISED				DOUBLE SUPERVISED			
			TRBL BELL ON PANEL		EXT. TRBL BELL ONLY		TRBL BELL ON PANEL		EXT. TRBL BELL ONLY	
			WITHOUT PILOT & SWITCH	WITH PILOT & SWITCH	WITHOUT PILOT & SWITCH	WITH PILOT & SWITCH	WITHOUT PILOT & SWITCH	WITH PILOT & SWITCH	WITHOUT PILOT & SWITCH	WITH PILOT & SWITCH
SELECTIVE CODE SYSTEMS	STANDARD	1	CA-1-B	CA-1-BV	CA-1	CA-1-V	CA-1-DB	CA-1-DBV	CA-1-D	CA-1-DV
		2	CA-2-B	CA-2-BV	CA-2	CA-2-V	CA-2-DB	CA-2-DBV	CA-2-D	CA-2-DV
		3	CA-3-B	CA-3-BV	CA-3	CA-3-V	CA-3-DB	CA-3-DBV	CA-3-D	CA-3-DV
		4	CA-4-B	CA-4-BV	CA-4	CA-4-V	CA-4-DB	CA-4-DBV	CA-4-D	CA-4-DV
		5	CA-5-B	CA-5-BV	CA-5	CA-5-V	CA-5-DB	CA-5-DBV	CA-5-D	CA-5-DV
	PRESIGNAL	1	CAD-1-B	CAD-1-BV	CAD-1	CAD-1-V	CAD-1-DB	CAD-1-DBV	CAD-1-D	CAD-1-DV
		2	CAD-2-B	CAD-2-BV	CAD-2	CAD-2-V	CAD-2-DB	CAD-2-DBV	CAD-2-D	CAD-2-DV
		3	CAD-3-B	CAD-3-BV	CAD-3	CAD-3-V	CAD-3-DB	CAD-3-DBV	CAD-3-D	CAD-3-DV
		4	CAD-4-B	CAD-4-BV	CAD-4	CAD-4-V			CAD-4-D	CAD-4-DV
		5	CAD-5-B	CAD-5-BV	CAD-5	CAD-5-V			CAD-5-D	CAD-5-DV
GENERAL ALARM SYSTEMS		2	G-2-B	G-2-BV	G-2	G-2-V	GD-2-B	GD-2-BV	GD-2	GD-2-V
		4	G-4-B	G-4-BV	G-4	G-4-V	GD-4-B	GD-4-BV	GD-4	GD-4-V
		5	G-5-B	G-5-BV	G-5	G-5-V	GD-5-B	GD-5-BV	GD-5	GD-5-V
MASTER CODE SYSTEMS		2	T-2-B	T-2-BV	T-2	T-2-V	TD-2-B	TD-2-BV	TD-2	TD-2-V
		4	T-4-B	T-4-BV	T-4	T-4-V	TD-4-B	TD-4-BV	TD-4	TD-4-V
		5	T-5-B	T-5-BV	T-5	T-5-V	TD-5-B	TD-5-BV	TD-5	TD-5-V

PANEL SIZE - 16"W x 20"H
HOUSING SIZE - 20"W x 24"H
FLUSH TRIM - 23"W x 27"H

HOUSINGS

FLUSH		SURFACE	
SMALL WINDOW	FULL GLASS	SMALL WINDOW	FULL GLASS
F	L	K	M

NOTE
NOT OVER 10 BELLS OR 8 HORNS ON 110 VOLTS A.C. NOT OVER 5 BELLS ON 24 VDC

INFORMATION REQUIRED

(1) TYPE DESIGNATION
(2) OPERATING VOLTAGE (AND CYCLES IF A.C.)
(3) TROUBLE BELL " " " "
(4) NUMBER & SIZE OF SIGNALS TO BE USED ON EACH CIRCUIT (SEE NOTE ABOVE.)
(5) CODES FOR STATIONS ON 'C' SYSTEMS, MASTER CODE (2-3 OR 4-4) ON 'T' SYSTEMS
(6) HOUSING TYPE (ORDER AS SEPARATE ITEM)

FIRE ALARM STATIONS

Stations are modern in design and operation. A straight, downward pull on the wide handle of lever winds spring and releases automatically at end of "pull," sounding four rounds of the code number of the station.

All stations listed below are "non-interfering," in the sense that any manipulation of the lever after it has been pulled to its low position, will in no way interfere with the sounding of the coded alarm.

Back boxes are furnished for either flush or surface mounting, and arranged for ½ to ¾-in. conduit. Boxes may be shipped in advance for installation with conduit.

FP
Flush Type

Open Door, Pull Lever, Coded Stations

Spring catch door protects pull lever against damages.

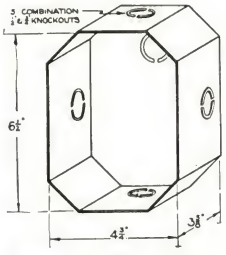
SP
Surface Type

FGP
Flush Type

Break Glass, Open Door, Pull Lever, Coded Stations

For schools, hotels and other places where door might be subject to tampering.

"W" Weatherproof Housing for All Types of Stations



Back Box for Flush Stations

List prices on all types of stations include back box which is billed at $2.50 when shipped in advance. This advance billing is deducted when remainder of order is shipped

Type Designations

Standard Coded Stations—*Closed Circuit, Open Door, Pull Lever*—SP—Surface type; FP—Flush type.

Closed Circuit, Break Glass, Pull Lever—SGP—Surface type; FGP—Flush type.

Pre-signal Coded Stations—*Closed Circuit, Open Door, Pull Lever*—SPD—Surface type; FPD—Flush type.

Closed Circuit, Break Glass, Pull Lever—SGPD—Surface type; FGPD—Flush type.

Note: For weatherproof housing, add "W" to any type designation.

Vibrating Cow Gong Trouble Bell

Trouble Bells

Type FAV4-4 illustrated is used when a disarrangement signal external to the control panel is required.

Otherwise a dome type bell is supplied on the panel.

Break Glass Non-code Station

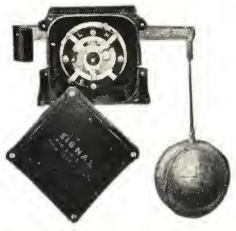
Use only with General Alarm and Master Code Systems. Breaking glass of station causes alarm to be sounded. Keys are provided for Fire Drill and Testing.

NON-CODE STATIONS*
Closed Circuit—Break Glass
SG-1 Surface Type
FG-1 Flush Type

*Fits standard single gang switch opening.
No back box furnished.

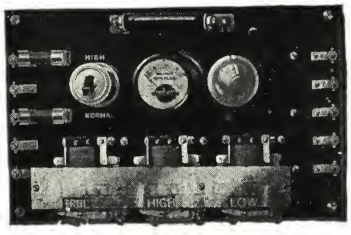
SIGNAL ENGINEERING TANK ALARM SYSTEM

The Signal Engineering High and Low Water Tank Alarm Systems indicate the water level limits in elevated water supply tanks. Equipment consists of a single copper float ball operating a high-low level tank switch, tank bell, trouble bell and an indicating control panel. This control panel is inclosed in a steel cabinet with glass door, and consists of a panelboard on which are mounted milliammeter, red lamp, transfer switch, test plugs, wire terminals, and three Signal Engineering Relays. Each of these relays has a properly worded target, which appears only when the relay is operated.



Float Controlled Switch

This system operates on a closed circuit under constant electrical supervision. Disarrangement of this system—such as a broken wire or connection—is indicated by the meter reading, the ringing of trouble bell, and by panel target reading "Trouble." Low water is indicated by ringing of the tank bell, by the lighting of a red lamp, and by a target drop reading "Low." High water is indicated by the tank bell and by a target drop reading "High." Trouble bell also rings with the high and low water indications. System is designed for operation on lighting current of 110-220 volts, a-c. or d-c.



Control Panel

DATA FOR THE SPECIFICATION WRITER

Specifications for Fire Alarm Systems

The four commonly accepted types of systems are covered in the following composite specification. Paragraphs indicated by (CA) apply only to the *Standard Selective Code System;* and (CAD), (G) and (T) apply to their corresponding systems. Text in parentheses is informative only and should be deleted, together with paragraphs not applicable to the system being specified.

System

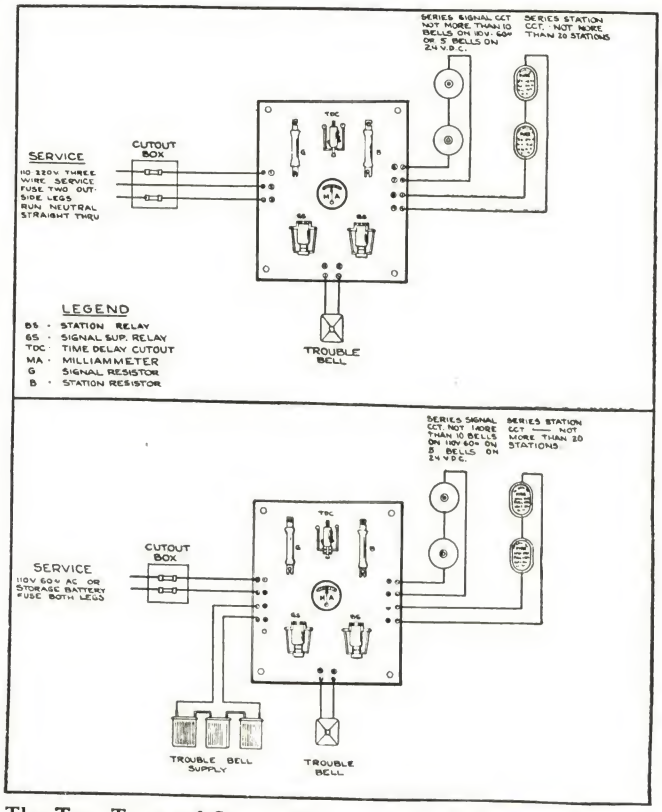
The system shall be the
(CA) *Standard Selective Code* type
(CAD) *Pre-Signal Selective Code* type
(G) *Continuous General Alarm* type
(T) *Master Code Transmitter* type
as manufactured by the SIGNAL ENGINEERING & MFG. CO., or equal, as approved in writing by the Architect (or Engineer).

(CA) Operation—Pulling down the lever of any station will sound on all signals, four rounds of the code of that station. At the completion of the four rounds, the system shall automatically restore itself to normal.

(CAD) Operation—Pulling down the lever of any station will sound on the pre-signal or pilot signals, four rounds of the code of the station operated. To sound an alarm throughout the building(s), a key is inserted in the station, and lever again pulled—sounding on all signals, four rounds of the code of that station.

(G) Operation—Breaking glass or opening door of station automatically sends out, through the control panel, a continuous series or single strokes on all bells or signals, until glass is replaced and station door closed. The system must be fully automatic, requiring no winding or resetting.

(T) Operation—Breaking glass or opening door of station automatically sends out, through the control panel, four rounds of a code signal—such as 2-3 or 4-4 (specify which), sounding on all signals. The system must be fully automatic, requiring no winding or setting.



The Two Types of Service Connections, and a Signal Circuit as Used on Any System

The station circuit shown above is used only on standard selective code system

(CA) (CAD) (G) (T) Control Panel—Panel is to be located in apparatus room in basement, as shown on plans (locate in a conspicuous and accessible place). Panel is to be of Ebony Asbestos and equipped with necessary supervisory and control equipment, including milliammeter and time delay cutout, and is to be furnished and installed complete with surface (or flush) type cabinet, with window to show milliammeter (full glass door if specified). Conduits shall enter cabinet through knockouts only, on sides or bottom.

(CA) (CAD) (G) (T) Trouble Bell—Panel is to be equipped with trouble bell (an external trouble bell may be provided and located as desired, in which case the trouble bell on panel may not be necessary). Specify as indicated by conditions.

(CA) Stations—Stations are to be coded flush open-door pull-lever type, installed and connected at locations as shown on plans, and with lower part of outlet box 5½ ft. from floor. The flush back box is to be roughed-in with conduit work. *Alternate* (for schools, etc.). Add, "Stations are to be break-glass type." (Locate stations at least one on each floor and so that there will be a station within 100 ft. of any point on the floor.)

(CAD) Stations—Stations are to be coded flush open-door pull-lever pre-signal type, installed and connected at locations as shown on plans, and with lower part of outlet box 5¼ ft. from floor. *Alternate* (for hotels, etc.). Add, "Stations are to be break-glass type." (Locate stations at least one on each floor and so that there will be a station within 100 ft. of any point on the floor).

(G) (T) Stations—Stations are to be of the plain non-code break-glass type, with normally open contacts, and to fit a single gang switch opening on a standard outlet box.

(CA) (CAD) (G) (T) Signals—Bells are to be 8-inch, single stroke solenoid type, underdome, semi-flush, rust-proofed and finished in dull black. The Universal back box is to be roughed-in with conduit work. (6, 10 or 12-in. Bells (or Horns) may be specified.)

(CA) (CAD) (G) (T) Current Supply—The system is to operate from the 3-wire 110-220 volt a-c. or d-c. commercial supply. (If a 3-wire 110 volt supply is not available, specify 2-wire 110 volt, and a 24- or 6-volt direct current supply for trouble bell. If there is a 24-volt clock system, use this 24-volt supply for trouble bell. If no storage battery is available, specify four dry cells for the trouble bell supply. The whole system may be operated from 24-volt storage battery, but 110-volt service is recommended.

(CA) (CAD) (G) (T) Wiring—Provide at point near meter a locked box containing a fused cutout connected to main supply. (Neutral should not be fused if 3-wire service is used.) From this point run 3 No. 14 wires to the control panel. (If battery is used for trouble bell, specify 2-wire 110-volt supply, and a 2-wire supply from storage battery or from the dry battery. If storage battery is used for operating system, specify 4 wires from storage battery to control cabinet.)

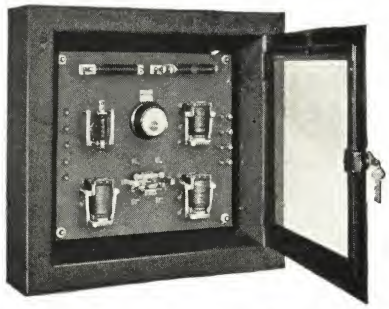
(CA) For each station circuit provide 2 No. 14 wires to form a loop on which the stations are connected in series.

(CAD) For station circuit provide 4 No. 14 wires to form two loops connected through the stations in series.

(G) (T) For station circuit: The stations are to be connected in parallel across two continuous loop circuits, starting from two of the four station terminals on the control panel; and, after connecting through all stations, returning to the other station terminals on the panel.

(CA) (CAD) (G) (T) For signal circuits provide two No. 14 wires to form a loop on which the signals of the circuit are connected in series.

Connection diagram will be furnished by the manufacturer, and all wiring is to be according to standard requirements for lighting and power, as given elsewhere in these specifications.



Typical Control Panel
Mounted in Type "M" Surface Cabinet, with full glass door.
Size 20 in. wide by 24 in. high

Optional Equipment Which May Be Specified

(CA) (CAD) (G) (T) Under "Control Panel" heading:

Pilot Lamps—Panel shall also be equipped with pilot lamp and throw-over switch to transfer trouble signal to pilot lamp. When trouble is cleared, trouble bell must resume ringing until switch is thrown back to normal position.

(CA) (CAD) (G) (T) Under "System" heading:

Double Supervision — System shall be double supervised.

City Fire Department Connection—(CA) (CAD) (Under Special Heading): The system shall be arranged to connect with an auxiliary type municipal fire alarm box—furnished by others. Contractor will provide a Sentinel Safeguard Panel, through which the interior system is to be connected by a two-wire circuit to the City box. This Safeguard Panel must positively prevent any alarm being transmitted to the City system, in case of trouble or disarrangement of the interior system; and shall allow only a regular alarm, sent from a station of the interior system, to get through to the City system. The Sentinel equipment shall include a cut-out device, to permit fire drills and tests on the interior system, without tripping the City Fire Alarm Box. (This Sentinel Panel should be located at a point near the municipal fire alarm box, and preferably in a locked closet or room.)

Specifications for Code Calling System and Auxiliary Service

Code Calling System—A complete code calling system shall be installed, as manufactured by the SIGNAL ENGINEERING & MFG. CO., to operate on .... volts (specify voltage, with cycles if a-c.). It shall be complete with sending station, relay and signals.

Sending Station—Shall be so designed that additional key sections may be added to meet future requirements without necessitating changes in wiring. The mechanism shall be a jeweled magnetic movement free from any motor. It shall be inclosed in a solid brass, dustproof case with standard black (or special) finish.

Relay—Shall be capable of handling 25 signals. It shall be free from springs, and shall have a form-wound moistureproof coil.

Signals—Shall consist of Signal Engineering .... (give number of signals and type). All gongs to be electrically operated, of the underdome type, free from springs, contact points and hinges. They shall embody the solenoid principle in design and have but one moving part (the plunger) free to move up and down within a bakelite tube. The magnet coil shall be form-wound, self-impregnated and moistureproof. Bells shall be so designed as to eliminate double tapping.

Auxiliary Service—***Automatic Time Sender***—Shall be a separate unit placed in some out-of-the-way location. It shall have a jeweled magnetic movement and shall be so designed as to permit automatic broadcasting of 15 rapid signals at predetermined times.

Night Telephone Service—Shall permit incoming calls to be brought to the attention of the watchman when operator is not on duty. It shall consist of a telephone relay, which shall have a form-wound self-impregnated moistureproof coil.

Watchman's Call—Shall provide a weatherproof push button (key type contact switch) to be placed at main or other entrance. It shall sound once on all signals for each operation.

Specifications for Tank Alarm System

The contractor shall furnish and install a High and Low Water Tank Alarm System, as manufactured by the SIGNAL ENGINEERING & MFG. CO., 57 Seventh Avenue, New York, N. Y. This system shall consist of a single copper float ball operating a high-low level tank switch, tank bell, trouble bell and indicating control panel. This control panel is to be inclosed in steel cabinet with glass door, and shall consist of a panelboard on which are mounted milliammeter, red lamp, transfer switch, test plugs, wire terminals, and three Signal Engineering Relays, each of these relays to have a properly worded target which will appear only when the relay is operated. This system operates on lighting current (110-220 volts, a-c. or d-c.).

Co-operation with Architects

SIGNAL ENGINEERING & MFG. CO. sales representatives will co-operate with architects, engineers and owners to determine the most practical installation for requirements indicated; and will furnish without cost, specifications, layouts and estimates based on conditions and covering the installation of any service within the scope of its manufacture.

All apparatus is guaranteed to be free from inherent electrical and mechanical defects.

ESTABLISHED 1904

SCHWARZE ELECTRIC CO.

Schwarze Specialized and General Service Sound Signals and Accessories

ADRIAN, MICH.

OFFICES IN PRINCIPAL CITIES

Products

BELLS, BUZZERS, HORNS, SIRENS, KODE-KALL.

Pioneer manufacturers of non-arcing, polarized, non-contact, plunger type alternating-current bells and buzzers.

Characteristics

Accessible, simplified, rugged construction; symmetrical design; labor-saving installation; integral conduit connections; low current consumption; low initial cost; weatherproof; long-lasting, dependable performance.

Standard finish, black. Optional finish, red, for fire alarm use.

Applications and Uses

Schools, institutions, hospitals, public buildings, office buildings, industrial plants, mines, railroads, shipping, stores, construction projects, etc.

Fire, sprinkler, burglar, hold-up, switchboard, powerhouse and engine room alarm systems; code paging and program clock systems; traffic control; special signaling systems; elevators; tanks; automatic control systems.

Indoors and out, light and heavy duty.

Installation Data

Installation data, roughing-in dimensions, resistance tables and current requirements furnished on request.

No. 700 Series

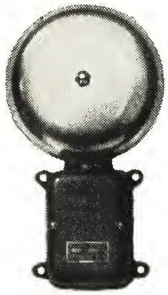
Famous "Cyclone" Vibrating Bells

Up to 14-in. gong diameter. Weatherproof, loud ringing. For class rooms, corridors, yard use and general service.

No. 700 Series—For a-c. No contacts. Polarized. For use on transformer or high voltage, 25 or 60-cycles.

No. 6F—For 6 volts and higher d-c.

No. 6F



No. 37

Single Stroke Heavy Duty Bells

Plunger type, 6 volts and higher. No contacts. Weatherproof.

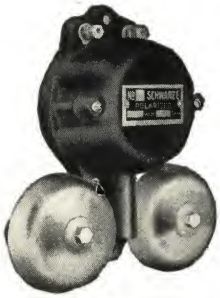
No. 37A—For a-c.

No. 37D—For d-c.

Sizes up to 12 in. For code signaling, announcement, fire-alarm.

No. 26—3-in. bell metal gong. For 6 volts and higher a-c. or d-c. Mellow and distinct. For call signals. Concealed terminals, standard.

No. 26



Nos. 9 and 11

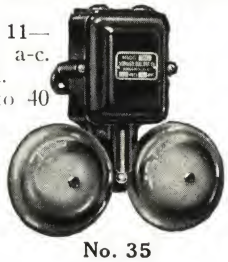
Double Gongs

Ideal for class rooms, corridors and general service.

Nos. 9 and 11—6 to 220 volts a-c. Gongs up to 10 in.

No. 35—Up to 40 volts d-c.

Nos. 22 and 23—Up to 220 volts. Gongs up to 16-in. For general fire alarm use, d-c. only.



No. 35

Heavy Duty Buzzers

No. 16—Non-contact, polarized. Up to 220 volts a-c. General purpose. Subdued signal.

No. 36—Non-arcing; up to 40 volts d-c. Subdued.

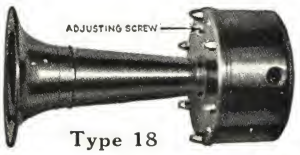
No. 11—Diaphragm type; up to 220 volts a-c. 110 volts d-c. For elevators, taxis, buses, etc. Loud.

Nos. 16 and 36

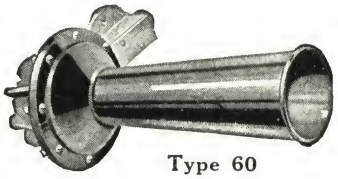
Nos. 11ED and 11EA

Type 18 Horn for Series Installation

For a-c. only. Non-contact, non-sparking for series or multiple installation, for ½-in. conduit or outlet box mounting. Outside adjustment.



Type 18



Type 60

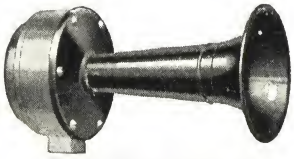
Type 60 Giant Vibrator

For a-c. only—½-in. conduit connection integral with terminal box. A powerful, penetrating, far-reaching signal—an ideal alarm call.

No. 3 Series All-purpose Horns

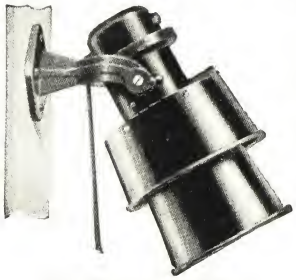
For a-c. or d-c., any voltage. Megaphone, 2-way and 3-way types. Multiple installation. Ideal for code signaling, fire alarm, etc.

No. 3 Megaphone



No. 3 Weatherproof

No. 3 Two-Way



Weatherproof Siren

Type 150 Siren

Standard voltage 110 a-c. or d-c. Standard finish, red enamel. Tilting bracket. For fire, riot, starting, dismissal or any emergency signaling purpose. Powerful, penetrating, instantaneous, weatherproof. High speed, ball bearing motor.

Kode Kall

Man-finding Kode Kall

A simple, economical, dependable, automatic paging device. Calls 30 different people. Repeats signals three times. As easy to install as a push button. Special bulletins on request.

Accessories

Manual trips; protective, screened housings; full gong guards; hanger plates; woodmats; breakglass stations; concealed bell-buzzer combinations, etc.

ESTABLISHED 1884

STANLEY & PATTERSON

INCORPORATED

GENERAL OFFICE, SALESROOMS, WAREHOUSE AND FACTORY
150 Varick Street, NEW YORK, N. Y.

TELEPHONE
WAlker 5-0150

CABLE ADDRESS
Eleclite
All Codes Used

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TORONTO, CAN.
HAVANA, CUBA

Products

ELECTRICAL SIGNALING DEVICES:

Signal Gongs, Annunciators, Pushbuttons, Telephones, Telephone Switchboards, Small Bells and Buzzers, Battery Sets, Power Supply Cabinets, Transformers, Fire Alarm Boxes, Fire Alarm Control Panels, Remote Control Transmitters, Burglar Alarm Devices, Relays and Special Signaling Apparatus of every description.

"THE BEST THAT TRADE FARADAY DEVEAU PR MARKS MONEY CAN BUY"

Systems

ELECTRICAL SIGNALING SYSTEMS:

Fire Alarm, Apartment-House Telephone, Intercommunicating Telephone, Hospital-Signal, Doctors In and Out, School-Signal, Hold-up, Burglar-Alarm, Hotel-Signal, Paging, Department Store Signal, Emergency-Lighting, Tank-Alarm, Sprinkler-Alarm, Standpipe-Pressure Signal, etc.

Catalogues

No. 45—DeVeau Telephone Systems and Apparatus.
No. 46—Faraday Industrial Fire Alarm Systems and Apparatus.
No. 47—Faraday Municipal Fire Alarm Systems and Apparatus.
No. 48—Faraday Electric Signaling Apparatus.
No. 49—Faraday Wiring Diagrams.
No. 50—Faraday Hospital Signal Systems and Apparatus.

Engineering Service

Catalogues listed above and special bulletins, issued from time to time, cover our complete line of Electric Signaling Devices in the manufacture of which we have been engaged for more than a quarter century.

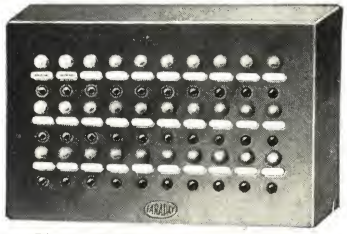
Our constant aim to produce apparatus electrically and mechanically perfect has resulted in a very general recognition of our Signaling Apparatus as *"The Best that Money Can Buy."*

Our Engineering Department will cordially co-operate with architects and engineers in planning any system to meet their requirements. This service is, of course, rendered free of charge and without obligation.

Faraday Fire Alarm Systems

Faraday Industrial Fire Alarm Systems are designed with full consideration of the necessity that a fire alarm system must be absolutely dependable in operation and, at the same time, simple and economical both as to initial cost and maintenance.

They range from the simple, open-circuit system, employing small "break-glass" non-coded fire alarm boxes, to the most comprehensive, doubly electrically supervised systems, with positive non-interfering code ringing fire alarm boxes, giving automatically a maximum of protection. Covered by Catalogue No. 46.

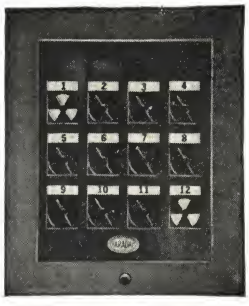


⅝-in. Opal Lamp Annunciator

DeVeau Telephone Systems

DeVeau Telephone Systems vary, in accordance to the character and size of building, from a simple telephone-connection between two points to the most elaborate intercommunicating system operated with switchboard and outlying stations in and throughout a building or a number of separate buildings.

Made for apartment houses, commercial buildings, factories, schools, etc. Catalogue No. 45, giving fullest information on DeVeau Telephone Systems and apparatus, will gladly be sent upon request.



Electric-reset Flush Annunciator

Faraday Signal Gongs

Faraday signal gongs are manufactured with a full recognition of the necessity of absolute dependability to function perfectly at all times.

We have for many years specialized in the manufacture of signal gongs and can supply them in accordance with any specifications to meet normal or special requirements. Covered by Catalogue No. 48.

Faraday All-metal Case Annunciators

Faraday All-metal Case Annunciators are manufactured by us in many types to meet all practical conditions and requirements, and excel by their superior construction and workmanship. Cases are made of heavy pressed steel. The principal types are:

(a) Hand Reset Gravity Drop.
(b) Electric Reset Drop.
(c) ⅝-in. Opal Lamp Patterns.
(d) 1¼ and 2½-in. Illuminated Unit Lamp Patterns.

Hand Reset Gravity Drop Annunciators—Are used in apartment houses, small hotels, homes, elevators, etc.

Electric Reset Annunciators—Used in all buildings where severe service conditions require the installation of an annunciator which will not get out of order.

⅝-in. Opal Lamp Annunciators—Are designed to meet the demand for an annunciator accommodating the largest number of signals in the smallest possible space, yet having the advantage of greater visibility than that of drop annunciators.

1¼ and 2½-in. Illuminated Unit Lamp Annunciators—Have won favor as signaling devices in places where greatest visibility is of vital importance. They are most frequently used in hospitals, institutions, hotels, public libraries, department stores or for calling systems. Covered by Catalogue No. 48.

Vibrating Half-grid-guarded Gong

Flush Wall Type

Code Ringing Fire Alarm Box

Handphone Type on Cradle

Non-code Ringing Fire Alarm Box

THE BELL TELEPHONE SYSTEM

AMERICAN TELEPHONE AND TELEGRAPH COMPANY AND ASSOCIATED COMPANIES

A Service for Architects, Builders, Engineers and Owners

Comfort and convenience are basic requirements of modern telephone service. Their complete realization in large buildings or in residences involves the planning, in advance of construction, of suitable facilities for telephones.

To help in the attainment of adequate telephone comfort and convenience our telephone engineers have prepared two illustrated booklets which will be furnished gladly to those interested in building projects.

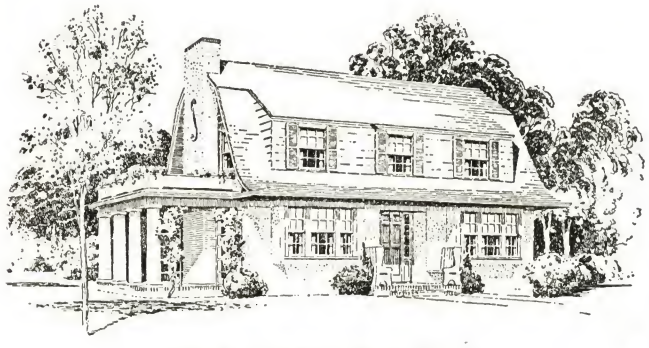
Write or call the nearest Bell Telephone business office.

Planning for Telephone Comfort and Convenience

With the view of laying out the required facilities to best advantage, the telephone company will be glad to co-operate with architects, engineers, builders and owners relative to desirable service arrangements for proposed projects. This consulting service of the telephone company is available without expense and should be particularly valuable to architects and others who are engaged in the design of plans and specifications for sale to home builders.

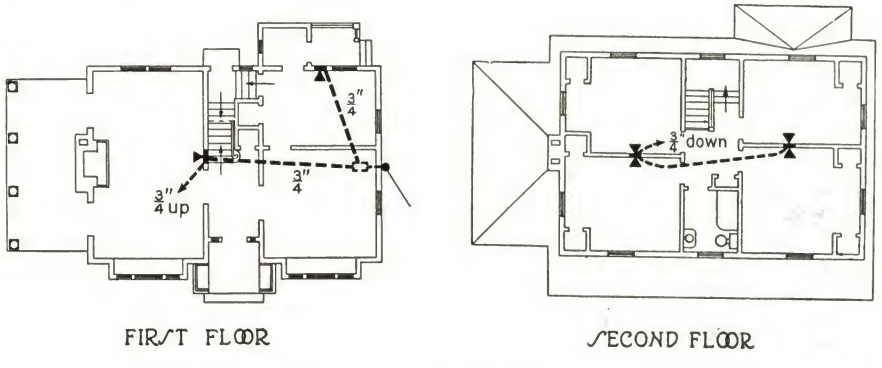
These facilities make for the satisfaction of the owners and tenants in the general improvement in appearance effected, as well as in the betterment of telephone service. *They are not provided by the telephone company since, in common with water, gas and electric light and power conduits, they must necessarily become a permanent part of the structure.*

Any business office of the telephone company will be glad to arrange for conferences between owners, architects, engineers and builders and the telephone company's representatives with reference to any phase of this matter.



House and Two Floor Plans

Diagram below shows service conduit on side of house connecting to protector cabinet in cellar. From this point conduit is run to telephone outlets on first floor. Conduit also connects these telephone outlets with outlets on second floor



Residences

With the growing appreciation on the part of telephone subscribers of the comfort and convenience to be obtained from adequate telephone service, more telephone facilities are being installed in homes to provide sufficient central office lines for family and servant use and for intercommunication within the household. It is important, therefore, that the facilities provided in the home be adequate for all of the telephones that may be desired, in the future as well as initially.

The placing of facilities for telephone wires and apparatus during construction results in general improvement of residences, in that better appearance is secured by concealing the wires and some of the apparatus; additional telephones when desired can readily be placed at convenient locations; protection is afforded to the wires and apparatus, thereby minimizing interruptions to the telephone service; and the service arrangements can be rearranged or enlarged without marring the walls and woodwork.

Following are some of the more important considerations in planning facilities for telephone convenience in residences.

Service Entrances—The location of the service entrance should permit as direct a route as possible for the wires from the telephone terminal to the entrance. If there is any doubt as to the point from which the wires will run, the telephone company should be consulted before the service entrance is located.

Service Conduits for Telephone Wires—Conduit should be provided for running the telephone wires from the point of attachment on the house into the building. The telephone company will run its wires through this conduit as required.

Telephone Protector Cabinets—Most residences require a protector in the telephone line. It is desirable, therefore, that arrangements be made in connection with the service conduit for the telephone protector. This is accomplished by providing a metal cabinet of suitable size to which the service conduit and the conduit to the telephones are connected.

Conduit for Inside Telephone Wires—In order to install the conduits for telephone wires while residences are under construction, it is necessary, of course, that the telephone locations be determined in advance.

If a wall box or telephone cabinet is not installed, the run of conduit from the protector cabinet should terminate in an outlet box.

Separate iron pipe conduit run from the protector cabinet to the telephone locations should be installed in the same manner as required for electric light installations.

Buildings

The provision of facilities for telephones during construction makes possible the concealment of the telephone cables and wires and thereby improves the general appearance of the building and its offices. The mechanical protection afforded the cables and wires minimizes interruptions to the telephone service. The flexibility provided by such facilities makes possible rearrangements and changes in the location or number of telephones which are often necessary to meet changing requirements for service, without the drilling of holes through finished walls and floors, the exposure of wires and cables in offices and in halls, and defacement of walls and trim by the wire attaching devices.

Following are some of the more important considerations in planning facilities for telephones in buildings.

Service Entrances—Service entrances may be underground or overhead. When the connection to the telephone company's plant is to be underground the matter of providing the necessary conduit for connecting the telephone plant with the owner's premises should be discussed with the telephone company. When the telephone company's plant outside the building is not underground and the owner of the building desires telephone service through underground conduit, the required conduit connection may be made at the owner's expense by a contractor in accordance with specifications which the telephone company will be glad to furnish.

Facilities for Cables and Wires—Facilities which carry the cables from the telephone company's plant to and through the building consist of main cable terminal cabinet or frame, riser shafts or vertical riser conduits, splicing closets, distributing terminal cabinets, conduit between splicing closets and distributing terminal cabinets.

Facilities which carry the telephone wires from the distributing terminal cabinets under the floors or by means of raceways to the telephone locations, consist of underfloor systems, conduit underfloor and wall system, metal base raceways, wood base raceways, molding raceways.

These facilities for cables and wires for a large building are illustrated diagrammatically in the figure to the right. The arrangement of the facilities will vary with loft buildings, office buildings, hotels, apartment houses, public buildings, hospitals, etc., and the telephone company will be glad to co-operate in determining the best arrangement for specific building projects.

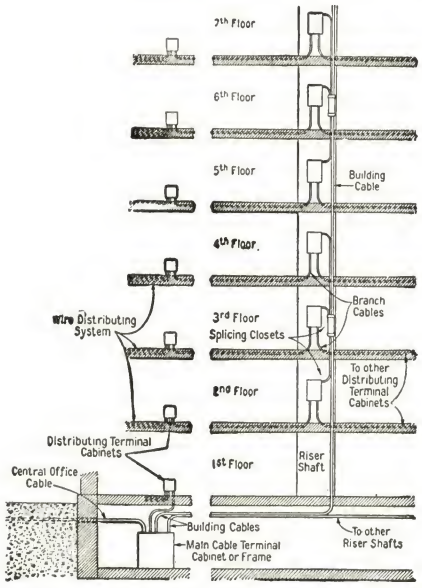
Facilities for Public Telephones—Office buildings, hotels, theatres, clubs, hospitals, etc., require public telephone facilities for the convenience of their occupants and patrons.

These facilities include booths, in which the telephones are placed, and in many of the larger buildings a small switchboard and tables for the telephone directories.

The general appearance and usefulness of these facilities is, of course, enhanced by their inclusion in the design of the buildings so that they harmonize with their surroundings. It is, therefore, recommended that the builders provide the booths as a permanent part of the buildings together with any space that may be required for switchboards and tables for telephone directories. Alcoves or rooms having easy access have been found generally satisfactory for these facilities.

The telephone company provides and installs the switchboard and telephones with the necessary wires and cables and will be glad to furnish data as to space required, booth dimensions, location of electric outlets and fittings to provide suitable illumination in the booths and for directories, etc.

Private Branch Exchange Switchboards and Associated Equipment—In many buildings, especially large office buildings, department stores, and hotels, private branch exchange switchboards are required for handling the intercommunicating telephone service in the building as well as the exchange telephone service. The telephone company should be consulted in all cases where private branch exchange requirements are involved, with the view of determining early in the planning of the building the desirable amount and arrangement of the floor space required for the accommodation of the switchboards and associated equipment and operators' quarters.



Sectional View of Cable Distribution in Office Building

Note how the cables extend up through the building with branch cables terminating in distributing terminal cabinets at suitable points on each floor

AUTOMATIC ELECTRIC INC.

Telephone, Signal and Communication Systems

FACTORY AND HOME OFFICE
1033 West Van Buren Street, CHICAGO, ILL.

SALES AND SERVICE OFFICES IN THE FOLLOWING CITIES

ATLANTA, GA., 202 Red Rock Building
BOSTON, MASS., 840-A Park Square Building, 31 St. James Avenue
CINCINNATI, OHIO, 1215 Mercantile Library Building, 414 Walnut Street
CLEVELAND, OHIO, 913 Midland Bank Building, 101 Prospect Avenue, N. W.
DETROIT, MICH., 643 New Center Building
KANSAS CITY, MO., 421 Commerce Building, 922 Walnut Street
LOS ANGELES, CAL., 1114 Pacific Finance Building, 621 South Hope Street
NEW YORK, N. Y., Room 906, 21 East 40th Street
PITTSBURGH, PA., 341 Oliver Building
ST. PAUL, MINN., 1510 Merchants' Bank Building
WASHINGTON, D. C., 508 Chandler Building, 1427 Eye Street, N. W.

Products

PRIVATE DIAL TELEPHONE SYSTEMS (P-A-X).

PRIVATE FIRE ALARM SYSTEMS.

WATCHMEN'S SUPERVISORY SYSTEMS.

Also Code Signaling Systems (Audible and Visual), Municipal Fire Alarm and Police Alarm Systems, Public Automatic Telephone Systems, Miscellaneous Telephone and Signal Accessories.

STROWGER AUTOMATIC DIAL SYSTEMS

History

While Strowger products now embrace the entire field of telephone, signaling and communication devices, all of these are the outgrowth of the Strowger Automatic Telephone System which, first installed for public service in 1892, has since been developed and expanded in application until it has become a standard for public and private exchange service in practically every country in the world.

Strowger P-A-X System

General—Strowger P-A-X is primarily an automatic interior telephone system of the familiar dial type, consisting of as many dial telephones as may be required, an automatic switchboard for setting up the connections, the necessary wiring for connecting the telephones to the switchboard, and a storage battery and charging device. Only one pair of wires is needed for connecting each telephone to the switchboard.

Strowger P-A-X may be installed as an isolated system, or with trunk connections to the public telephone exchange subject to the regulations and approval of the local telephone company. In the case of a connected system, the same telephones are used for both city and interior calls.

Telephones—The telephones of the P-A-X are similar to the automatic telephones used for ordinary public exchange service. Each telephone is equipped with a calling dial 3 in. in diameter, which has a disc perforated with 10 finger holes, numbered from 1 to 0. Telephones are furnished in the conventional wall and desk types and in the popular cradle types, such as those illustrated.

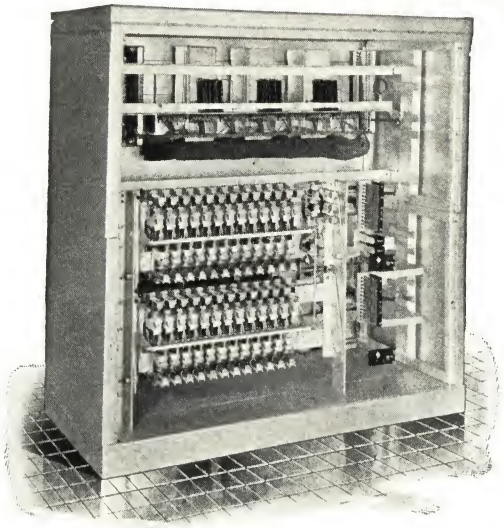
There are also types for special purposes, such as mine telephones, hand telephones, flush telephones, etc.

Automatic Switchboards—This apparatus takes the place of the operator in setting up connections and is placed in any convenient or available place, the size of which depends upon the size of the system. The apparatus is entirely self-contained and sufficiently attractive in design and finish to warrant installation in a conspicuous place. The switchboard is furnished in a number of sizes, depending upon the ultimate capacity required. The larger installations are capable of indefinite expansion without change in original installation.

Special Services—In addition to interior telephone service, certain types of Strowger P-A-X may be equipped to render affiliated services, all controlled and operated by the automatic switchboard and involving but slight extra wiring or expense. Any or all of these services may be included in the initial installation or added later as required. These services include code call (to send audible signals to all parts of an establishment to locate a person not at his desk); conference wire (providing for a telephone conference); emergency alarm (for fire or other emergencies); watchman super-

Type 1-A Type 2

P-A-X Monophones



A Typical P-A-X Switchboard
Capacity 50 lines

vision (for recording and supervising the movements of watchmen); executive right-of-way (permitting an executive to call busy telephones); and executive direct-line (permitting an executive to call without dialing).

General Specifications of Types—The following specifications will enable the architect to determine the type number of the P-A-X best suited for any project under consideration:

Type 1—Common talking, selective ringing. Capacity of seventy telephones, but only one conversation at a time. Code call if desired.

Type 2—Thirty telephones, three simultaneous conversations. Executive direct-line service if desired.

Type 10—Ten lines, two simultaneous conversations.

Type 20—Twenty lines, four simultaneous conversations. Code call, conference and executive direct-line services if desired.

Type 25—Initial capacity of up to fifty lines and seven simultaneous conversations. Will provide any or all special services.

Type 50—Unlimited capacity. Will provide any or all special services.

Method of Operation—The person calling lifts the receiver in the customary manner and the connection is then made by rotating the dial. If station 65 is wanted, the finger is placed in the dial hole over the figure 6 and drawn around to the finger stop. The finger is then removed, and the dial turns back to its original position. This operation is repeated for the figure 5.

The bell at station 65 then rings at intervals until the called station answers or until the receiver is hung up at the calling station. If the station wanted is engaged, a distinctive buzz is heard by the person calling. Connection may then be released by hanging up the receiver.

Typical Specifications for Automatic Interior Telephone System (Full Intercommunicating)

General—Under these specifications there shall be furnished and installed complete, ready for operation, an Automatic Interior Telephone System as manufactured by AUTOMATIC ELECTRIC INC., ..., or equal, as approved by ..... The system shall provide complete intercommunication between all stations; all connections shall be secret, except as specifically provided herein; ringing shall be controlled automatically, without the necessity of a ringing key or button at any telephone; and automatic busy tone shall be provided. Not more than two wires shall be required from each telephone to the central switchboard.

Central Switchboard — The central Automatic Switchboard shall, as installed, be wired for ..... telephone lines and ..... simultaneous conversations. It shall be furnished with the switch positions reserved for the total installed capacity completely wired and equipped with jacks, cables, and apparatus for multipling the telephone lines and trunks so that lines or trunks may be added by placing the required apparatus in jacks.

Telephones—The telephones shall be of the following types:

.....Wall Telephones
.....Desk Telephones
.....Monophones, Type.....
.....Monophones, Type.....

All telephones shall be of the commercial long-distance type, with polarized double-gong ringers, and equipped with standard ten-digit calling dials. Telephones shall be equal in quality and performance to those used by telephone operating companies for dial service.

Power Equipment—The power equipment to be furnished shall consist of the following:

An approved storage battery of proper voltage and capacity, such battery to be of the glass-jar, fully enclosed sprayproof type.

A rectifier of the vacuum-tube type, especially designed for telephone battery charging, arranged to operate on alternating current of ..... volts, ... cycle, ... phase, and to be of sufficient capacity to charge the battery at the normal charging rate.

Wiring and Conduit System—A complete system of conduits, terminal boxes, cable, and wiring shall be installed as shown on plans (or, as directed by the architect). All wires and cables shall be run in rigid iron conduit, which shall be of ample size to prevent injury to wires and cables when they are pulled in.

Telephone wiring for dry locations shall be of No. 19 B&S gauge twisted pair rubber-covered and braided interior telephone wire. For locations where dampness may be encountered, No. 18 B&S gauge twisted pair wire, rubber covered and with saturated braid, shall be used. Where found more convenient, standard No. 22 B&S gauge lead-covered cable with saturated core may be used from local distribution points to the switchboard, this wire being silk-and-cotton insulated, and coded. One pair of wires shall be used from each telephone directly to the automatic switchboard, or to the nearest distributing cable terminal. Cable and telephone distribution wires shall be terminated on approved terminal blocks, mounted in suitable terminal cabinets.

Miscellaneous—The switchboard and the power equipment shall be installed in a substantial steel cabinet designed to be as dustproof as is practical.

A suitable set of wrenches, pliers, and other tools, including a hand test telephone for testing, are to be furnished, together with a set of circuit and wiring-diagram blue prints, and a complete set of adjustment specifications covering the relay and mechanical equipment.

Strowger Fire Alarm Box
Weatherproof type

Strowger Fire Alarm System

This system has been especially designed to meet the fire protection requirements of manufacturing plants and other private enterprises. It differs from ordinary fire alarm systems in that each reporting station has its own line, so that a fault on one line can affect only one station instead of a number of stations.

The reporting stations are all of the break-glass type but contain no coding mechanism. The turning in of an alarm requires only the breaking of the glass. There are no handles to turn or levers to pull. There is one common coding machine for the entire system and this is placed under the direct supervision of the fire chief or head watchman. However, all equipment is furnished in duplicate so as to provide an additional set for emergency purposes at all times.

Typical Specifications for Fire Alarm System

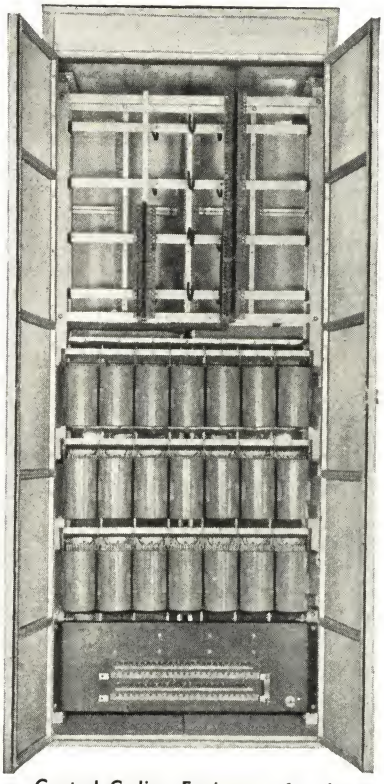
Under these specifications shall be furnished and installed a complete Fire Alarm System, including alarm boxes, coding equipment and wiring, as manufactured by AUTOMATIC ELECTRIC INC., or equal.

General—The system shall provide for the following features:

(1) The lines shall operate with normally closed circuits, shall be supervised against open circuits, and shall be so arranged that short circuiting of a line will not prevent operation.

(2) The system shall be of a type in which destruction of or damage to any alarm box circuit will not cause any other alarm box or alarm box circuit to be inoperative.

(3) There shall be associated with each alarm box circuit, at the location of the fire chief, a lamp to indicate the location of the alarm box originating the alarm. This lamp shall be arranged to light even though the code should fail to sound or even though the coding machine is engaged in sending an alarm at the time.



Central Coding Equipment for the Strowger Fire Alarm System

(4) The alarm boxes shall be of the break-glass type.

(5) The system shall be so designed that any or all boxes may be operated simultaneously without interference or mutilation of the codes.

Equipment—Central station equipment shall have all vital contacts arranged in duplicate. All relay equipment shall be provided with metal dustproof covers of a slip-on type.

A cabinet for the fire chief shall be furnished and installed in fire headquarters and equipped with keys and lamps for each fire alarm station. This apparatus shall be so arranged that, whenever an alarm box is operated, the associated lamp will light showing the location of the station reporting, this lamp to remain lighted until the glass in the alarm box is replaced. The equipment shall also include keys that permit the fire chief to test any or all lines. There shall also be furnished and installed at location of fire chief a punch register and time stamp which provides a permanent record on a paper tape showing alarm codes as sent in.

The fire chief's equipment shall include a supervisory lamp associated with each alarm box circuit, so arranged that if an alarm box line becomes open, the corresponding supervisory lamp will light. The circuit shall be so arranged that an open circuit condition will not cause the sending of a false alarm, but will merely operate the supervisory lamp, advising the fire chief of an unstandard condition on that line.

The system shall be so arranged that the operation of an alarm box will cause the central station apparatus to perform the following four functions:

(1) Send out a coded audible alarm at the supervisor's location. The supervisor shall be able, by operating a key, to sound the coded alarm on all signals in the premises or only those in certain sections, as desired.

(2) Send the codes of the alarm boxes without interference or mutilation.

(3) Light the lamps associated with the stations originating the alarms at the fire chief's desk, giving an immediate indication of the location of each box originating an alarm, the audible and the visual signals being totally independent of each other.

(4) Record the numbers of the stations on a punch register.

The system shall be arranged for an ultimate capacity of ..... alarm stations, and installed equipped for ..... stations. All codes shall be of two digits, from 1-1 to 9-9. The coding equipment shall be so designed that whenever an alarm box is operated, the code will be sounded at least four times.

Power Plant—The system shall be designed to operate from storage batteries furnished in duplicate. These batteries shall be capable of operating the system for a period of not less than 36 consecutive hours without recharging. All alarm box circuits shall be protected individually with alarm type fuses.

Alarm Boxes—The alarm boxes shall be designed to be dustproof and moistureproof, and arranged for either flush or surface mounting. The box shall be constructed of brass or other non-corrosive malleable material. All boxes shall be finished in vermilion enamel and distinctly numbered to correspond with their respective codes.

Strowger Auto-Com

Strowger Auto-Com is a complete intercommunicating telephone system of the dial-controlled type, for use in any location which can be adequately served by ten telephones or less. It consists merely of a number of dial-type telephones, each having a buzzer signal, connected by a multiple cable to a filter unit and a battery. The battery consists of eight dry cells; or, if desired, a storage battery with facilities for charging from commercial current may be employed. The filter unit contains fuses and filters for the power equipment.

Auto-Com Monophone

There is no switchboard—all connections are completed through a movable contact arm attached to the telephone dial. When it is desired to make a call, the user removes his Monophone handset from its cradle and dials the proper number, the dial remaining in its operated position. The calling party then signals by pressing a push button which is conveniently located beside the dial.

The called party answers by merely lifting his handset, and the conversation may begin. After it is completed, the replacement of the handset at the calling station restores the dial to its normal position.

Code call and conference services are available, if desired. Code call takes the place of one telephone, and reduces to nine the number of telephone stations.

THE NORTH ELECTRIC MANUFACTURING COMPANY

Automatic Telephone Equipment

GALION, OHIO

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Products

PRIVATE AUTOMATIC TELEPHONE SYSTEMS.
CITY AUTOMANUAL TELEPHONE EXCHANGES.
DIAL AUTOMATIC TELEPHONE SYSTEMS.
REMOTE CONTROL POWER SYSTEMS.
AUTOMATIC DIALS.
RELAYS and RELAY SWITCHING SYSTEMS.
NORTH-WESTINGHOUSE REMOTE CONTROL EQUIPMENT for Electric Power Stations.
AUTOMATIC STOCK EXCHANGE RECORDING EQUIPMENT.

The Company

THE NORTH ELECTRIC MANUFACTURING COMPANY has been engaged continuously in the manufacture of high grade telephone equipment since 1884. Early interested in the development and application of machine switching methods to telephone exchange operation, the North Company has contributed indispensable pioneering achievements to the art of automatic telephony, and now owns and controls one of the most important blocks of patents.

Hand Telephone

Independent in ownership and control, and unfettered by binding affiliations opposed to the highest interests of the telephone art, THE NORTH ELECTRIC MANUFACTURING COMPANY is able to operate at all times to the best advantage of its clients, and to offer a product of quality matured by years of practical experience in the manufacture and installation of Automatic Telephone Systems of all kinds.

THE NORTH ALL-RELAY AUTOMATIC TELEPHONE EXCHANGE

The North "All-Relay" Automatic Telephone Exchange, manufactured in this country exclusively by THE NORTH ELECTRIC MANUFACTURING COMPANY, is the latest completed development in the automatic telephone industry. It has been specially designed and constructed to reduce maintenance requirements and costs to the very minimum.

The "All-Relay" Central Switching Gear is composed solely of small solidly constructed relays, each comprising only a magnet, a hinged armature, and a group of contact springs. These relays connect with the calling line, register the impulses from the dial, choose the wanted line, test, ring and perform all the functions of a girl operator in a manual switchboard.

The "All-Relay" equipment is entirely devoid of the wipers, shafts, gears, ratchets, pawls, latches, coil springs and other like parts of which all selector-type automatic systems are composed, and does not require the delicate adjustment, frequent re-adjustment, cleaning and lubrication common to such selectors.

Operation

Simply lift the receiver and dial the required number —the called party's bell is rung instantly and indicated by a distinct signal in the calling party's receiver—this ring is repeated intermittently until the call is answered or abandoned. When the call is answered, ringing is immediately stopped and the line cleared for conversation. When a busy line is called, a busy signal is heard in the calling party's receiver.

Charger, Batteries and Exchange of the Simplex Unit

COMPLETE RANGE OF MODELS

Selective Ringing, Common Talking

Model 1—(Simplex). 100 lines or less

Selective Ringing, Selective Talking

Model 2—10 lines, 4 links or less
Model 3—30 lines, 6 links or less
Model 5—50 lines, 6 links or less
Model 10—100 lines, 10 links or less
Model 30—1,000 lines, 100 links or less

Model 1 (Simplex)

Selective Ringing, Common Talking

The Simplex Unit is designed for organization with light telephone usage. This system has a valuable application in schools where the distance between classrooms renders an automatic telephone system indispensable.

Capacity—100 lines or less, common talking.

Switchboard—wall cabinet type, 12 x 24 x 9 in.

Power plant—equipment is optional, consisting of either a 24-volt, 12-ampere hour Philco battery in glass jars and associated charging equipment, or an ac.—dc. transformer (battery eliminator) to operate from ac. source.

Model 2

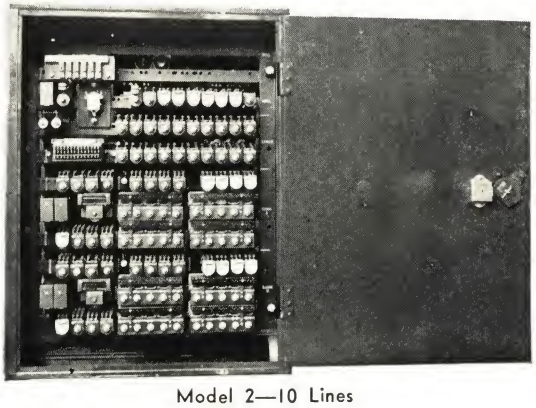
Selective Ringing, Selective Talking

A complete automatic telephone exchange built on a small scale to meet the communication requirements of private homes, institutions, small business organizations, lodges, schools, churches, etc., providing the same service as well as all feature advantages of the larger sized systems.

Capacity—10 lines, 4 links or less.

Switchboard—wall cabinet type, 21 x 26 x 10½ in.

Power plant—Same as Model 1.



Model 2—10 Lines

Model 3

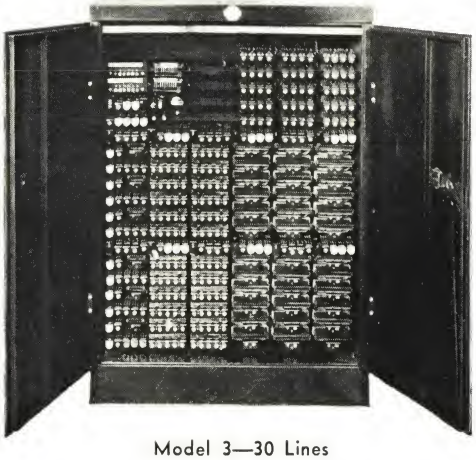
Selective Ringing, Selective Talking

The All-Relay Exchange Type Model 3 is an automatic telephone system built along the lines of large city exchanges but of a size adapted for use as an independent privately owned system in offices, factories, schools, colleges and the like.

Capacity—30 lines, 6 links or less.

Switchboard—floor cabinet type, 52 x 36 x 12 ins.

Power plant—equipment is optional, consisting of either a 24-volt, 24-ampere hour Philco battery in glass jars and associated charging equipment, or an ac.—dc. transformer (battery eliminator) to operate from ac. source.



Model 3—30 Lines

Model 5

Selective Ringing, Selective Talking

A complete automatic telephone exchange designed for heavy traffic equipped completely with telltale guard lamps and audible alarm for indicating trouble in house-wiring, etc.

Capacity—50 lines, 6 links or less.

Switchboard—floor cabinet type, 78 x 36 x 12 ins.

Power plant—equipment is optional, consisting of either a 48-volt, 24-ampere hour Philco battery in glass jars and associated charging equipment, or an ac.—dc. transformer (battery eliminator) to operate from ac. source.

Model 10—100 lines

Selective Ringing, Selective Talking

This system employs the same circuits and rugged relay switching mechanism as does the Model 5 and differs from it fundamentally only by the number of lines and links with which it can be equipped.

Capacity—100 lines, 10 links or less.

Switchboard—floor cabinet type, 78 x 36 x 12 ins.

(Two cabinets required when more than 4 links are equipped).

Power plant—equipment is optional, consisting of either a 48-volt, 100-ampere hour Philco battery in glass jars and associated charging equipment, or an ac.—dc. transformer (battery eliminator) to operate from ac. sources.

Model 10—100 Lines

Model 30—1000 lines

Selective Ringing, Selective Talking

This system is built up by using an All-Relay selector unit in conjunction with the Model 10 unit.

Capacity—1000 lines, 100 links or less.
Switchboard—floor cabinet type, 78 x 36 x 12 ins.

(One selector cabinet and two connector cabinets per hundreds group).

Power plant—depending upon number of lines equipped.

FEATURES OF NORTH TELEPHONE EXCHANGE MODELS

The features described below can be obtained on all models with the exception of the Simplex, which, however, can be equipped with Code Call.

Code Call—A complete automatic paging service, operating from any of the telephones by dialing two additional digits. The addition of a series of gongs, horns, whistles or lights located at strategic points can be heard or seen simultaneously at any point in the plant—thus locating and summoning to the nearest telephone instantly the party wanted regardless of where he may be. This equipment can be furnished in sizes capable of coding, 6, 36 or 100 employees.

Two-party Service—All Selective Talking Exchanges are equipped without further cost, for party line service which provides for a capacity of twice as many telephones, on a party line basis, as there are lines equipped. The same selective, intermittent automatic ringing is provided for each party line.

Model 5
50 Lines

Relays Neatly Assembled in a Steel and Glass Cabinet

Executive Line Service—This service is provided at no additional cost. It permits an executive's line so equipped to connect to the party called regardless of whether the called station is busy or not.

Conference Service—Conference service can be furnished at a slight additional cost and enables a number of parties, by dialing the conference number, to confer with each other over the telephone system as easily as if they were face to face.

Telephones

Telephones are equipped with standard North dials and can be furnished in four standard types—Wall, Flush, Desk and Monophone and can be used in conjunction with any of the above models. The last mentioned type can now be supplied in colors at an additional cost. These instruments are of equal quality and are interchangeable with "city" telephones.

SPECIFICATIONS

Note: The following simplified specification is so worded as not to shut out competitive bids in cases where local laws forbid the use of closed specifications.

The contractor shall furnish and install ready for service one automatic interior telephone system with all conduits, wiring, telephones, battery, power equipment and other apparatus as hereinafter described.

Exchange Type—The telephone switching equipment shall be of THE NORTH ELECTRIC MANUFACTURING COMPANY'S "All-Relay" automatic selective-ringing, selective-talking type or equal, having terminals for calling and for called lines, and connecting links, with automatic connection of the calling line to the link upon lifting the receiver, and automatic connection of the link to the called line by impulses transmitted over a single pair of wires from the calling station and produced by a ten-digit finger-hole dial mounted on the telephone set, the same as in automatic city exchanges. The switching mechanism shall be composed of relays exclusively.

General—The exchange shall be so designed as to provide the following features:

(1) Each station shall be able to communicate with every other station.

(2) Any two stations shall be able to communicate without the possibility of being overheard or interfered with by a third station.

(3) Access to any station already in use shall be automatically prevented and, when attempted, a distinctive signal shall be automatically transmitted to such station attempting.

(4) All connections shall be controlled by the operation of finger-hole dials carrying the digits 1 to 0 and mounted on the telephones.

(4) All connections shall be controlled by the operation automatically from the exchange without the necessity of a ringing key or button at the telephone.

(6) The ringing of the bell at the called station shall be indicated to the person calling by a distinctive audible signal in the receiver of the calling station.

Exchange Size—The exchange shall have a capacity of ..... lines and ..... links (trunks or connectors) and the initial installation shall be ..... lines and ..... links. Provision is to be made for adding lines and links without altering the original equipment.

Telephones—Telephone instruments shall be of the highest quality and in design, construction and performance the equal of telephones used by public telephone companies. All telephones shall be equipped with ringers of the polarized double-gong type. Telephones shall be furnished in the following types and quantities:

.....desk telephones; ..... flush telephones;
.....wall telephones; ..... hand telephones.

Power Equipment—The power equipment shall include a 48-volt (24-volt for Type 3) storage battery of sufficient ampere-hour capacity to run the exchange for 24 hours under normal load without receiving charge. There shall also be furnished a motor-generator, tungar or other suitable approved rectifier for keeping the battery charged. Devices shall be included for generating alternating current suitable for operating the telephone bells and furnishing the busy signal. All of this equipment shall be of standard design as furnished by the manufacturer for the size and type of exchange covered by these specifications.

Housing—The exchange proper shall be contained in a steel and glass cabinet. The power equipment shall be mounted separately in accordance with the standard practice of the manufacturer.

Wiring—Telephone wiring shall be of No. 19 B&S gauge twisted pair braided, rubber covered interior telephone wire for dry locations, and No. 18 B&S gauge saturated braided rubber covered wire where dampness may be encountered.

A single pair of wires shall be used from each telephone directly to the automatic switchboard, or to the nearest distributing cable terminal.

Where found more convenient, standard No. 22 silk and cotton insulated lead covered switchboard cable may be used from local distribution points to the switchboard.

Cable wires and telephone distribution wires shall be run in rigid conduit.

Conduits—Conduits shall be run in the switchboard room between the various pieces of apparatus according to the manufacturer's blue print layout.

Installation—This contractor shall install all apparatus, connect all telephones, and turn the entire system over to the owner in first class operating condition.

Switchboard installation shall be made according to specifications furnished by the manufacturer.

GRAYBAR ELECTRIC COMPANY

INCORPORATED

Inter-communicating Telephone Systems

Graybar Building, Lexington Avenue and 43rd Street

NEW YORK, N. Y.

For Distributing Houses, see our page on Electrical Equipment
For Graybar Electrical Equipment for Home, Office and Industry, also Graybar Commercial, Industrial and Floodlighting Equipment, see Manufacturers' Index

GRAYBAR INTER-COMMUNICATING TELEPHONE SYSTEMS

System No. 1—Selective Ringing, Selective Talking

Service

For use in business organizations, industries, stores, institutions, large residences, etc., where frequently more than one conversation will take place at the same time, where instantaneous connections without loss of time are necessary, and where the highest grade of transmission is required.

Operation

Each station can (by merely pressing a button) selectively ring and talk with any other station without disturbing the rest of the stations in the system and as many separate conversations can be carried on simultaneously as there are pairs of Inter-Phones. For example, in a system consisting of six Inter-Phones, three separate conversations can be carried on at the same time.

For each station in the system, one push button key is required in each Inter-phone.

Capacity

The Inter-Phones are available in standard sizes of 6, 12, 16, 20 and 24 buttons.

Inter-Phones for System Number One

No. 1324C-12

These Inter-Phones embody the highest standards of engineering, design and workmanship. Five different designs of Inter-Phones are provided for this system—namely, surface wall type, flush wall type, desk set type, cradle type and hand set type. These Inter-Phones all have the same circuit characteristics and may be used interchangeably in a system.

Wall Types—Sets are finished in black enamel and have a hinged face plate which makes it possible to easily inspect all connections and apparatus without disturbing installations.

No. 1324 Surface Wall Type—All metal set having hinged face plate, movable transmitter and hand receiver.

Code No.	Number of buttons	Housing, in.		
		Height	Width	Depth
1324C-6	6	10	6⅜	3
1324C-12	12	10	6⅜	3
1324C-16	16	14 5/16	7 1/16	3
1324C-20	20	14 5/16	7 1/16	3
1324C-24	24	14 5/16	7 1/16	3

No. 1355C-16

No. 1355 Flush Wall Type—Has a steel face plate on which is mounted talking and signaling apparatus and a sheet steel outlet box arranged for ¾-in. conduit. Outlet box can be separated from set and installed in wall during construction of building.

Code No.	Number of buttons	Housing, in.			Outlet box, in.		
		Height	Width	Depth	Height	Width	Depth
1355C-16	16	14½	6⅞	.....	12⅞	5¼	3 11/32
1355C-20	20	14½	6⅞	.....	12⅞	5¼	3 11/32
1355C-24	24	14½	6⅞	.....	12⅞	5¼	3 11/32

Desk Type—The No. 6016D set consists of desk stand and metal key box.

Desk stand is finished in bower barff. It is the type of desk stand generally used for public telephones.

Key box is finished in dull black enamel and is provided with four rubber feet to keep metal housing from scratching table or desk. Connecting cord between key box and desk stand is 5½ ft. long. Cable entrances are provided at bottom and ends of box.

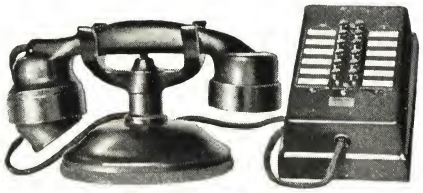
Code No.	Number of buttons	Desk stand	Cord, ft.	Key box	Dimensions, in.		
					Width	Length	Depth
6016D-6	6	1140BE	5½	328C-6	5	7½	2⅝
6016D-12	12	1140BE	5½	328C-12	5	7½	2⅝
6016D-16	16	1140BE	5½	328C-16	5¾	10¾	2⅝
6016D-20	20	1140BE	5½	328C-20	5¾	10¾	2⅝
6016D-24	24	1140BE	5½	328C-24	5¾	10¾	2⅝

Cradle Type—No. 6016CH set consists of hand set with cradle type mounting and desk type key box.

Hand set is made of black moulded bakelite and is most efficient from a standpoint of both design and workmanship.

Cradle or mounting for supporting above hand set consists of metal base finished in black with nickel trimming. It is arranged for desk mounting for supporting hand set when not in use. Cutout switch is provided for operating purposes.

Key box used with this set is same as described above for No. 6016D type Inter-Phone.



No. 6016CH-12

Code No.	Number of buttons	Hand set and cradle	Cord, ft.	Key box	Dimensions, in.		
					Width	Length	Depth
6016CH-6	6	1016CH	5½	328C-6	5	7½	2⅝
6016CH-12	12	1016CH	5½	328C-12	5	7½	2⅝
6016CH-16	16	1016CH	5½	328C-16	5¾	10¾	2⅝
6016CH-20	20	1016CH	5½	328C-20	5¾	10¾	2⅝
6016CH-24	24	1016CH	5½	328C-24	5¾	10¾	2⅝

No. 6016HR-12

Hand Set Types—*No. 6016HR*—Consists of hand set with hanger and desk type key box. Hand set is finished in black with nickel trimmings. A talking button is located in hand set handle which takes the place of a switch-hook.

Hand set hanger is a simple nickelplated hook for hanging hand set to side of desk or wall.

Key box is same as described for No. 6016D type Inter-phone.

Code No.	Number of buttons	Hand set	Cord, ft.	Hand set hanger	Dimensions, in.			
					Key box	Width	Length	Depth
6016HR-6	6	1003R	6	141A	328C-6	5	7½	2⅝
6016HR-12	12	1003R	6	141A	328C-12	5	7½	2⅝
6016HR-16	16	1003R	6	141A	328C-16	5¾	10¾	2⅝
6016HR-20	20	1003R	6	141A	328C-20	5¾	10¾	2⅝
6016HR-24	24	1003R	6	141A	328C-24	5¾	10¾	2⅝

No. 6038C-12

No. 6038C — Consists of hand set and switch-hook box for mounting to side of a desk. Also includes desk type key box.

Hand set is made of black moulded bakelite and is most efficient in design and workmanship.

Switch-hook can be installed on side of desk, on wall, or any vertical surface.

Key box is same as described for No. 6016D type Inter-phone.

Code No.	Number of buttons	Hand set and switch-hook box	Key box	Dimensions, in.		
				Width	Length	Depth
6038C-6	6	1038C	328C-6	5	7½	2⅝
6038C-12	12	1038C	328C-12	5	7½	2⅝
6038C-16	16	1038C	328C-16	5¾	10¾	2⅝
6038C-20	20	1038C	328C-20	5¾	10¾	2⅝
6038C-24	24	1038C	328C-24	5¾	10¾	2⅝

Accessories

Cable—For connections between various stations, cable specially designed for Inter-Phones can be supplied. This cable includes necessary number of wire conductors (two pairs for battery leads and one pair for each station in system) and is furnished in three different types to suit various locations and conditions:

Type	6 stations	12 stations	16 stations	20 stations	24 stations
Fireproof braid	No. 134B	No. 141B	No. 157B	No. 158B	No. 136B
Brown cotton braid	No. 155B	No. 156B	.....	.....	.....
Lead covered	No. 134B	No. 141B	No. 157B	No. 158B	No. 136B

Cable Terminals—A cable terminal should be used wherever a junction is to be made between cables. In cases where cable can be run direct to Inter-Phone, no cable terminal is necessary. The number of cable terminals required should be determined by the installer.

No. 19 Cable Terminal—No. 19 type cable terminal is made of hard wood, numbered and shellacked, and equipped with a sheet steel cover, finished in black enamel.

Code No.	Capacity, pairs	Length, in.	Width, in.	Depth, in.	Use with buttons
19A	14	8	5⅞	2½	6 and 12
19B	26	14	5⅞	2½	16, 20 and 24

Stranded Flexible Cables—This stranded flexible cable is for use with No. 6016D, H, CH and HR Desk Inter-Phone Sets, where it is required to move the key box of these sets about the desk.

Furnished with silk-covered, mercerized and common cotton braid. The standard outer color of the cable braid is brown.

Cord Code No.	Number of single conductors	Used with button capacity
416	16	6
428	28	12
436	36	16
444	44	20
452	52	24

Dry Batteries—Not more than twelve dry cells will be necessary for operating system. (Five cells for the talking circuit; four to seven cells for ringing circuit, depending upon length of line.)

Bell Ringing Transformers—Bell ringing transformers may be used for ringing bells of System No. 1. However, they cannot be used for furnishing the talking current.

Type A transformer delivers current at three voltages, 6, 14, and 20, the selection of which depends upon the line resistance.

Detailed information for installing, including wiring diagram, battery requirements, cable connections, etc., are included in our bulletin, "Installing and Maintaining Graybar Inter-Phones, which will be furnished upon request.

System No. 11—Selective Ringing, Common Talking

Service

For use in residences, banks, institutions, warehouses, stores or other mercantile establishments where conversations can be limited to one at a time.

Operation

Each Inter-Phone in the system is equipped with a number of push buttons (one for each other station in the system). By depressing the button marked with name or number of station wanted, the bell at that station will ring and there only.

Any station in the system can selectively ring any other station. *Only one conversation can be carried on at a time.*

Capacity

The wall type Inter-Phones can be furnished in capacities of 2, 3, 4, 6 and 8 buttons, accommodating 3, 4, 5, 7 and 9 stations respectively in a system.

The desk and hand set Inter-Phones are furnished in capacities of 4 and 8 buttons, accommodating 5 and 9 stations respectively in a system.

No. 2527C-8

Inter-Phones for System No. 11

Wall Types—Finished in black enamel and made rustproof by the Parker Process.

No. 2527 Surface Wall Type—Surface mounting metal housing contains all the talking and signaling apparatus. Has metal back-board with hinge arrangement for mounting set to wall.

Code No.	Number of buttons	Dimensions, in.		
		Height	Width	Depth
2527C-3	3	7½	5	2⅝
2527C-4	4	7½	5	2⅝
2527C-6	6	7½	5	2⅝
2527C-8	8	7½	5	2⅝

No. 2539 Flush Wall Type—Has flush steel face plate on which is mounted all talking and signaling apparatus, also metal outlet box and set of outlet box hangers for mounting set in wall.

Code No.	Number of buttons	Dimensions
2539C-3	3	See below
2539C-4	4	
2539C-6	6	
2539C-8	8	

Cradle Type—Consists of hand set with cradle type mounting having push buttons mounted in the base. Hand set is black moulded bakelite, light in weight, pleasing in appearance and efficient in service. Inter-Phone set includes an apparatus box containing signaling bell and connecting block.

No. 6044C-8

Number of buttons	Code No.
4	6044C-4
8	6044C-8

Hand Set Type—Consists of efficient light-weight hand set equipped with "press-to-talk" lever; also metal push button block having black enamel finish with nameplate opposite each button. Block includes terminals for connecting hand set cord.

Inter-Phone set includes bell and connecting block, which may be ordered enclosed in metal apparatus box, indicated in following:

No. 6034BH

Number of buttons	Code No.
4	6034AZ
4	6034BG
8	6034BB
8	6034BH

Accessories

Retardation Coil—A No. 51H retardation coil must be ordered separately for installation near battery of each system.

Cable—Three common wires and one individual wire for each station.

Batteries—Five Columbia gray label dry cells required for complete operation of this system.

System No. 12—Master Station, Common Talking

Service

Consists of one centrally located "Master Station" Inter-Phone to which are connected other "outlying station" Inter-Phones. System provides for communication from a central point to different stations and vice versa.

Operation

Master Station Inter-Phone is equipped with a number of push buttons, one for each outlying station in system. By depressing button marked with name or number of outlying station wanted, bell at that station will ring and there only.

Outlying stations are equipped with only one button which will ring master station when depressed. Only one conversation can be carried on at a time.

Capacity

One master station and from two to sixteen outlying stations.

MASTER STATION INTER-PHONES FOR SYSTEM NO. 12

Wall Types—No. 2527 Surface Wall Type

Code No.	Number of buttons	Dimensions of housing, in.		
		High	Wide	Deep
2527C-2	2	7½	5	2⅝
2527C-3	3			
2527C-4	4			
2527C-6	6			
2527C-8	8			

No. 2539 Flush Wall Type

Code No.	Number of buttons	Face plate, in.		Outlet box, in.		
		High	Wide	High	Wide	Deep
2539C-2	2	9	5⅝	7½	4	2⅝
2539C-3	3					
2539C-4	4					
2539C-6	6					
2539C-8	8					

Cradle Type

Code No.	Number of buttons	Set consists of	
6044C-4	4	1044C-4 cradle	35B apparatus box
6044C-8	8	1044C-8 cradle	35B apparatus box

Hand Set Type

Code No. with housing,	Code No. without housing,	Number of buttons	Set consists of
6034BG	6034AZ	4	35-B apparatus box (with housing) or 11-B Bell & 8H connecting block (without housing)
6034BH	6034BB	8	

Outlying Station Inter-Phones for System No. 12

Following outlying station Inter-Phones are similar in construction to master station Inter-Phones except that only one button is provided in each set for ringing master station.

Number of buttons	Metal wall type Inter-phones		Hand set Inter-Phones		
	Surface	Flush	Cradle type	Surface box type	Flush box type
1	2527C-1	2539C-1	6044C-1	6043E	6042K

No. 6042E is same as No. 6042K, but without face plate and wall box.

Accessories

Retardation Coil—A No. 51H retardation coil must be ordered separately with each master station Inter-Phone and installed near battery of system.

Wiring—For connection between outlying stations and master station either cable or insulated wires can be used, depending largely upon layout of system. Three common wires are required throughout system, and, in addition, one individual wire from master to each outlying station. Where there is a long run of a large number of wires, it will be found economical to use cable, and at all distributing and junction points to install connecting blocks. From these connecting blocks separate wires can be run to Inter-Phones.

Batteries—Five Columbia gray label dry cells are required for operation of this system when distance between master station and most distant outlying station is 750 ft. or less, and No. 22 B&S gauge wire (as in case of Western Electric cable) is used.

Elevator Inter-Phone System, Common Talking

Service

For use in all buildings to provide service between the elevator starter, elevator cabs, the engineer, the superintendent, the machine room, etc., depending upon the total number of master and outlying stations to be installed.

Operation

Similar to System No. 12 operation (master and outlying stations), except that more than one master station may be provided.

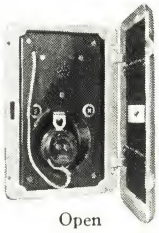
Capacity

One or more master stations and outlying cab stations as required.

Master Station Inter-Phones

Starter's Station—The elevator company must provide sufficient space in the starter's control panel to mount one of the following types of Inter-Phones. This set to be equipped with push buttons for calling all other stations with the exception of the elevator cabs. (Cab buttons already provided for by Elevator Company on starter's panel).

Closed



Open

Types of Inter-Phones—No. 2527-C, surface wall type; No. 2539-C, flush wall type; or No. 6034, hand set type.

Elevator Cabs—The Inter-Phone for the elevator cab may consist of a flush type mounted in a special outlet box and frame as illustrated. The elevator company will provide the frame and outlet box in which to mount this Inter-Phone set. In case standard type Inter-Phones are to be installed, the following sets are recommended. (There are two push buttons in these sets, for calling the starter, and such other of the master stations as selected.)

Types of Inter-Phones—No. D-1640, flush wall set designed to mount in a recess box furnished by the elevator company, door of box to hold building certificate; No. 2539-C-2, flush type; or No. 2527-C-2, surface wall type.

Machine Room—The machine room Inter-Phone usually consists of No. 2527-C-2 surface wall set. This instrument is equipped with two push buttons for calling the starter and engineer stations. Should he wish to talk to other stations he can signal through the starter's station.

Superintendent's and Engineer's Offices—The Inter-Phones for these offices may consist of cradle type hand set No. 6044-C, equipped with sufficient buttons for calling the starter, the machine room, each other, etc.

Battery Equipment

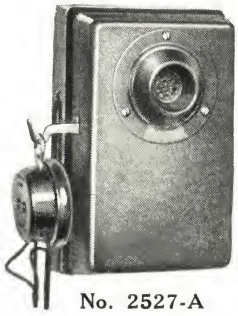
Six dry cells mounted in a suitable battery box will provide both talking and ringing battery. If desired, an efficient battery eliminator will be supplied. A No. 51-H retardation coil mounted at the battery will furnish the talking current.

Wiring Requirements

The wiring consists of three common battery wires, plus an individual ringing wire for each station callable. The master stations are connected to a main distributing panel midway of the hatchway, which is in turn connected to individual terminal boxes in each shaft. Connection from the latter to the cabs is by means of flexible trail cable hung from the bottom of the cab. Wiring should be in conduit wherever subject to possible injury.

Wiring diagrams and assembly drawings showing dimensions of Inter-Phones will be furnished on request to the GRAYBAR ELECTRIC COMPANY.

No. 1801 Private Branch Exchange Switchboard



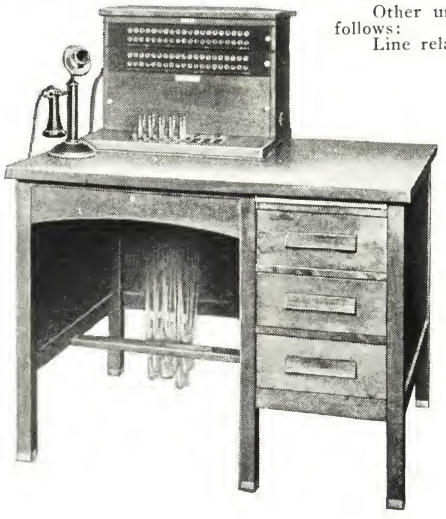
No. 2527-A

Service

Provides for communication between the switchboard and any number of outlying stations up to 80. Operator may also connect any two outlying stations for conversation. Five such conversations, non-interfering, may be carried on simultaneously. Recommended in place of Inter-Phone Systems when 24 or more stations are to be installed.

General Construction

The minimum capacity switchboard, equipped to handle 20 outlying stations, consists of three units—top unit, cord unit, and supporting unit. For greater capacities, up to 80 stations, line units are added, one for each 20 stations, or fraction thereof. The illustration shows a 40-line board.



Cord Units

The cord unit includes all the operating parts required for 20-station operation—five cord circuits and 20 line jacks with their signal lamps. The unit designation varies according to the type of telephone provided for the operator—No. JC-2 if a hand set; No. JD-2 if a desk set.

Line Units

These units are required *only* when it is desired to serve more than 20 outlying stations. These units or banks, each have an ultimate capacity of 20 lines; they are factory equipped with line lamps and jacks in multiples of five lines, and are inserted in the top unit below the 20-bank furnished as part of the cord unit. Line units are designated as follows—

With five line lamps and jacks, No. HA-1; ten, No. HB-1; fifteen, No. HC-1; twenty (fully equipped) No. HD-1.

Caution—When ordering it should be kept in mind that no line unit is required for the first 20 lines; it is therefore advisable when specifying or ordering, always to indicate the total capacity desired.

Supporting Units

The switchboard illustrated is mounted on a flat-topped desk unit, No. K-3, with the cords concealed at rear and side by wooden panels. Two other types of support are available, the No. K-1, consisting merely of two metal brackets, and, for wall mounting, the No. K-2, which consists of two brackets and a casing for enclosing the cords.

No. 2554-A or No. 6044-B

Miscellaneous Units

Other units which may be used with this system are as follows:

Line relay unit (long lines)—No. HA-2.

Simultaneous ringing and talking (alarm)—No. HA-7.

Call transfer unit (night service)—No. HB-6.

Wiring and Battery

The system wiring consists of one common wire and two individual wires from the switchboard to each outlying station. Two sets of batteries are required for operating the system, one set for talking and one set for signaling. Further installation data will be furnished on application to the GRAYBAR ELECTRIC COMPANY.

Outlying Stations

The outlying station Inter-Phones may consist of the following:

Metal Wall Types—*Surface*—No. 2527-A. *Flush*—No. 2539-A.

Hand Set Types—*Cradle*—No. 6044-A. *Wall Box*—No. 6043-R.

Note: Information on flush type switchboard will be furnished on request.

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY

GENERAL OFFICES AND FACTORIES
100 Carlson Road, ROCHESTER, N. Y.

BRANCH SALES OFFICES
CHICAGO, ILL., 17 South Jefferson Street
KANSAS CITY, MO., Coca-Cola Building

STROMBERG-CARLSON TELEPHONE MANUFACTURING CO., LIMITED OF CANADA
211-219 Geary Avenue, TORONTO, ONT.

Products

Manufacturers of Inter-Communicating Telephone Systems, Telephone Apparatus.
Program Service Systems.
Dealers in Telephone Cable and Supplies.

Selective Talking—Selective Ringing Telephone System No. 1

System No. 1 satisfies the requirements of most offices, factories, etc., where the volume of traffic does not justify the use of a switchboard and operator. Each telephone may ring and talk with any other telephone without interfering with any of the remaining stations.

No. 903 Type Station

Station Equipment

Each station is equipped with a telephone and key box of either 12 or 22-station capacity. However, it is only necessary to purchase station equipment actually required. Additional stations may be added without disturbing those already installed.

No. 903 Type—Combined wall telephone and key box. Finish is dull golden oak. It contains complete talking, signaling and switching apparatus for one station. Furnished in 12 or 22-station capacity.

No. 1128 Type—A hand set telephone and key box both of which are finished dull black. All signaling and switchboard apparatus is contained in the key box. Furnished in 12 or 22-station capacity.

No. 1128 Type Station

Wiring

Full metallic circuit wiring between all stations. Stromberg-Carlson cables, in full color code, are furnished in proper capacities and contain all wires essential to the system. Terminal boxes provide ready facilities for making cable connections.

Battery

A set of 7 cells is required to supply current for talking purposes and either 7 to 10 cells or a bell ringing transformer connected with the lighting circuit for ringing the telephone bells.

Private Exchange Switchboard System No. 6

System No. 6 offers to architects, contractors and owners a standardized inter-communicating telephone system for factories, offices, schools, hospitals, clubs, hotels, etc., where the volume of traffic necessitates simultaneous conversations and where the services of an attendant are required. With this system it is possible for any telephone to be connected with any other by signaling the operator, who makes all connections.

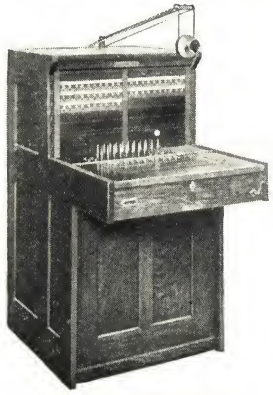
Switchboard Equipment

The switchboards are made in four sizes:
No. 104 Cordless type—10 lines capacity.
No. 101 Cord type—50 lines capacity.
No. 102 Cord type—100 lines capacity.
No. 106 Cord type—300 lines capacity.

The No. 104 cordless switchboard comes fully equipped with 10 lines and 5 connecting circuits but the No. 101, No. 102 and No. 106 types of switchboards, although wired to capacity in all instances, may be purchased with as low as 10 lines and 4 connecting circuits equipped.

Switchboard Operation

All connections through the No. 104 switchboard are made by means of keys. The removal of the receiver from the hook of the station instrument lights a lamp in the switchboard as a signal to the operator who answers over her telephone and makes the desired connection by the operation of keys. The return of connected parties' receivers to the hook switches illuminates another lamp indicating to her that the connection is no longer required, when she restores the keys to their normal position.


No. 102 Switchboard

The No. 101, No. 102, and No. 106 switchboards have identical operating characteristics. The removal of the receiver from the hook of the station instrument lights a lamp which notifies the oper-

ator that her services are required. She answers by inserting the answering cord in the indicated jack and completes the requested connection by inserting the calling cord of the pair in the jack of the desired party and ringing his telephone. On the completion of the conversation both cords are returned to their normal position.

Operator's Telephone Set

Either a suspended or breast plate type transmitter and a watchcase type receiver with head band for the No. 101, No. 102, or No. 106 type switchboard. For the No. 104 switchboard a standard No. 1168 desk stand.

Outlying Station Telephones

No. 1168 Desk Stand—Provides a very neat, light weight station instrument, equipped with Stromberg-Carlson standard transmitter and receiver. Signaling equipment mounted in No. 1156-BY desk stand box, a 1000-ohm ringer, an induction coil and a 1 M.F. condenser.

Both pieces of apparatus are finished in dull black enamel with nickel trim. Mounting space of desk set box $9\frac{3}{16}$x$6\frac{3}{4}$x$3\frac{9}{32}$ in.

No. 1155-BY Wall Telephone—Contains all talking and signaling apparatus. Box is of best steel finished in dull black enamel with nickel trim. Telephone is equipped with Stromberg-Carlson standard transmitter and receiver. Signaling equipment consists of a 1000-ohm ringer and a 1 M.F. condenser. Mounting space $9\frac{3}{16}$x$6\frac{3}{4}$x$6\frac{7}{8}$ in.

No. 1177 Hand Set Telephone—Provides the convenience of a one-piece instrument with talking efficiency equal to the desk stand. Signaling equipment mounted in the No. 1156-BY desk set box, 1000-ohm ringer and 1 M.F. condenser. Mounting space of desk set box $9\frac{3}{16}$x$6\frac{3}{4}$x$3\frac{1}{4}$ in.

No. 1177 Hand Set

Wiring

Two wires are required to connect each station with the switchboard. Stromberg-Carlson standard switchboard cables are furnished in proper capacities for the requirements of any size of installation.

Battery

For any installation of not over 100 stations 11 cells of Electric Storage Battery Company's Type C T chloride accumulators. To charge the battery a General Electric Company's No. 244,708 tungar rectifier is employed.

Systems No. 2, No. 3 and No. 4

Systems No. 2, No. 3 and No. 4 are designed to furnish service in small factories, offices, or residences where the number of stations is limited and it is not necessary to carry on more than one conversation at a time. For this type of service one of these systems is suitable to meet every requirement.

Program Service Systems

Stromberg-Carlson Program Service Systems consist of master sets of program originating equipment—Stromberg-Carlson radio receivers and phonographs—wired to suitable amplifiers and connected to the program service wiring systems which serve the sound projectors in the various parts of the buildings. Any number of channels may be wired to the sound outlets thus providing a choice of programs.

This equipment is suitable for installation anywhere—hotels, schools, hospitals, public, and private institutions.

Service Furnished

Best in radio programs is available to every loud speaker because the master set is one of the best radios built.

Programs are always available regardless of radio conditions by making use of the phonograph and magnetic pick-up.

Public rooms may be supplied with music when an orchestra is not available.

Program schedules and control of volume are under the immediate control of the operator.

Paging or announcing may be accomplished through a close speaking microphone.

Equipment Covering No. 2 Program Service System

Level Indicator enables operator to judge correctly the volume level. Prevents distortion from overloading.

Radio Receiver is equipped with automatic volume control, visual tuning silent key, range control, and monitor jack.

Mixer Panel is supplied with switches for supplying current and for impressing radio, phonograph or microphone programs upon the system.

Amplifiers are sufficient to furnish adequate volume for all loud speakers in the system.

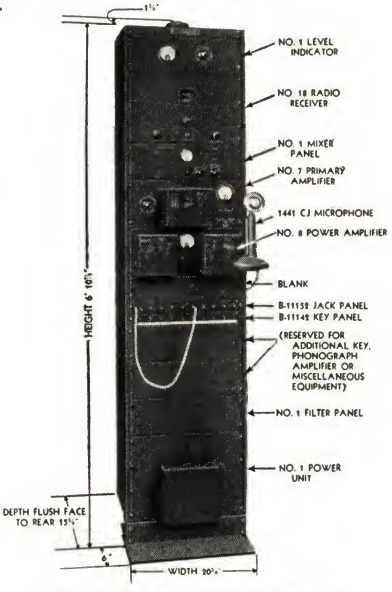
Power Unit and Filter Panel provides rectified alternating current from 60-cycle, 105-125-volt power supply to operate the system.

Mounting Frame and Cabinet consists of heavy angle iron uprights and sheet metal cabinet. Opening the cabinet door disconnects current.

Phonograph is electrically operated of either the automatic record-changer type or manual-change type.

Close Speaking Microphone permits paging or announcing.

Loud Speakers are of either magnetic or electro dynamic types—table, wall, floor, or auditorium—to meet conditions.



No. 2 Program Service System
(Typical Panel)

System No. 3

This system is designed for the smaller types of installations, where less power is required and where the circuit requirements are simple.

RCA VICTOR COMPANY, INC.

ENGINEERING PRODUCTS DIVISION

Radio Equipment and Parts

CAMDEN, N. J.

100 Monroe Street
CHICAGO, ILL.

155 East 24th Street
NEW YORK, N. Y.

235 Montgomery Street
SAN FRANCISCO, CAL.

REPRESENTATIVES IN PRINCIPAL CITIES

RCA CENTRALIZED RADIO EQUIPMENT FOR MODERN BUILDINGS

In planning new apartment, hotel and other multiple residence buildings, provision for proper radio reception is a necessity. New buildings not equipped in the beginning with adequate radio facilities may soon have to be so equipped at a greater expense.

To meet the rapidly growing demand for high quality radio distribution systems, the RCA Victor Company, Inc., has designed special apparatus for apartment houses, hotels, hospitals, schools, ships, residences and, in fact, to meet any condition calling for centralized control of sound reproduction.

Two principal methods of wiring buildings are available, depending on the service required, and installations may be made during course of construction or in existing buildings without inconvenience to occupants.

For apartment houses or where permanent residents require the use of the usual individual receivers, the RCA Antenaplex System provides a single antenna with suitable distribution wiring throughout the building connected to wall outlets wherever desired. As many as 250 radio receivers of any make can be operated simultaneously from this common antenna, without the interaction and interference usually experienced in apartment houses.

For hotels, schools, hospitals, etc., where it is desired to operate any number of loud speakers, head telephones or radio pillows from a central control panel, the RCA Centralized Radio System is provided. With this system, one to four programs can be made available at every outlet throughout the building, and the design of the various units available is such that practically any requirement of radio, phonograph or announcing sound distribution can be successfully met.

Descriptive bulletins covering either system will be mailed on request.

The RCA Victor Company, Inc., provides complete engineering layout and specification service for either system without obligation, and architects or engineers should communicate with the nearest RCA Victor office for this purpose.

THE RCA ANTENAPLEX SYSTEM

The RCA Antenaplex System involves the location of one Antensifier for every 50 receiver outlets. Not more than five Antensifiers should be operated from one antenna. From these Antensifiers, RCA Cabloy is run to wall outlets located wherever desired. The Antensifiers may be inserted in the line to operate a maximum of 50 receivers for each 500 foot run, or they may be grouped in a roof penthouse location feeding suitable risers. RCA cable clamps, RF5055, should be employed on surface runs.

Some of the unique features of this system are:

(1) The high signal intensity obtained.

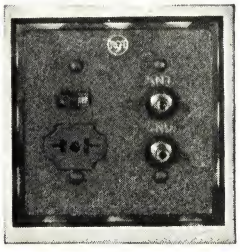
(2) The total absence of interaction between receivers.

(3) Elimination of the pickup of local interfering noises from electrical equipment usually encountered where long lead-ins are necessary.

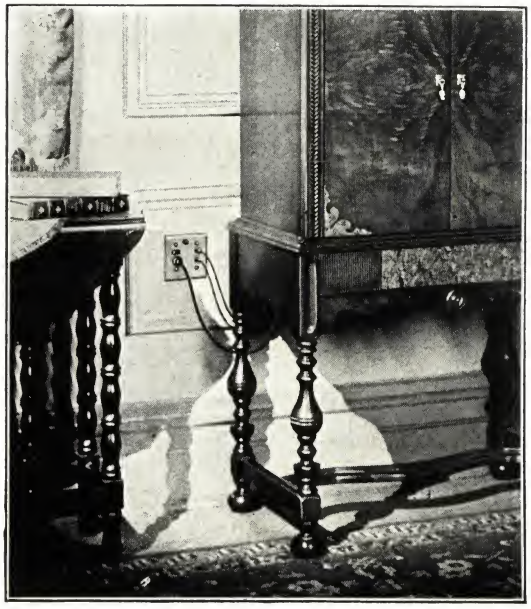
(4) Equally efficient simultaneous reception of signals at all frequencies in the broadcast range by different receivers connected to the system.

(5) Low initial cost and negligible maintenance cost.

RCA Antensifier
12⅝ x 9 1/16 x 10⅜ in.



Radio Outlet Unit, Model RFO-5632
With current tap and switch.
2-gang



Apartment Installation Showing Radio Outlet and Power Supply to Receiver

Radio Outlet Unit
1-gang
Model RF-5634

RCA Cabloy, Model RF-5050
Lead covered
⅛-in. diam.

Radio Outlet Unit, Model RF-5034
With double current tap.
2-gang

(6) Ease of installation, and as foolproof as the wiring for the electric lighting circuits.

(7) No moving parts—no vacuum tubes on any extensions.

(8) Compact arrangement, attractive appearance—above all, *inconspicuous.*

(9) Elimination of the shielding effect of steel frame buildings on long lead-ins.

(10) Vastly improved appearance of the building.

This equipment is designed for alternating or direct-current line power operation.

A general description of the apparatus involved, together with a schematic sketch of the wiring layout, is incorporated in bulletins, sent on request.

RCA CENTRALIZED RADIO

The RCA Centralized Radio receiving system was designed for the purpose of furnishing radio programs throughout large buildings, such as hotels, schools, apartment houses, hospitals and in any other place where it is desired to operate and control a multiplicity of loudspeakers, head telephones or radio pillows from a central location.

Special Design—This apparatus should not be compared with ordinary radio receivers which are designed for home use. Highly specialized equipment is necessary to meet the demands of a true centralized radio system. RCA Centralized Radio control panels are built in true central station switchboard form—rugged, reliable, and are easily installed and operated. Constant attention is not necessarily required, provision having been made for automatic operation when desired.

Flexibility—The apparatus is so designed that the installation can be conveniently extended or modified as requirements dictate. Additional loudspeakers or other reproducers may be connected to the original network at any time, and when the full capacity of the amplifiers has been reached, additional amplifiers may be installed in a uniform manner, for which provision is made on the central racks. Any combination load of loudspeakers, radio pillows or head telephones may be operated from one amplifier unit, depending on the volume level desired.

Safety and Convenience—The distribution system is so arranged that it will render the most reliable service with a minimum of attention. Protective devices are incorporated to prevent tampering or accidental damage to the extension devices as well as the central station equipment.

Extension Fittings—A complete line of extension equipment is available for this system. Outlet devices are provided for loudspeaker, headphone or radio pillow extensions. A variety of types have been designed to meet the requirements of one, two, three and four-channel installations and loudspeakers can be supplied with or without individual volume controls. The selection of programs is accomplished by means of special jacks for plugging in the loudspeaker or headset, or selector switches may be supplied for this purpose if desired. The cover plates are secured in such a manner that the layman, with ordinary tools, cannot remove them.

Centralized Radio Panel, Model AF-6100

Headphones, loudspeakers or radio pillows with extension cords and plugs are available in forms particularly adapted to centralized radio service. A special wall type loudspeaker has been developed, for mounting flush in the wall. This is enclosed in a metal box, faced with a neatly decorated grille, which may be concealed by a suitable drape, if desired. This type of loudspeaker is thus protected from deliberate tampering or accidental damage.

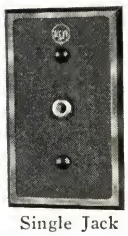
Particularly in a new building, it is advisable to consider the economy in the installation of wiring and outlets for two or more channels even though but one channel is required for the initial installation. Installations can be made in existing buildings with no inconvenience to occupants.

Power Supply—The equipment is supplied for alternating or direct-current line power operation; no batteries or charging devices are necessary.

Electric Phonograph—A special electric phonograph unit may be included in the installation if desired.

Microphone — For announcements, etc. Microphone equipment may be supplied for the use of the proper authorized persons at a central point, to reach any or all extensions.

Information relative to the complete line of accessory equipment for portable, flush or external wall mounting is available on request.



Single Jack

Double Jack

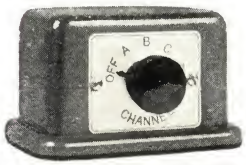
Volume Control

Channel Selector Switch

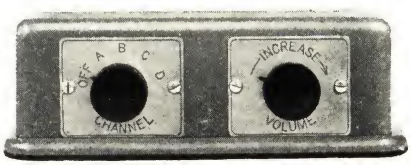
Flush Wall Type

Loudspeaker, Wall Type, Model AF-6179

Dimensions of plaque 11⅜ x 13⅜ x 1 1/16 in.
Dimensions of wall box 10x12x4 in.



Program Selector Switch



Combined Program Selector and Volume Control

Volume Control

Portable Type

YAXLEY MANUFACTURING COMPANY

Approved Radio Products

1528 West Adams Street, CHICAGO, ILL.

Products

Radio Convenience Outlets.
Local and Central Burglar Alarm Systems.

Also Radio Products which include: Cable Connector Plugs, Automatic Power Control, Rheostats, Switching Rheostats, Potentiometers, Battery Switches, Inductance Switches, Jacks, Jack Switches, Phone Plugs, Panel Lights, Pilot Light Switches, Resistances.

Radio Convenience Outlets

General Installation Information—Yaxley Radio Convenience Outlets meet every radio requirement. They fit any standard switch box. For purposes of description, these outlets may be divided into two parts, namely: (1) the plate, and (2) the jack. The jack, which is thoroughly insulated from the plate, is permanently attached to a supporting strap, by means of which it may be mounted on the switch box. In the event that no switch box is used, the supporting strap may be fastened to the plaster lath or studding by means of wood screws. The wall plate fastens directly to the mounting strap by means of screws which are provided. The plate serves as a cover only and is not subject to any strain when plugs are inserted or removed from the jack.

Handsome Appearance—Finishes—Yaxley Radio Convenience Outlets are furnished regularly with either a rich, handsome bakelite plate, with satin brown finish, or metal plate in burnished brass, as desired. Special finishes in color or plating will be furnished on request.

Wiring Layouts—Distribution and Availability—Yaxley Radio Convenience Outlets may be installed by any electrical contractor. We will be glad to furnish complete technical information and wiring diagrams to meet any particular plan, without obligation. These outlets may be readily procured from jobbers and dealers in electrical and radio supplies.

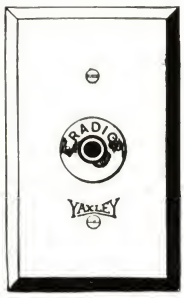
No. 135—For Loud Speaker Connections—Makes it practical to place radio receiving set in one room and enjoy reception in another part of the building. More than one No. 135 Radio Convenience Outlet may be used on the same circuit.

No. 134—For Several Loud Speaker Connections—Same as No. 135 but equipped with an impedance coil wound to 2200 ohms, which is equivalent to the resistance of the average loud speaker unit or head set. An equal volume is possible from one or several loud speaker units on the same circuit at the same time.

No. 136—For Aerial and Ground Connections—Aerial and ground wires are brought to the convenience outlet behind the sash and are then available for connection to the set by means of phone tip plugs furnished with each plate or No. 14 solid wire.

No. 137—7-Conductor, for Battery Connections—Make connections to the set through the outlet. Furnished complete with plate and plug.

No. 142—For Two Loud Speaker Connections—Same as No. 135 except that it has two speaker jacks on a single plate to be used on a two-channel system.



No. 135

No. 136

Special Plates for Any Individual Requirements

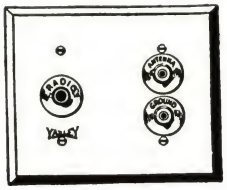
No. 142

No. 134

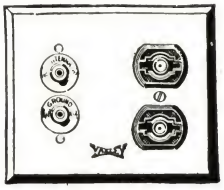
Gang Convenience Outlets

Yaxley Radio Convenience Outlets are also made up in gangs to form many effective combinations.

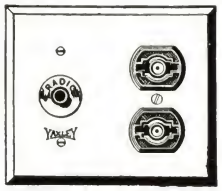
In addition to those illustrated below, special gang combinations will be figured on and made up on request.



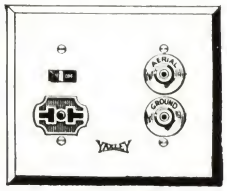
No. 238
For loud speaker and aerial and ground



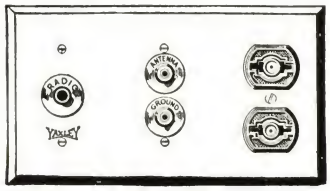
No. 241
For aerial and ground and A.C. connections



No. 242
For loud speaker and A.C. connections



No. 245
For electrical connections, with indicating "on" and "off" switch, and aerial and ground connections



No. 353
For loud speaker, aerial and ground and A.C. connections

Local and Central Burglar Alarm Systems

A considerable part of the engineering and manufacturing facilities of the Yaxley Manufacturing Company is devoted to the development of local and central station systems of protection against burglary, employing in this connection many items identical with or closely related to Yaxley Approved Radio Products. Full information will be furnished on request.

WESTERN ELECTRIC PUBLIC ADDRESS SYSTEMS

Distributor in the United States
GRAYBAR ELECTRIC COMPANY
Graybar Building, New York, N. Y.

Distributor for Canada and Newfoundland
NORTHERN ELECTRIC COMPANY, LIMITED
General Sales Offices: 637 Craig Street, West, Montreal, P. Q.

Foreign Distributors
INTERNATIONAL STANDARD ELECTRIC CORPORATION
67 Broad Street, New York, N. Y.

General

Western Electric

The Western Electric Public Address System is a system for amplification, reproduction, and distribution of speech and music to an audience of from one to any size in a room or auditorium—or to the various parts of a building.

A Microphone Picks Up the Sound

Developed by Bell Telephone Laboratories for the WESTERN ELECTRIC COMPANY, the Public Address System has steadily increased its scope of commercial usefulness, until today its applications are practically endless.

Modern building enterprises of many kinds are including this equipment in their specifications.

Public Address Systems and Music Reproducer

Western Electric manufactures several types of Public Address Systems, applied according to requirement and area to be covered. The newest systems represent all the latest developments in the art.

The essential parts of the Public Address System are:

(1) One or more microphones for "picking up" sound.

(2) "Mixing" and control panels.

(3) Amplifying apparatus.

(4) Observer's communicating system for theaters and similar auditoriums.

(5) Receivers and projectors, or loudspeakers of suitable design, depending upon conditions of installation.

(6) Necessary wiring and circuits.

Modern School Systems Find the Equipment Invaluable

A Western Electric radio receiver must be added if radio programs are to be reproduced.

In conjunction with the Western Electric Music Reproducer, the Public Address System can be operated at low cost from standard phonograph records—reproducing with fullness and richness, tone suggestive of a great orchestra. In conjunction with a receiving unit, radio programs may be reproduced with original effectiveness. And by using microphones and a selective system, house announcements and instructions may be simultaneously delivered in as many locations, and to as many people as desired.

The Western Electric Music Reproducer operates in exactly the same way as any phonograph but the difference is in the result.

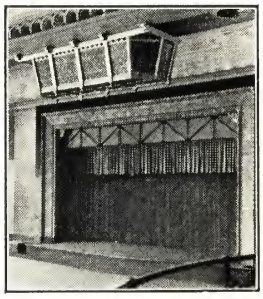
It consists of a motor-driven turntable, the pick-up or the electro-magnetic reproducer arm which carries the needle, a speed and volume control—all of which are mounted in a small cabinet. This cabinet may be kept out of sight in any convenient place, though always ready to operate by simply pressing a button and switching the pick-up to the amplifier of the Public Address System.

Hospitals Now Can Shorten the Convalescent Period

It should be pointed out that the Public Address System is especially planned for scientific distribution of sound—and for radio distribution it requires only the addition of loudspeakers and a Western Electric radio receiving set to deliver the program to the locations and at the volume desired.

With a Public Address System, radio distribution is only one of the features by means of which entertainment may be supplied 24 hours a day—regardless of what may be on the air. With Public Address System and Music Reproducer there is music at any time for dancing, concert or accompaniment; with a microphone in circuit, management announcements, instructions or emergency directions are most quickly given in every part of the house at once; while with a receiving unit, radio programs are reproduced as desired.

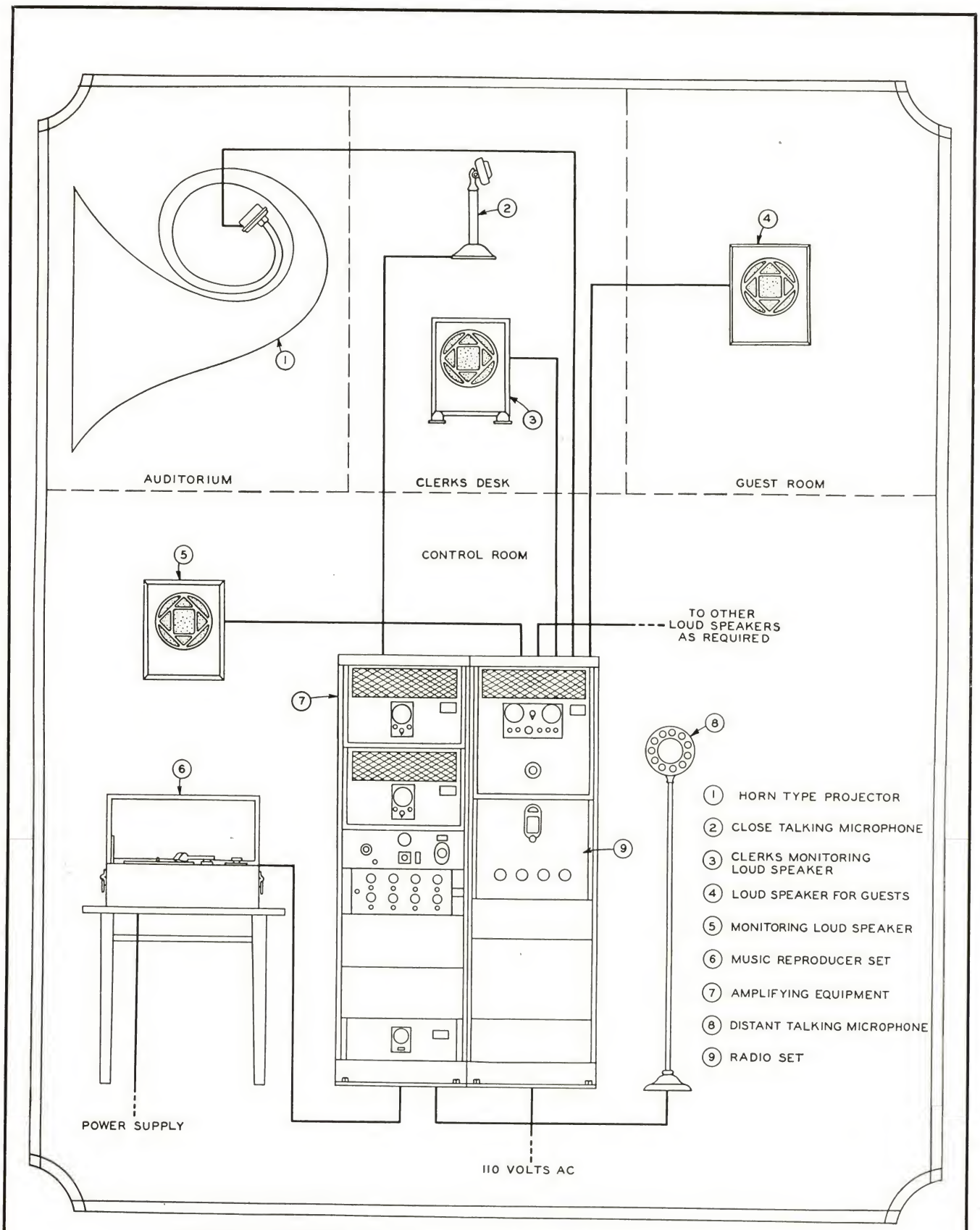
Whether it is reproduction directly from the voices of speakers, singers or from instrumentalists, from records or the distribution of a radio program; voice and instrument, alone and together, in any desired volume are rendered in tone and clarity comparable to the original. Distortion, variation, and noise are pleasingly absent.



In the World's Largest Auditorium

Graphic Suggestions for Public Address System

The two following pages graphically suggest the multiplicity of uses for this system. On one page is shown an actual *picture* of a typical installation. The adjacent page shows an explanatory, schematic diagram of the same installation.



SCHEMATIC DIAGRAM OF THE WESTERN ELECTRIC PUBLIC ADDRESS SYSTEM
With explanatory legend. This diagram indicates wiring and general layout of equipment

PICTORIAL DIAGRAM OF THE WESTERN ELECTRIC PUBLIC ADDRESS SYSTEM

Showing the application of each piece of equipment. The numbers correspond to the numbers on the schematic diagram (preceding page)

Cost

The cost of a Public Address installation is relatively small, considered in the light of its variety of uses—and of the profitable returns, direct and indirect, from those uses.

In estimating the cost of installation, individual requirements must be considered. Full information, including expert engineering advice, gladly given on application.

Guarantee

The Public Address System was developed and perfected by the Bell Telephone Laboratories which are the research laboratories of the AMERICAN TELEPHONE and TELEGRAPH COMPANY and the WESTERN ELECTRIC COMPANY. Thus the Public Address System represents the last word in electrical development as applied to sound transmission. The quality of workmanship of the Public Address System is guaranteed by WESTERN ELECTRIC COMPANY, manufacturers of equipment for the Bell System for nearly 50 years. Its reputation for painstaking methods and quality workmanship is scarcely equalled in any industry.

With a Public Address System, Weak Voices Are Heard to the Farthest Corners

Service

Western Electric maintains an emergency stock of Public Address repair parts at strategic locations throughout the country. In emergency, nearest Western Electric distributor should be consulted. Thereby expert knowledge is always readily available.

Radio Distributing Systems for Hospitals, Schools, Hotels, etc.

The radio distributing feature of the Public Address System has proved especially popular in large public buildings.

A single radio program may be heard via individual loudspeaker or earphones in as many rooms at once as desired.

In hospitals, the period of convalescence may be shortened by cheerful entertainment distributed (always under rigid control) by this system. The use of earphones prevents disturbance to patients who may require silence.

School children, in all parts of school buildings, may take advantage of educational radio programs. They may study "current events" by hearing the current events actually happen—whether it be a speech by the President of the United States, reports of an inspiring airplane flight, or news of distant explorations.

This Music Reproducer Set Is Always Ready and Out of the Way

Hotels, too, have found corresponding features of the Public Address System desirable and profitable. They may give to guests in their rooms symphony concerts, radio reports of the big fight and the big game, daily stock market quotations, Broadway jazz, setting up exercises—in fact, everything interesting that comes over the radio.

Clubhouses, ocean liners, and amusement parks also may apply this service.

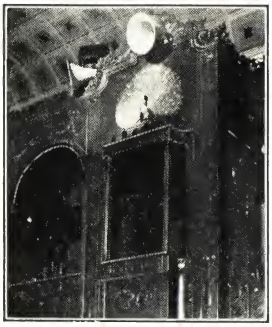
Many Possible Uses

There is no limit to the possible uses of the Public Address System—except the limits of human ingenuity. New applications are being discovered constantly.

Many uses, however, have been tried out in actual practice, and have proved extremely successful.

In Schools—The principal's announcements can be heard in all or whatever rooms he desires. Or, it may be, the voice of the music teacher, the gym teacher, school doctor, or a prominent visitor.

This system may supplement the auditorium—solving the "overflow" problem in overcrowded schools. Public Address makes the whole school an auditorium. Or it may be used *within* the auditorium, or to make it possible for small voices to be heard everywhere without voice-strain.



A Large Variety of Projectors Is Available for Use with the Different Systems

But perhaps the most valuable use of all for this system is that of auxiliary fire alarm or for other emergencies. Loudspeaker commands make possible an instant change in the line of march.

In Hospitals—In addition to picking up radio programs, the Public Address System can distribute the fun-making of professional entertainers who frequently visit hospitals. The Music Reproducer may also be used here to good advantage.

In Hotels—Music from the hotel orchestra may be carried to every part of the building. Guests may be paged quickly and unobtrusively. (Radio and Music Reproducer applications are also possible.)

In Churches—The voice of a speaker can be heard in all parts of the church, *clearly,* and without effort on the speaker's part.

Large Gatherings—The Public Address System becomes a necessity *indoors* in large auditoriums, convention halls, etc., and *outdoors* in the stadium, race track, or other sports center.

In the Theater—This system does wonders in the theater—especially in the very large talking picture houses of today. Supplementary stage entertainment need no longer work under severe difficulties.

Industrial Uses—The commercial service rendered by the Public Address System is not confined to entertainment alone. It has valuable industrial uses—in railroad switching, at airports, on movie sets; in industrial plants and railroad stations.

The Loud Speaking Telephone, Wall or Desk Type, Is Used for Small Indoor Areas

And a Myriad Other Uses—It may be used: in airplanes, courtrooms, department stores, vehicular tunnels, golf courses, parks, steamships, boats, prisons; at all outdoor functions; and by newspapers.

ELECTRO-ACOUSTIC PRODUCTS COMPANY

GENERAL OFFICE AND FACTORY
200 East Illinois Street, CHICAGO, ILL.

BRANCH OFFICES
NEW YORK LOS ANGELES DETROIT NEW ORLEANS

SOUND AMPLIFYING AND SOUND REPRODUCING EQUIPMENT

The Result of Twenty Years' Experience in Pioneer Development and Manufacture

Electro-Acoustic System Installed in This Auditorium Made it Possible for 30,000 People at an Election Rally in Chicago to Hear Clearly and Distinctly Every Word Spoken from the Rostrum

Complete Installations for Every Conceivable Use

Theaters	Public Buildings	Grandstands	Carnivals	Airports	Clubhouses
Schools	Broadcast Stations	Restaurants	Sound Advertising Trucks	Gymnasiums	Amusement Parks
Hotels	Auditoriums	Stadiums	Factories	Natatoriums	Private Residences
Churches	Apartment Houses	Railroad Stations	Department Stores	Railroad Yards	Garages
Hospitals	Rinks	Athletic Fields	Ball Rooms	Ships	Chapels

Complete Sound Distribution Panel
For schools, hotels, apartment houses, etc.

Features

The ELECTRO-ACOUSTIC PRODUCTS COMPANY's many years of experience in development has resulted in the marketing of sound reproducing systems featuring:

Unexcelled Tone Quality Performance: Unsurpassed tone quality achieved with resistance coupled amplification as applied by the ELECTRO-ACOUSTIC PRODUCTS COMPANY.

Durability and Freedom from Service: Utilization of materials of proven excellence and durability to safeguard the reputation of Electro-Acoustic equipment for trouble-free operation.

Low Original Cost of Equipment: A complete line to sell direct to the user eliminating the wholesale mark-up.

Low Installation Cost: The use of electro-dynamic loud-speakers, especially developed to eliminate expensive wiring, have reduced installation costs tremendously. Yet, unlike the magnetic type speakers frequently used for such installations, the Electro-Acoustic speakers retain all of the clarity of reproduction obtained in the quality radio sets of today.

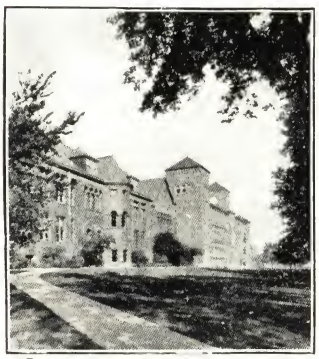
Flush Type Loud Speaker
For wall mounting

Guarantee

The ELECTRO-ACOUSTIC PRODUCTS COMPANY offers an absolute guarantee of "satisfactory performance." Mechanically and electrically, E. A. P. Systems are guaranteed for a period of one year.

Service to Architects

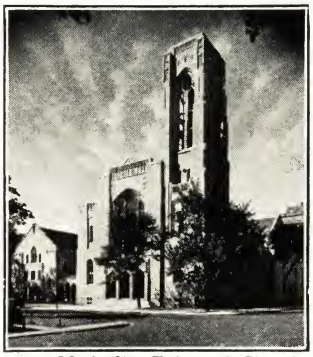
A staff of well trained engineers is at your service. They will help solve your sound distribution and acoustical problems without cost or obligation to you.



Lyons Township High School, La Grange, Ill.

Stadium, Chicago, Ill.

Arlington Park Race Course, Arlington Heights, Ill.



First Methodist Episcopal Church, Evanston, Ill.

Typical Electro-Acoustic Products Company Installations

THE CINCINNATI-VICTOR CO.

712-720 Reading Road, CINCINNATI, OHIO

THE VICTOR IN-BILT ELECTRIC CLOCK

Description

The Victor In-Bilt Electric Clock is a modern built-in-the-wall clock with no wiring visible. The clock is always accurate and requires no winding, regulating or oiling. It is only necessary to start and set—it never gains or loses.

A ferrule, wall box and wire fittings are standard equipment with the clock itself. Installation is simple and rapid.

The case of the clock bears directly on the plaster, making an exceptionally attractive installation.

The clock is set by turning the hands in the usual way and spinning the knob above the hands in the direction indicated.

The unit is carefully tested and put in service before shipment.

The Victor In-Bilt Electric Clock

Specifications

Diameter, dial 5¼ inches, case 7¾ inches; front start and set; finishes, C30 chromium, C31 brushed silver, C32 antique bronze; dial, brushed silver; swinging door; convex lense; ⅜-inch lap of clock case over wall box flange provided to hide chipped or uneven plaster finish; movement, Victor; current, 60 cycles, 110-120 volts, alternating only.

Installation

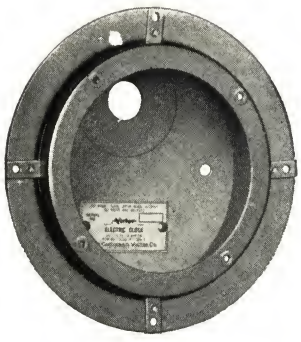
Mounting the Ferrule—The Ferrule, which is 5¾ inches in diameter by 3 inches deep, is installed in the wall with the wiring notch up or down, and the face of the flange flush with the plaster line. In a brick wall, the ferrule should be set in the brickwork and wedged in the proper position.

Wiring—Standard BX Cable (a pair of No. 14 wires) should be run through the wiring slot and into the ferrule, allowing about 6 inches excess wire for connecting to the clock. This should be connected directly to the house lines, with no switch in the circuit.

Mounting the Wall Box—The wall box may be mounted any time after the plastering. In the rear of the wall box is a $\frac{13}{16}$-inch hole for mounting the No. 2210 BX 90-degree fitting. The wires are fed through a hole in the wall box, pulling the fitting into place against the back of the box. The lock nut is then slipped over the wires and the fitting is clamped to the wall box.

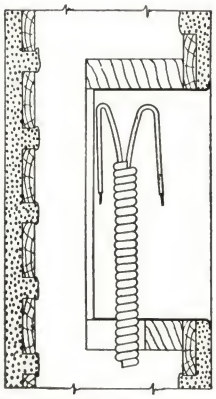
On the flange on the wall box are four holes through which the wood screws (furnished) should be screwed into the headers to hold the wall box securely against the flange of the ferrule.

Mounting the Clock Unit—The clock unit need not be mounted until the building is practically completed and the lighting fixtures are connected. Slip the clock unit over the wall box, aligning the holes in the dial with the tapped holes in the slip ring of the wall box.

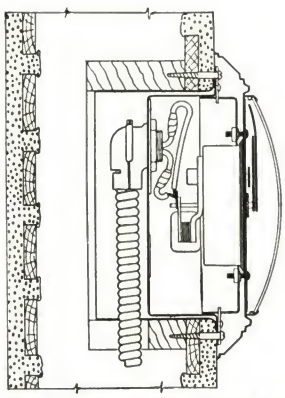


Wall Box

Heavy gauge steel, cadium plated; reinforced at opening for BX cable; provided with slip ring for adjustment of dial to vertical position; diameter flange 7 ins.; depth 1⅝ ins. behind flange



Section Showing Ferrule and Wiring



Showing Completed Installation with Wall Box in Place

Ferrule

Heavy gauge steel japanned; wiring slot for BX cable; diameter 5¾ ins.; standard depth 3 ins.; 2-in. depth furnished on order

INTERNATIONAL TIME RECORDING CO.

DIVISION OF THE INTERNATIONAL BUSINESS MACHINES CORPORATION

Manufacturers of Time Recorders and Electric Time Systems

GENERAL OFFICES
270 Broadway, NEW YORK, N. Y.
BRANCH OFFICES AND SERVICE STATIONS IN ALL PRINCIPAL CITIES

Products

INTERNATIONAL TIME RECORDING, INDICATING and SIGNALING and ALLIED DEVICES, including: Hourly Supervised Electric Time Systems; Master Clocks; Secondary Clocks; Automatic Payroll Machines; Attendance Recorders; Job Time Recorders; Time Stamps; Door Recorders; Program Machines; Public Address Systems; Laboratory equipment; Telephone and Fire Alarm Systems; Bell Equipment.

Service

This company maintains a competent engineering service that is invaluable to architects and engineers.

Complete details are available in every International office, branch office and service station in every principal city.

Our Specification Manual for architects is now on the press. Copies for distribution will be available in the near future.

International Supervised Electric Time System

A radical improvement over the ordinary clock system, in that it is designed around the principle of *hourly supervision*. This feature, which checks and proves the accuracy of each unit once an hour, is the most important contribution ever made to time system engineering because it entirely eliminates manual regulation and all other expensive maintenance. Operates from either alternating or direct current.

Master Clock

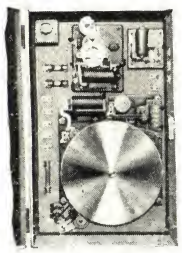
Time Indicating Devices

Are furnished in a wide range of designs and sizes to conform with any decorative or architectural scheme. Wall, suspended, weatherproof and tower clocks.

Secondary Clock

Time Signaling Devices

Operate bells, gongs, whistles (steam or air), sirens, horns, or buzzers. Metal disc and paper tape program machines to meet the schedule requirements of every organization—whether school, factory, office or store. Ordinarily used in conjunction with the International Supervised Electric Time System for maintaining pre-arranged schedules in step with the established time standard.



Program Machine

Corridor Gong

Public Address Systems

Particularly for school applications. Used for radio programs, instruction, phonograph records, and speech distribution.

Telephone and Fire Alarm Systems

Approved by fire underwriters. Adaptable to the needs of any type building, organization or institution. All equipment is rugged in construction, simple in operation and furnishes the highest quality service at a minimum cost. Operates from alternating or direct commercial current or batteries as required.

Time Recording Devices

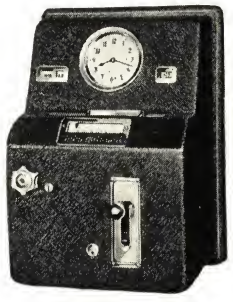
For measuring, recording and checking attendance time. Payroll machines that provide a simultaneous audit of payroll figures with original time records on one ledger sheet. Attendance recorders that print attendance records for any desired period, on a separate card for each employee.

Job time recorders that supply scientifically correct records of time spent on the job.

Also autograph recorders, door recorders, etc.

Job Time Recorder

Automatic Payroll Machine



Card Recorder

Laboratory Panels

For physics laboratory experimental work. Built in all sizes and types (for either alternating or direct current), to meet individual requirements.

LANDIS & GYR, INC.

DEPARTMENT: MAGNETIC CLOCK CO.

Manufacturers of Magneta and Inducta Clock Systems

104 Fifth Avenue, NEW YORK, N. Y.

Products

MAGNETA and INDUCTA ELECTRIC CLOCK SYSTEM; LANDIS & GYR ELECTRIC CLOCKS.

Also Electric Meters for alternating or direct current, Time Switches, Transformers, Special Metering Equipment.

Magneta Electric Clock System

The Magneta System operates directly on 110 to 120-volt alternating or direct current and consists of a master clock and a number of secondary clocks.

It is intended for use in high quality hotels and other buildings and in fine residences. Workmanship and finish are the highest degree attainable in clock manufacture. Provisions can be made for adaptation to any interior planned by the architect.

Magneta Master Clock

It is unlike any other clock system, having a magneto-electric master clock, which itself generates the current impulses necessary for actuating the secondary clocks, thus rendering the clock system independent of outside sources of current. *An interruption in current supply will not affect it or the secondary clocks.*

There are no batteries or contacts used to drive the secondary clocks, thereby eliminating a usual source of trouble.

Movement—The master clock is equipped with an automatic self-winding arrangement. Has a "Remontoire" type escapement, the most accurate made; the type applied to all astronomical regulators, and used where absolutely accurate time is required.

Operation—The clock movement proper, as well as the magneta generating apparatus, are both operated by weight; the generating apparatus being released every minute by the clock movement. The weight is wound automatically by an electric motor. This motor derives its source of power from the electric supply line in the building. The clock is therefore not affected by an interruption in current supply, up to a period of from 8 to 12 hours. If the power line is permanently out of order, the clock can be wound by hand.

Capacity and Size of Master Clocks—The master clocks differ in size according to the number and size of the secondary clocks. The smallest size master clock will drive 25 small or medium sized secondary units—(5 to 12-in. dial). A 50-unit master clock is one which controls 50 secondary clocks up to 12-in. dials. Larger secondary clocks require more units. Thus for example, a 20-in. dial secondary clock takes 3 units.

Relay master clocks allow systems up to any number of secondary clocks.

Secondary Clock, No. 647

Secondary Clocks—These clocks all have Magneta electrical movements. The standard type is a circular wood case in oak or birch (mahogany finish) or a circular metal case with white enameled dials, black numerals, balanced hands and stout glass fronts. In both cases, the figures are marked on a white dial in either Arabic or Roman.

Secondary clocks are noiseless and can be used in bedrooms where other clocks would be objectionable.

Secondary Clock, No. 666

Prominent Magneta Installations

Magneta Systems are installed in some of the most prominent buildings in this country and Canada. Among them are:

U. S. Custom House, New York
U. S. Post Office, New Orleans
Union Station, Washington
U. S. Post Office, Washington
Ritz-Carlton Hotel, New York
Singer Building, New York
U. S. Rubber Building, New York
New York Edison Co., New York
Cook County Hospital, Chicago
Courthouse, Memphis
Examiner, San Francisco
St. Francis Hotel, San Francisco
Meteorological Bureau, Toronto
Dominion Observatory, Ottawa

Landis & Gyr Electric Clocks

These are individual clocks which operate from house alternating or direct-current supply. They are independent of frequency and voltage variation. Each clock has a mechanical reserve for approximately 3 days, therefore not affected by current interruptions. Silent in operation, no hum.

Made in mantel and square wall style. Mantel style has a 5½-in. dial; wall style, 10-in. and 12-in. dials.

Landis & Gyr Electric Clock

WARREN TELECHRON COMPANY

Manufacturers of Telechron* Timekeeping Equipment

ASHLAND, MASS., U. S. A.

DISTRIBUTORS AND REPRESENTATIVES IN PRINCIPAL CITIES
IN CANADA: Canadian General Electric Co., Ltd., TORONTO, ONT.

Single Face Clock

Products

MASTER CLOCKS for frequency regulation in power stations; MOTOR DRIVEN CLOCKS for indoor and outdoor use, in single and multiple face design, illuminated and non-illuminated; PROGRAM CLOCKS for operating signals; SIGNAL CONTROL BOARDS; TOWER CLOCKS; SIGN CLOCKS; MOTORS and MOTOR DRIVEN MOVEMENTS for time stamps, time recorders, flow meters, pyrometers, and other special devices operating on timekeeping principles.

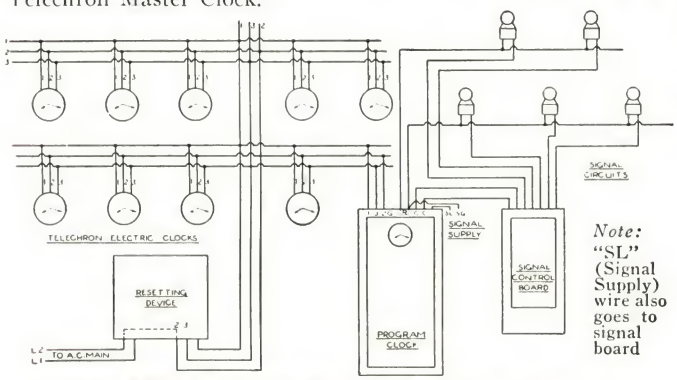
Telechron

**Telechron is the trade-mark (registered in U. S. Patent Office) of the* WARREN TELECHRON CO.

Single Circuit Program Clock

Principle of Operation

All clocks and timekeeping devices operated directly and continuously by a self-starting, synchronous motor, the speed of which is controlled directly by the frequency of the alternating current to which it is connected. The frequency is in turn controlled in the central station of the power company with the aid of a Telechron Master Clock.



Typical ADMR (Automatic Dual Motor Resetting) System for School Building

Fields of Application

Schools—Clocks for classrooms, boiler room, gymnasium, corridor and auditorium use. Single and multiple circuit program clocks, signal boards and signal equipment.

Hospitals—Clocks for offices, corridors, wards, lobbies, and special tap bell clocks for operating rooms.

Office and Public Buildings—Built-in wall models for offices. Corridor and lobby clocks, and outdoor clocks for wall face mounting.

Banks—Special designs in marble, bronze, etc., for banking room. Post and bracket clocks for outdoor use.

Towers—Single and multiple face designs, all driven individually and at continuous rate by separate movements and motors. Not affected by weather conditions. For non-illumination, flood illumination, inside or Neon illumination.

Railroad Stations—Marble clocks for concourse; clocks for waiting rooms and offices. Outdoor clocks for face of building.

Hotels—Special built-in construction for guest rooms; clocks for corridors, lobbies, dining rooms and offices.

Marble Dial Clock

Sign Clocks—For advertising purposes; small models to combine with suspension type signs. Larger types for mounting on sign frames on roof of building, directly illuminated with Neon tube, or sign lamps.

Central Control Equipment

Although Telechron Clocks operate individually from the light socket—where a great many clocks are installed or where a minimum amount of attention can be given to timekeeping equipment, as in hospitals, banks, schools, etc., a separate wiring circuit is recommended, with a central control unit to take care of resetting the complete system to correct time (following a possible interruption in power supply), as a unit, either automatically or manually.

System control may be of three-wire dual motored type, or of two-wire double frequency type, the use of either depending directly upon number and types of clock equipment involved.

Time Stamps and Time Recorders

This equipment is available through licensees, with Telechron motors, some models being suitable for use with above central control equipment and others for individual installation only.

Guarantee

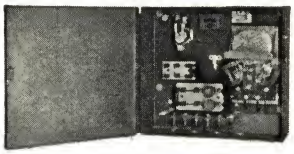
All equipment manufactured by the WARREN TELECHRON COMPANY is guaranteed against mechanical and electrical defects for a period of one year.

Features of Telechron Timekeeping Equipment

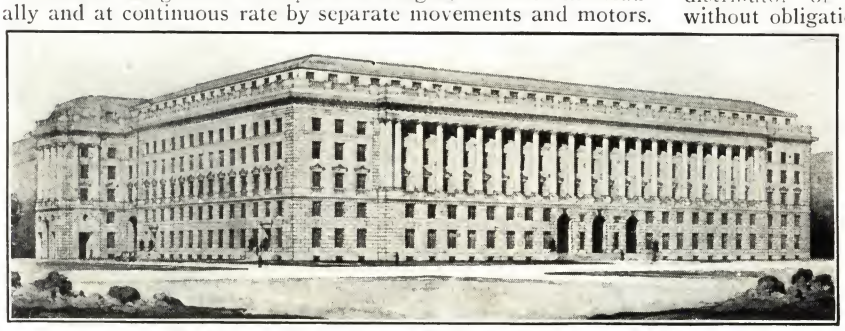
Each clock is a complete, independent timekeeper in itself. No local master clock to adjust, clean, oil, etc. With a Telechron Master Clock in the powerhouse, your electric company is able to control generator speeds so effectively that the accuracy of the Telechron Clock is assured. Each clock is completely sealed, requiring no lubrication, regulating or cleaning.

Specifications

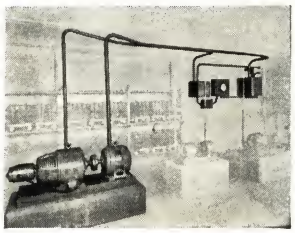
Complete specifications and recommendations to cover your particular requirements will be supplied by your local Telechron distributor or by the factory without obligation.



(Below)
Control Equipment for This Installation



The New Internal Revenue Building, Washington, D. C.
Is equipped with an ADFR (Automatic Double Frequency Resetting) System involving 875 clocks with buzzers, two 6-circuit program clocks, and central control equipment. System installed April, 1930



(Above)
Control Unit for ADMR Telechron Clock System

ESTABLISHED 1884 INCORPORATED 1888

THE STANDARD ELECTRIC TIME COMPANY

SPRINGFIELD, MASS.

BRANCH OFFICES

ATLANTA, GA., William-Oliver Building
BALTIMORE, MD., Baltimore Trust Building
BIRMINGHAM, ALA., 2920 Seventh Ave., So.
BOSTON, MASS., 10 High Street
BUFFALO, N. Y., 220 Delaware Avenue
CHICAGO, ILL., Monadnock Building
CLEVELAND, OHIO, Union Trust Building
COLUMBUS, OHIO, 83 So. High Street
DALLAS, TEX., Mercantile Bank Building
DENVER, COLO., 562 Pennsylvania Street
DETROIT, MICH., Donovan Building
KANSAS CITY, MO., Mutual Building
MINNEAPOLIS, MINN., McKnight Building
NEW YORK, N. Y., 50 Church Street
PHILADELPHIA, PA., 1612 Market Street
PITTSBURGH, PA., Bessemer Building
SCRANTON, PA., 148 Adams Avenue
TAMPA, FLA., 55 Central Avenue

THE STANDARD ELECTRIC TIME COMPANY OF CALIFORNIA

BERKELEY, CAL., 950 Parker Street
LOS ANGELES, CAL., 124 W. 4th Street
PORTLAND, ORE., 65 First Street
SEATTLE, WASH., 1714 First Avenue, So.
SPOKANE, WASH., 110 So. Cedar Street

THE STANDARD ELECTRIC TIME COMPANY OF CANADA, LTD.,

MONTREAL, QUE., 726 St. Felix Street,
TORONTO, ONT., 57 Bloorstreet, West

Products

Starting in 1884 with the manufacture of Electric Master and Secondary Clocks, exclusively, THE STANDARD ELECTRIC TIME COMPANY has, from time to time, widened the scope of its activities. Never, however, has it deviated from its originally established policy of manufacturing but *one quality* of merchandise—the very best that experience, fine materials and first-class workmanship can produce. Today, THE STANDARD ELECTRIC TIME COMPANY is contributing invaluable aid to successful management and operation of high schools, colleges, public buildings, banks, factories, department stores, hotels, hospitals, etc., through its development of the following electrical specialties:

ELECTRIC TIME SYSTEMS; TELEPHONE SYSTEMS; ELECTRIC OUTSIDE, TOWER and STREET CLOCKS; FIRE ALARM SYSTEMS; SCIENCE LABORATORY EQUIPMENT; HOSPITAL SIGNALING SYSTEMS.

Note: All dimensions given in this catalogue are approximate and subject to change. Where exact information is essential, please write for confirmation.

"STANDARD" ELECTRIC TIME SYSTEM

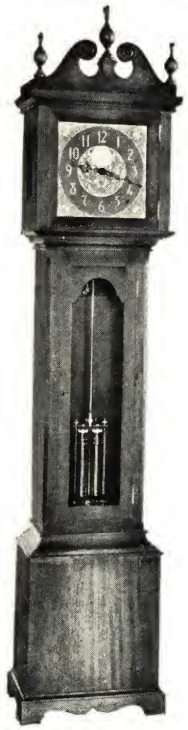
The "Standard" Electric Time System is of the so-called central control system, operating on a minute or a half-minute impulse. A self-winding master clock operates as the time regulator, furnishing the impulses for operating the various types of secondary clocks or other apparatus used. This system provides uniform synchronous time throughout a building and permits the simplest possible form of secondary clock mechanism.

"Standard" Equipment comprises products based on experience of nearly a half-century and includes a complete line of master clocks, secondary clocks and program clocks of all types needed for general or special construction purposes. All equipment is thoroughly standardized, thus insuring uniformity and simplifying service and repairs.

MASTER CLOCKS

Furnished with self-winding movements, spring-operated for approximately one hour in case of current interruption, or with 6-day weight-driven, motor-wind movements. They are equipped with Graham dead-beat escapements, platinum iridium circuit closers, and are arranged for operating either secondary clocks only, or both secondary and program clocks, with the latter in master or separate case. Regularly furnished with 60-beat metal ball pendulum guaranteed to regulate within 30 seconds per month, or mercurial compensating pendulum guaranteed to regulate within 10 seconds per month, the latter having double micrometer adjustment for fine regulation.

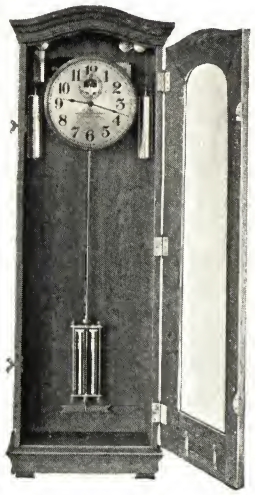
Left:
List No. 12, 60 Beat Master Clock with Program Clock in Same Case
Dial, 12 in.; height, 65 in.; width, 22¾ in.; depth, 9¾ in.



Grandfather Type Master Clock
Mahogany finish. Dial, 12 in.; height, 91 in.; width, 21½ in. Available in other designs and dimensions to architect's specifications.

Cases

Regularly furnished in oak, Median finish, but can be made in special woods to order and in special finish to match sample. Special hall clocks, in grandfather and similar cases, furnished to architects' design.



Right:
List No. 10P Motor Wound 6-Day Movement Master Clock
Dial, 12 in.; height, 65 in.; width, 22¾ in.; depth, 9¾ in.

SECONDARY CLOCKS

Movement

This is of exceptional simplicity—a pair of magnets with armature. Upon receiving the impulse from the master clock, the armature magnet is drawn down, compressing the driving spring and drawing the ratchet pawl back one tooth on the escapement. When the armature releases therefor, the clock is driven ahead one minute by the driving spring. The train of gearing between the minute and hour hand is the only further mechanism required. These movements are specially designed to run without oiling and with minimum attention or replacement. Movements can be installed in many types of special cases, such as mantel clocks shown on page 3. Cases can be selected by owner and can usually be fitted with "Standard" movements.

Cases

Made in wide variety of types for every building requirement. Surface or semi-flush type cases require special outlet boxes for permitting works to recess in wall.

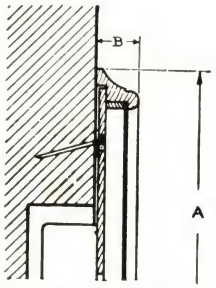
Wood Case Clocks—Generally square or round, also double-dial with bracket for wall or ceiling mounting, and are furnished in Median (dark brown) oak or birch. Special woods and finishes furnished according to architects' specifications.

Metal Case Clocks—Furnished in round, surface or semi-flush types, also in double-dial with bracket for wall or ceiling mounting. Regular finish is brown to match Median oak. Special finishes to sample.

Marble Dial Clocks—Furnished in all available types of marble having sufficient strength to prevent cracking. Numerals and minute dots mounted on marble are cast bronze to match trim. Dials are ordinarily round, but can be made in square or fancy patterns, with or without rims.

Square Wood Case Secondary Clock

List No.	Dial, in.	Dimensions, sq. in.	Depth, in.
S- 8	8	12	3⅜
S-10	10	14	3½
S-12	12	15½	3¾
S-14	14	19¾	3⅞
S-18	18	23	4¾
S-24	24	29	4¾

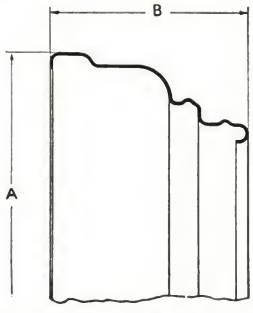


Cross Section of Flush Type Secondary Clock With Wood Ring

Dust and Water Proof Secondary Clock

Case: Japanned iron; Bezel: nickel plated cast bronze

List. No.	Dial, in.	Outside diam. A, in.	Depth B, in.
CI- 8	8	9⅞	3⅞
CI-10	10	12	3⅞
CI-12	14⅜	14⅜	4
Case and bezel: polished cast bronze			
CB- 8	Same	Same	Same
CB-10	as	as	as
CB-12	above	above	above



Cross Section of Round Metal Case Secondary Clock

Flush Type Secondary Clock with Wood Ring

List No.	Dial, in.	Outside diam. A, in.	Depth B, in.
F- 8	8	10$\frac{3}{16}$	1$\frac{7}{16}$
F-10	10	12$\frac{3}{16}$	1$\frac{7}{16}$
F-12	12	14$\frac{3}{16}$	1$\frac{7}{16}$
F-14	14	16$\frac{3}{8}$	1$\frac{7}{16}$
F-18	18	21¼	2$\frac{1}{16}$
F-24	24	27¼	2$\frac{1}{16}$

Round Metal Case Secondary Clock

List No.	Dial, in.	Outside diam, A, in.	Depth, B, in.
RM- 8	8	10⅜	3⅛
RM-12	12	14$\frac{7}{16}$	3⅛

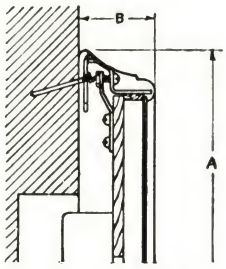
Round Metal Case Secondary Clock

List No.	Dial, in.	Outside diam., in.	Depth, in.
RM-14	14	19	3½
RM-18	18	24	5
RM-24	24	30	6

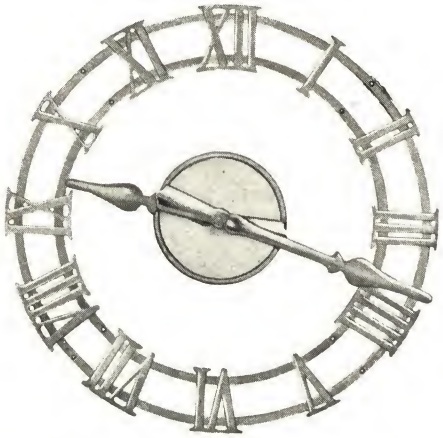
SECONDARY CLOCKS (Continued)

Flush Type Secondary Clock with Metal Ring

List No.	Dial, in.	Outside Diam. A, in.	Depth B, in
FM- 8	8	11	2
FM-10	10	12½	2
FM-12	12	1413/16	2
FM-14	14	16⅝	2
FM-18	18	21¼	2½
FM-24	24	27⅞	3



Cross Section of Flush Type Secondary Clock with Metal Ring



Bronze Skeleton Dial Secondary Clock

List No.	Dial, in.	List No.	Dial, in.
SK-14	14	SK-30	30
SK-20	20	SK-36	36
SK-24	24	SK-48	48

Large Secondary Mantel Clock, Mahogany Finish

List No.	Dial, in.	Height, in.	Length, in.	Depth, in.
558	7½	12	28½	6

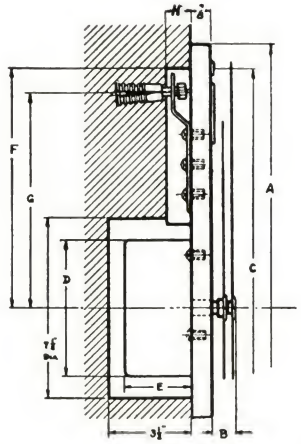
NOTE: *All clocks regularly furnished with Arabic numerals; furnished with Roman numerals when specified.*

Gothic Type Secondary Clock, Mahogany Finish

List No.	Dial, in.	Height, in.	Width, in.	Depth, in.
551	5	11⅜	7¼	5½

Marble Secondary Clock, Heavy Cast Bronze Trimming

List No.	Diam. in	List No.	Diam. in.
MD-14	14	MD-24	14
MD-16	16	MD-30	30
MD-18	18	MD-36	36
MD-20	20		



Cross Section of Marble Secondary Clock
(Showing Method of Mounting)

Inches								Inches							
A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H
12	1½	11	5⅛	2	5½	4⅜	1½	22	1⅞	20	5⅝	2¾	10	9	2½
14	1½	12¾	5⅛	2	6	4⅞	1½	24	1⅞	22	5⅝	2¾	10	9	2½
16	1⅞	14½	5⅝	2¾	7	5⅞	1½	30	1⅞	27½	5⅝	2¾	Spec. hang.		
18	1⅞	16¼	5⅝	2¾	8	6⅞	1½	36	2¼	33	6½	3¾	Spec. thc.		
20	1⅞	18	5⅝	2¾	9	7⅞	1½						of marble.		

Double Dial Secondary Clock with Metal Case and Bracket for Wall or Ceiling Mounting

List No.	Dial, in.	Bracket, length, in.	Over-all diam. in.
D-12	12	20⅝	17
D-14	14	23½	18⅞
D-18	18	30⅛	25⅛
D-24	24	36⅜	31⅛

PROGRAM CLOCKS

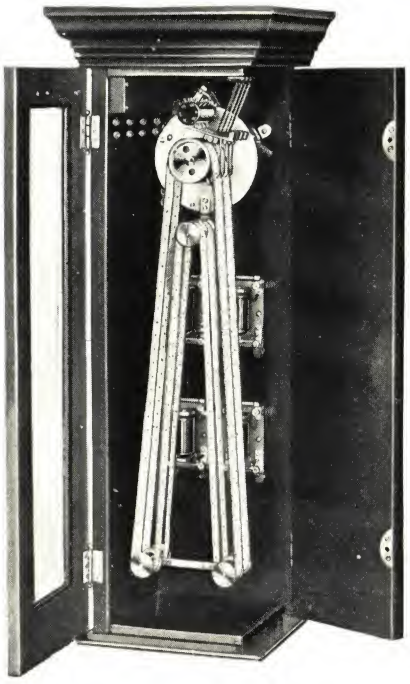
The "Standard" Program Clock, the function of which is to ring program signals at pre-determined intervals in accordance with required schedules, is completely automatic in action and accomplishes the following important results:

(1) Selects the proper minute for bell ringing by means of selective contact made through perforations in program ribbon.

(2) Cuts out the signals at night, Saturdays, Sundays or any 12-hour period required, or changes the signals from one program circuit to another, by means of a calendar drum incorporated in the movement.

(3) Changes in the program schedule are easily made by changing the paper program ribbon.

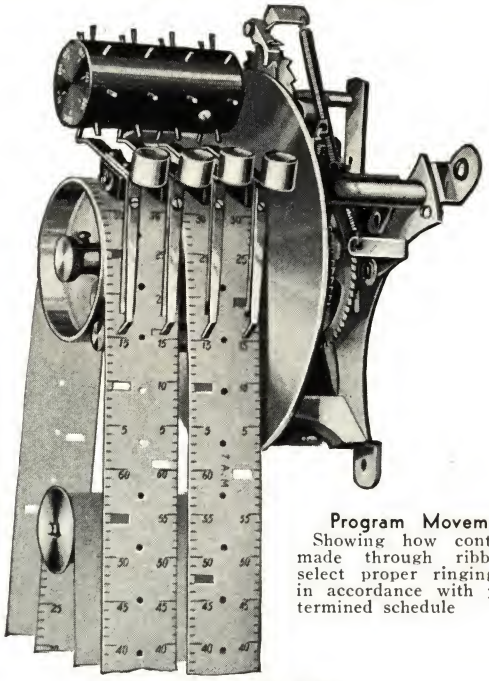
The "Standard" Program Clock thus assures complete flexibility with simplicity of operation and perfect reliability. All program signals are operated through relays with gravity type armatures.



No. 412 Program Clock
Case open, showing working parts of four-circuit clock

Mounting

The Program Clock is furnished either in the Master Clock case or in a separate case, as desired.



Program Movement
Showing how contact is made through ribbon to select proper ringing time in accordance with pre-determined schedule

Program Clock Data

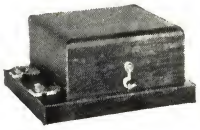
No.	Circuits	Height, in.	Width, in.	Depth, in.
12 hours				
212	2	35 3/16	11	7 5/8
412	4	35 3/16	11	8 5/8
612	6	35 3/16	11	9 7/8
24 hours				
224	2	35 3/16	11	7 5/8
424	4	35 3/16	11	8 5/8
624	6	35 3/16	11	9 7/8

Fire Alarm Testing from Program Clock

When used with an open circuit type fire alarm system, provision may be made for the automatic testing of the fire alarm from the Program Clock. This test is usually made each morning before school opens.

PROGRAM SIGNALS

Wood Box Bell



Wood Box Buzzer

Weatherproof Bell

Weatherproof Bell with Housing, Screen and Gong
(17 in. wide; 25 in. high; 8 in. deep)

"Standard" Program Signals consist of buzzers and bells with either wood or metal cases. The bell sizes range from 3-in. diameter room bells to 12-in. diameter for the outside gongs, the over-all size of which is 17 ins. wide, 25 ins. high, 8 ins. deep. Special tone gongs of the tea or cow bell type are also available.

"Standard" bells are designed to maintain careful alignment of contacts, with long wearing quality. Their tone is clear and strong. Outside gongs are made of pure bell metal and are equipped with screens, mats and hoods for protection against the weather.

"Standard" bells and gongs will be furnished for either direct or alternating-current operation with magnet windings of the proper resistance for the voltage desired.

CONDENSED DESCRIPTION OF "STANDARD" ELECTRIC TIME SYSTEMS WITH METHOD OF POWER SUPPLY

The Standard Electric Time Company features two types of clock systems.

(1) A. C. with Constant Service Reserve Power.
(2) D. C. from Storage or Primary Battery.

A.C. Constant Service System

With this system, the clocks run from the 110-volt A. C. lighting service without the use of any batteries, through an A. C. Rectifying Power Unit panel. This panel is provided with a transfer relay which is normally held up when the 110-volt A. C. is on. In case of A. C. current failure, the relay drops and closes a circuit connecting the system to a 24-volt Reserve Power Unit of Telecells. This is a primary battery needing no charging or attention whatsoever and will last a great many years, as it is only used during the occasional periods of main current failure.

A.C. Rectifying Power Unit

When the A. C. current is resumed, the system is automatically put back on it. This arrangement insures constant time, regardless of A. C. current failures.

The spring-driven master clock is recommended for use with this system.

D.C. from Storage or Primary Battery

If storage battery is used for operation of the clock system, it should preferably be installed with a charging panel including automatic charging attachment mounted on the same panel or in a separate case.

With this device, the master clock will automatically keep the battery fully charged, thus simplifying attention.

Automatic Battery Charger

A. C. Power Units

For constant service systems (requires 4 wires from panel to master clock).

List No.	Capacities		Size, in.		
	Clocks	Dials, in.	High	Wide	Deep
781	Up to 22	14	17	13	8¼
782	Up to 50	14	23	17	8¼
783	Up to 100	14	23	17	8¼
784	Up to 50 additional clocks	14	17	13	8¼

Note: Clocks with dials more than 14 ins. and up to 30 ins., count as *two* 14-in. dials.
Clocks with dials more than 30 ins. and up to 48 ins., count as *nine* 14-in. dials.

Reserve Power Units

List No.	Volts	Panels used	Cabinet Size, in.		
			High	Wide	Deep
791	12	No. 781 and 830	29½	15½	10¼
792	24	No. 782, 831 and 833	29½	28¼	10¼
793	24	No. 783 and 832	39½	28¼	12¼

OUTSIDE CLOCKS

"Standard" Outside Clocks are divided into two classes: first, those operated by Secondary Magnetic Drive; second, those operated by Motor-driven Tower Clock Movements.

Outside Clocks Operated by Secondary Magnetic Drive

Description

Furnished in completely assembled units for convenience in mounting as shown in the cross section on the following page. The unit consists of a drum casing with flanged rim at outer edge, a clock dial, the movement with cover, weather glass and ring of lamp sockets for illumination. The Vitrolite glass used provides a clear white dial in the daytime and a very finely illuminated clock face at night, free from shadows and spots. The assembled unit can be furnished for mounting against a flange from the inside or from the outside of the wall, with sizes as indicated in the table on page 6.

Wall Type

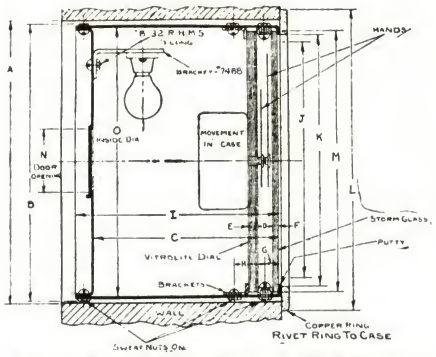
Outside Clocks with Secondary Magnetic Drive can be furnished with plain dial, marble dial, etc., for operation over doorways, as for instance, on bank buildings.

Post Type

Post Clocks are always very effective for advertising purposes, particularly for banks. They are of strong, substantial design, pleasing architecturally and utilize a minimum of sidewalk space. Can be arranged for illumination of dials by spotlights from the outside, or, preferably, with an inside ring of lamps controlled from "Standard" automatic time switch.

Dial sizes are available from 30 to 36 ins. in diameter.

Illuminated Glass Dial Wall Type Clock for Facade of Federal Land Building, Springfield, Mass.



Layout of Wall Type Clock in Wall Opening

Post Type Clock

WALL OPENING	DIA. OF CASE	WIDTH OF MOVEMENT	SPACER	THICKNESS DIAL	THICKNESS GLASS			DEPTH OF CASE	MIN. CIRCLE	SIGHT DIA.	OUTSIDE DIA.	DIA. OF GLASS DIAL	DOOR OPENING	INSIDE DIA OF CASE	NO. OF LIGHTS	MOVEMENT NO.	SPRING NO.
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O			
48	47 3/8	12	1 3/4	5/16	1/4	1 3/16	1 23/32	12 5/8	44	46 3/8	50 5/8	11 7/8	12 1/2	47 1/4	12	*3	12
45	44 3/8	12	1 3/4	5/16	1/4	1 3/16	1 23/32	12 3/8	41	43 3/8	47 3/8	43 7/8	12 1/2	44 1/4	12	*3	12
40	39 3/8	12	1 3/4	5/16	1/8	1 3/16	1 27/32	12 5/8	36	38 3/8	42 3/8	38 7/8	12 1/2	39 1/4	12	*3	12
36	35 3/8	12	1 3/4	11/32	3/16	1 1/8	1 3/4	12 5/8	32	34 3/8	38 3/8	35	11 1/2	35 1/4	12	*3	10
30	29 3/8	8	1 1/8	11/32	3/16	1 3/16	1 7/16	8 5/8	27	28 3/8	31 1/8	29	9 1/2	29 1/4	8	*2	10
24	23 3/8	8	1 1/8	11/32	3/16	1 3/16	1 7/16	8 5/8	21 1/2	22 3/4	25 3/8	23 3/4	7 1/2	23 3/8	6	*2	10
20	19 3/4	8	1 1/8	11/32	3/16	1 3/16	1 7/16	8 5/8	17 1/2	18 3/4	21 1/4	19 1/4	6 1/2	19 3/8	4	*2	8
18	17 3/4	8	1 1/8	11/32	3/16	1 3/16	1 7/16	8 5/8	16	16 3/4	19 3/4	17 1/4	5 1/2	17 3/8	4	*2	8
16	15 3/4	8	1 1/8	11/32	3/16	3/16	1 7/16	8 5/8	14	14 3/4	17 3/4	15 1/4	5 1/2	15 3/8	3	*2	8
14	13 3/4	8	5/8	11/32	3/16	5/16	1 7/16	8 5/8	12	12 3/4	15 1/4	13 1/4	4 1/2	13 3/8	3	*1	8
12	11 7/8	8	5/8	11/32	3/16	5/16	1 7/16	8 5/8	10	10 7/8	12 7/8	11 3/8	3 1/2	11 1/2	3	*1	6

Dimensions of Wall Type Clock in Wall Opening

Motor-driven Tower Clocks

Advantages

This type of clock offers a distinct advance over the old weight-driven clock, for the following reasons:

(1) It is controlled from a Master Clock located on the ground floor, so that wind vibration or swaying does not affect its regulation.

(2) It requires very little space for the operating mechanism, with no special reinforcing of the tower construction.

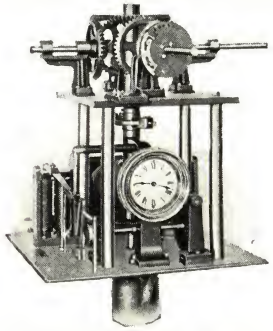
(3) It requires no winding or individual setting, because it is controlled from the Master Clock.

(4) It is operated with a much more powerful drive than the weight mechanism affords. In cold climates, therefore, it will operate in icy and sleety weather without difficulty.

Clock Mechanism

Is of the motor-driven impulse type. The motor would be either d-c. for operation from a battery, or a-c. for operation from the main power or lighting supply. Available for operation of one, two or four dials. Entire mechanism can be mounted on a pedestal or placed on the floor beams with separate or integral crown gear. The following data on a "Standard" Tower Clock movement, pedestal mounted, with integral one-way crown gear, is typical.

Height of movement top from floor .....48⅜ ins.
Height of drive shaft from floor .....44⅞ ins.
Height of movement base plate from floor.....37⅛ ins.
Height of movement.....11⅞ ins.
Width of movement base plate .....16 ins.
Length of movement base plate .....18½ ins.
Least possible distance between center of movement and dial.....25½ ins.



"Standard" Electric Tower Clock Movement

Campanile Type of Tower Clock at University of California

Hands

Clock movements operate hands exposed to the weather without cover glass. Hands, however, should be of wood or light metal construction arranged with sufficient balance weight length for reliable operation.

Hands may be specially constructed for illumination by lamps set in troughs, along the hands, covered with colored or transparent glass.

Dials

Are of sectional construction with numeral castings of iron or bronze bolted together.

Note: It is generally accepted practice to have dials of a size based on 1-ft. diameter dial for each 10 ft. that clock is above the ground.

Clock Illumination

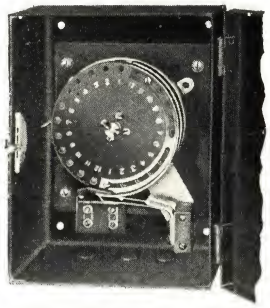
This can be effected by a spot light hung over the dial in front of the face, or by illumination inside the tower. For the latter method, the inside of the tower should be painted white, with a vertical row of lights in each corner.

Lamps with 75 to 200-watt capacity, according to intensity of illumination desired, should be placed from ½ to 2 ft., depending upon lamp wattage.

Automatic Lighting Attachment

Operated directly by the Master Clock and turns the lights on and off in the tower clock at any predetermined time. Requires no winding and no adjustment, except for seasonal changes several times a year.

Cost of this control attachment is fully justified by the electricity saved.



"Standard" Automatic Lighting Attachment

SCIENCE LABORATORY EQUIPMENT

For Schools and Colleges

Listed by Underwriters' Laboratories

The Equipment and Its Uses

"Standard" Experimental Laboratory Equipment is furnished for supplying various low and high voltages alternating and direct current in physics, chemistry, general science, and electrical laboratories, or wherever varying voltages are required for experimental purposes.

The apparatus described herewith in most part is applicable to Junior and Senior High Schools. College requirements are usually entirely different and each job has to be studied and laid out to meet individual needs. Special equipment is designed and furnished for any job, when so required.

The equipment consists of the following:

(1) Main Combination Experimental Panel—As per illustration of List No. BSFUV6-12. (Normally placed in Physics Laboratory.)

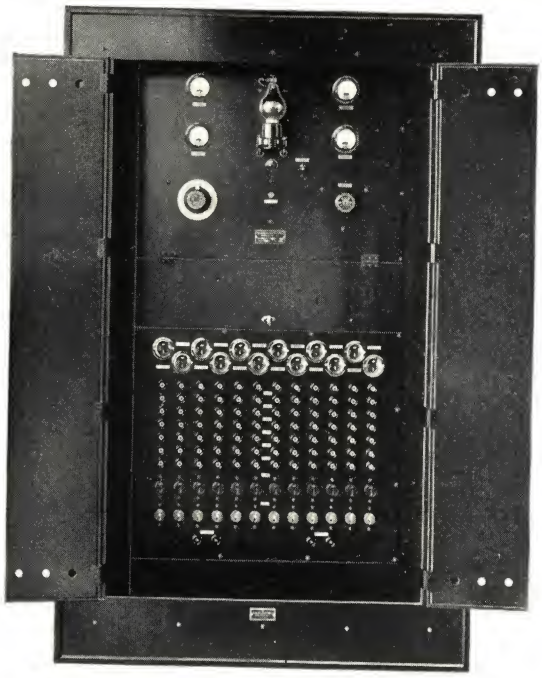
(2) Sub Distribution Panels—If required for additional laboratories, as per illustration of List No. BSFU-8.

(3) Storage Battery—To furnish from 2 to 24 volts D.C. (This is usually placed in storeroom near main panel.)

(4) Motor Generator—To furnish from 90 to 125 volts D.C. (Usually placed near battery or main panel.)

(5) Transformer—With taps to furnish low voltages A.C. (if required.)

(6) Special Table and Wall Receptacles and Extension Cords—As needed.



Combination Distribution and Control Panel for 12 Table Circuits. List No. BSFUV6-12

Experimental Panel

This consists of two sections; a jack panel for distributing the different voltages to the various students' and instructors' tables, also the control panel for battery charging and motor generator control.

Distribution Jack Panel—This is composed of a row (or rows) of double pole male type fused receptacles, with one receptacle for each table circuit. (A circuit for each group of 2 or 4 students, also 2 or 3 circuits on instructors' tables, are usually required.) Below these is a group of seven horizontal rows of single pole jacks, each row bussed on back and connected to seven taps from the 24-volt storage battery. The battery is divided so that from 2 to 24 volts in 2-volt steps are available for any or all table circuits.

Distribution or Sub Panel for 8 Table Circuits. List No. BSFU-8

Below the battery jacks are rows of polarized receptacles for 110-volts D.C. from generator, and 110-volt A.C. from the house lighting current. Jacks may also be furnished for various low voltages alternating current which are obtained from a tapped transformer, if required. Distribution panels are furnished for any number of table circuits.

The connections from the current supply jacks and receptacles to the outgoing table feed receptacles are made by means of "Tirex" connector cords of the proper length, with male and female plugs on ends. The jacks and plugs are of such construction that it is impossible to short circuit the panel by improper plugging. The necessary number of cord connectors are furnished with each panel. Panels are made of ⅛ in. thick extra smooth steel.

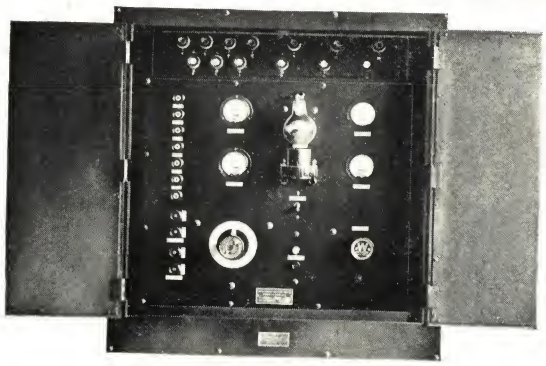
Control Panel—Arranged for charging the storage battery from the 110-volt A.C. lighting current and also for control of motor generator set.

The charging equipment consists of a 6-ampere charging rectifier (12-ampere furnished with larger batteries), battery voltmeter and ammeter, charging switch and rheostat, so that any section or entire battery may be charged as required. This panel also contains motor starting switch, generator voltmeter and ammeter, generator field rheostat, fuses for all current supply lines, necessary switches, etc.

The distribution and control panels are also furnished in separate units when desired. See illustrations.

Sub Panels

Where there are only one or two laboratories, one main combination panel is usually sufficient. In larger schools where there are several laboratories and lecture rooms, it is customary to furnish a combination main panel in physics laboratory and sub distribution panels in the other laboratories, thus eliminating the necessity of going back to main panel to make table circuit connections.



Control Panel. List No. BSU6

Sub panels are furnished to accommodate the number of circuits required, and are fed with the various voltages from the main panel.

Panel Mountings

Panels are usually enclosed in flush steel cabinets with solid steel or glass paneled doors on front, and steel doors or removable cover plates on rear so that panel connections are accessible. Surface mounting type cabinets are also furnished. Cabinets are furnished with space below the panel for housing connector cords.

Panels may be constructed to mount on pipe standards, or enclosed in free standing steel cabinets with space below for motor generator set.

Exact details as to dimensions, wall thicknesses, etc. should be worked out with us for each job.

Storage Batteries

For the average high school, we recommend a 24-volt, 60-ampere hour capacity, lead battery of the sealed glass jar type, such as in illustration of List No. DMGO-7. The cells are connected in series and the taps taken off

24-Volt Storage Battery, List No. DMGO-7
Rack is 56 ins. long x 18 ins. wide

as required to give the various voltages from 2 to 24. Edison battery may be furnished if desired.

The battery should be placed near the main panel, such as in a storeroom, and mounted on a substantial rack or in a cabinet which we can supply, if desired.

Motor Generators

Motor generators of from 750-watt to a 2½ kw. should be furnished to supply 110-volt D. C. current so often required in experimental work. The generator should be a flat compound wound machine. A motor line safety switch and a remote control magnetic starter switch are furnished and mounted conveniently near the motor generator set.

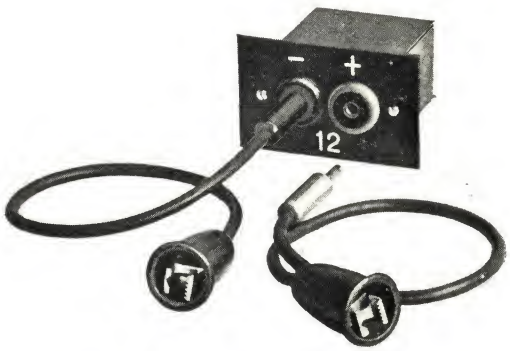
The machine should be located in the physics department or storeroom near the main panel.

Transformer

When low voltages, alternating current, are desired, we furnish a transformer rated from ½ to a 1½ k.va with secondary taps to give the different voltages desired, as for instance, 6, 12, 18, 24 volts. The transformer may be mounted in rear of panel (if space affords) or any convenient place.

Special Table and Wall Receptacle

It is very desirable that the table and wall receptacles employed for experimental use be of a different character than the ordinary convenience outlet. For this purpose we furnish a special outfit consisting of two single pole dead front jacks mounted on bakelite panel, with



Detail of Table Receptacle and Extension Cords List No. TR-230

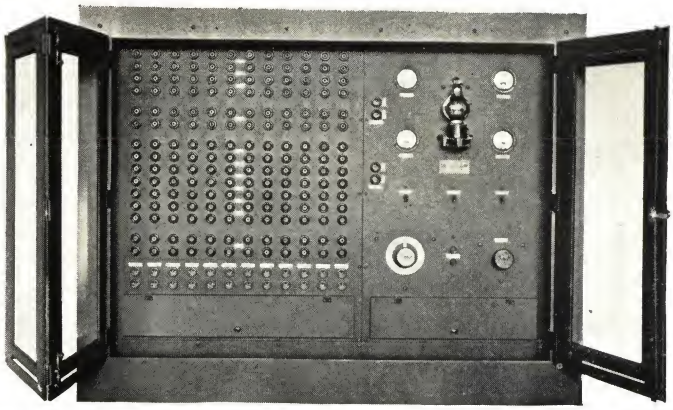
circuit number and polarity markings etched in and painted white. One jack and bakelite handle of cord are furnished in red to indicate the positive connection.

For the purpose of making the connections to experimental apparatus on table, two "Tirex" cords with plugs on one end and rubber insulated clips on other, are furnished with each receptacle. This is shown by illustration above.

Dimension Data

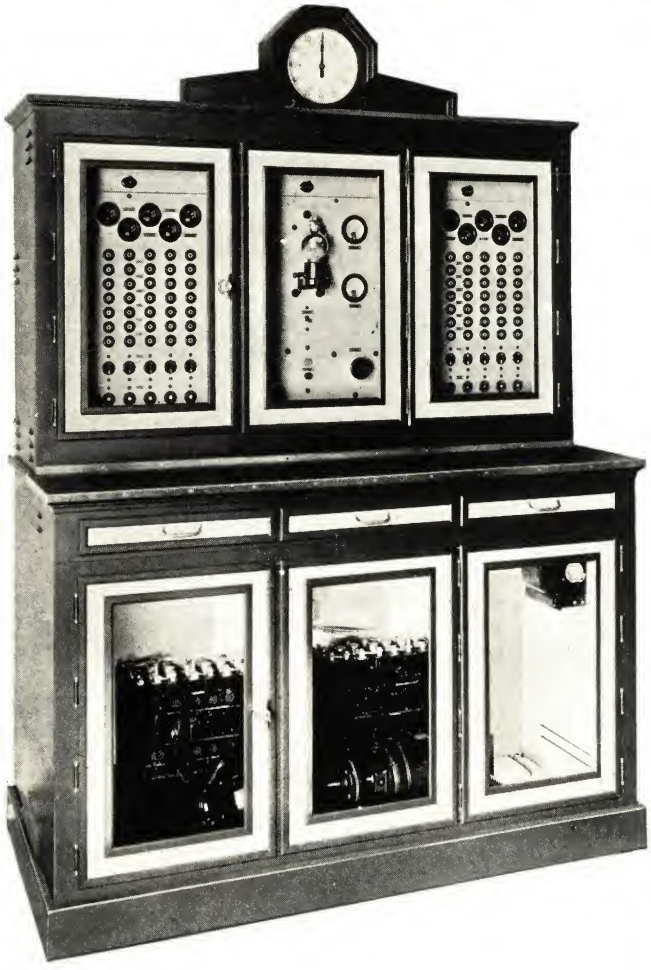
The dimensions given below are approximate, and may vary with the conditions of the job. Actual working data should be obtained from us before work is started.

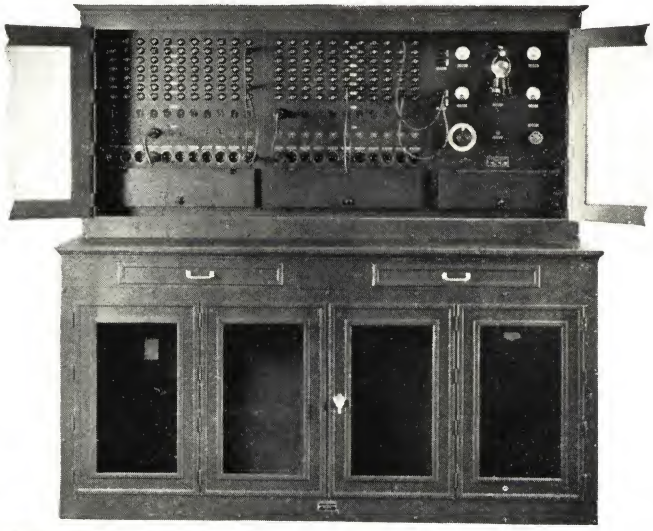
Equipment	List No. (Last figures indicate number of table circuits)	Width, outside trim, in.	Height, outside trim, in.	Depth or wall thickness, in.
Combined Distribution and Control Panels. *Vertical Arrangement; Flush Cabinets*	BSFUV6-10	38	66	16
	BSFUV6-12	43	66	16
	BSFUV6-16	52	63	16
	BSFUV6-20	63	63	16
	BSFUV6-24	72	63	16
Combined Distribution and Control Panels. *Horizontal Arrangement; Flush Cabinets*	BSFU6-6	44	40	12
	BSFU6-8	49	40	12
	BSFU6-10	54	40	12
	BSFU6-12	58	40	12
	BSFU6-14	68	40	12
	BSFU6-16	72	40	12
	BSFU6-20	81	40	12
	BSFU6-24	90	40	12
Sub or Distribution Panels. *Flush and Semi-flush Cabinets*	BSFU-2	17	37	10 for flush cabinets 4 for semi-flush cabinets
	BSFU-4	22	37	
	BSFU-8	31	37	
	BSFU-10	35	37	
	BSFU-12	40	37	
	BSFU-16	54	37	
	BSFU-20	63	37	
Control Panel Only. *Surface Type Cabinet*	BSU6	27	33	15

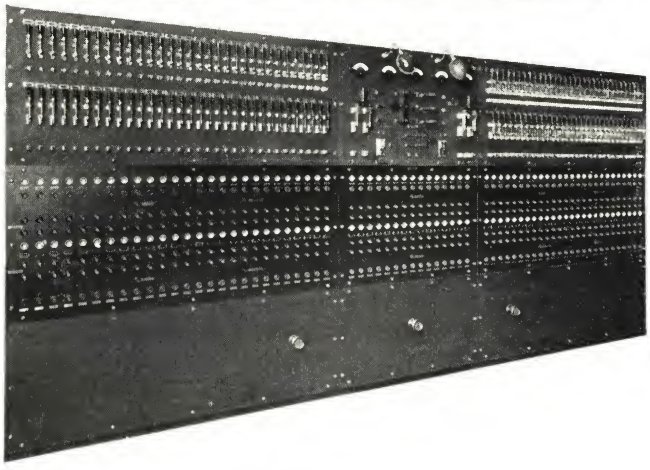


Right:
Special 12-Circuit Experimental Panel Using All Single Pole Jacks

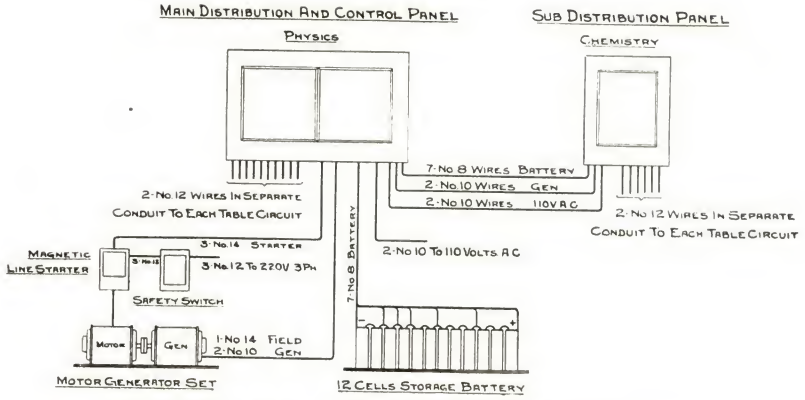
Below:
Special 22-Circuit Experimental Panel in Steel Cabinet with Lower Compartment for Motor Generator Set







Above:
Special 14-Circuit Experimental Panel with Edison Battery and Motor Generator in Lower Compartment and Physics Laboratory Ticker Clock Mounted on Top



Typical Wiring Diagram of "Standard" Laboratory Equipment

Above:
Experimental Panel Furnished for the Chemistry Building of The University of Texas

SPECIFICATIONS FOR SCIENCE LABORATORY EQUIPMENT

The following is applicable in general to an average size High School, but different jobs may vary considerably. THE STANDARD ELECTRIC TIME COMPANY will gladly furnish any data and suggestions possible to assist architects and engineers in laying out jobs.

General

The Electrical Contractor is to furnish and install in laboratories where shown, electrical experimental panels, storage battery, motor generator and special table (and wall) receptacles. This specification is based on apparatus as made and furnished by THE STANDARD ELECTRIC TIME COMPANY. Bids of other manufacturers of approved similar and equal apparatus will be considered but are to appear as an alternate giving the amount to be added or deducted if so used, otherwise equipment in accordance with this specification is to be furnished.

Main Panel

Install in ——— laboratory where shown a List No. BSFU6-14 (number of table circuits) experimental panel arranged to distribute from 2 to 24 volts D.C. from storage battery, 110 D.C. from motor generator, and 110 volts A.C. from lighting current to any or all the students' and instructors' tables as shown. The distribution of these voltages shall be by means of a combination of male and female jacks and connector cords. The arrangement and construction shall be such that it will be impossible to plug in and get a short circuit. Each table circuit shall be fused with a plug type fuse in cabinet provided with hinged door.

The panel shall contain all necessary equipment for charging the storage battery and the control of the motor generator set. The battery charging apparatus shall consist of a bulb rectifier, voltmeter and ammeter, charging rheostat, necessary fuses and switches. The motor generator control shall include motor starting switch, generator voltmeter and ammeter, field rheostat, plug type fuses for all feeds, switches, etc.

The panels shall be inclosed in flush type steel cabinet of 10-gauge extra smooth furniture stock steel, with steel [plate glass] doors on front and screw-on steel cover plate [doors] in rear. The doors and glass panels are to be provided with flat mould around edges and provided with heavy bronze vault type handles with top and bottom bolts and locks.

The finish of panels and cabinet to be "Standard" brown lacquer.

Sub Panels (if required)

Furnish and install where shown on plans a ——— circuit sub panel in ——— laboratory. (Mention any other panels as required.)

The sub panel (s) shall be of same type and arranged for the same voltages as the distribution panel before specified, and shall have red bull'seye and switch to indicate when the motor generator set is running. Panel (s) shall be mounted in flush [semi-flush] type steel cabinet with steel [glass paneled] doors.

Special Table (and Wall) Receptacles

Furnish and install List No. TR-230 table receptacles where shown, consisting of outlet box, bakelite panel with dead front single pole receptacle. One receptacle to be black bakelite for negative connection and one to be red to indicate positive. Panel shall be engraved and painted in with white, indicating circuit number and popularity markings. Provide with each station two No. TC5-30 extension cords.

Storage Battery

Furnish and install where shown a 24-volt type DMGO-7 storage battery as made by Electric Storage Battery Co. Battery to be furnished complete with lead covered copper intercell connectors, hydrometer and mounted on 2-tier battery rack (or in cabinet) painted 2 coats of acidproof paint.

Motor Generator

Provide and install complete a ——kw motor generator set of Westinghouse, G.E. or equal approved make with a (220-volt, 3-phase 60-cycle) motor directly connected through flexible coupling to a 125-volt D.C. compound wound generator. Furnish also a fused line safety motor switch and a Westinghouse or equal 11-200 H magnetic starter switch, mounted near motor generator set.

Wiring

The contractor is to furnish and install complete conduit and wiring as required for the experimental laboratory equipment. Each table circuit shall consist of two No. 12 wires run in separate pipe. Battery feed wires to panel shall be seven No. 8. From generator to panel run two No. 10 and one No. 14. Provide three No. 14 from panel to motor switch and two No. 12 for 110-volt A.C. feed. Provide a 3-phase power circuit from main switchboard for operating the motor generator set. The contractor is to install complete all laboratory equipment, including the special table receptacles, and is to make connections from floor to table in such manner as approved by architect. The contractor is to obtain wiring diagram and all installation data from manufacturer before starting work. All conduit and wiring to be in strict accordance with Underwriters' requirements.

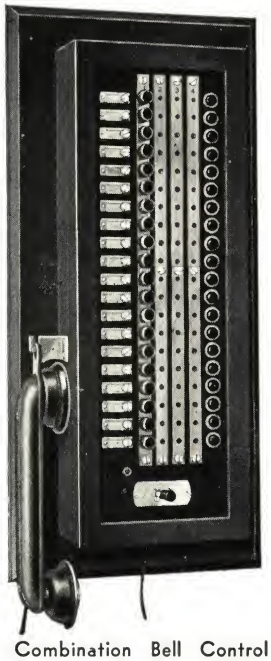
"STANDARD" TELEPHONE SYSTEM

Designed Especially for Schools, and Other Buildings of Similar Type

The "Standard" Telephone System is of the common talking, selective ringing type, consisting of a combination of Bell Control Board and Central Station, designed primarily for use in schools or other buildings where such equipment answers the requirements. It provides a thoroughly practical and reliable system of the simplest type, free from complicated switchboard or automatic control to get out of order.

Bell Control Board and Master Telephone Station

This unit consists of plug strips corresponding to the number of program circuits. Each strip has a row of tapped holes numbered in accordance with the rooms. Plugs can be inserted for cutting any room bell or buzzer into any program circuit. Push buttons permit individual ringing of any bell for telephone calling or private program schedule.



Combination Bell Control Board and Master Telephone Station Arranged for 20 Stations and 4 Program Circuits

Left: Wall Telephone with Long Receiver

Wall Telephone with Watch-case Receiver

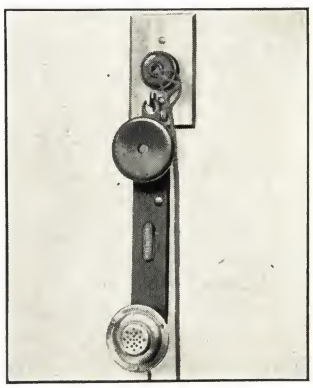
Room Stations

These may be of various types, the one most commonly used being the Wall Surface-Type Telephone with a watchcase receiver. A long receiver may be used in place of this, or if preferred, a detachable microphone that can be removed and kept locked in the teacher's desk when not in use.

Operation of System

The "Standard" Telephone System operates from the same battery used for the program clock and bell systems or with alternating current systems from a rectifier and transformer. When the receiver of any room telephone is removed from its hook, a buzzer warning calls attention of the clerk or principal at the Master Station.

With this system teacher-to-teacher conversation can be supervised. Also, several teachers can be called and be given instructions simultaneously.



Hand Microphone

FIRE ALARM EQUIPMENT

For Use in Buildings of Every Description

"Standard" Fire Alarm Equipment is available in four types: Type 450, the Open Circuit, Non-supervised System with Non-coded Fire Boxes (or Stations); Type MC, the Closed Circuit, Supervised System with Non-coded Fire Boxes; Type BCR, the Closed Circuit, Pre-signal System; and Type BC, the Closed Circuit, Supervised System with Coded Fire Boxes. The Open Circuit, Non-supervised System differs from the Closed Circuit, Supervised System in that the former merely provides a general alarm with no provision for supervision of wiring or apparatus.

TYPE 450 OPEN CIRCUIT FIRE ALARM SYSTEM

General Description

The "Standard" Type 450 Fire Alarm System is a very simple, yet completely reliable warning that has been successfully used in buildings for many years. It is of the open circuit, non-supervised type, comprised of a Master Code Panel, Non-code "Break-Glass" Boxes, and either single-stroke gongs, vibrating bells or horns. It is made for A.C. or D.C. operation.

No. 450
Master Code Panel

Master Code Panel

Consists of a cabinet 10 ins. wide, 13 ins. high, 6 7/16 ins. deep, containing a code transmitter which rings all the fire signals with a code of 2-3 for four rounds, whenever a fire station is operated. A "break-glass" station is placed on the outside of the cabinet door. This station may be opened with a key, providing for fire drills to be given from this point if desired. At completion of an alarm, where glass is broken in a fire station, a trouble bell, also mounted in the cabinet, rings until the glass has been replaced in the station originating the alarm.

No. 451
"Break-Glass"
Box

No. 451-H
"Break-Glass" Box

Cow
Gong

Fire Boxes

The Non-code "Break-Glass" Boxes are furnished with either the usual chain-suspended hammer (No. 451) or a hinged lever type hammer (No. 451-H). The latter features a spring built into the box under the hammer handle, serving as a bumper so that glass will not break if hammer is merely lifted up and let fall. To actually break glass, hammer must be lifted up and deliberately thrown down hard.

It is impossible to leave hammer in an upright position; it cannot be removed, nor can it deface the wall in any way.

Regular 4-inch outlet boxes with 1-inch raised single-gang cover plates are used for mounting these stations. All stations are wired in multiple.

Signals

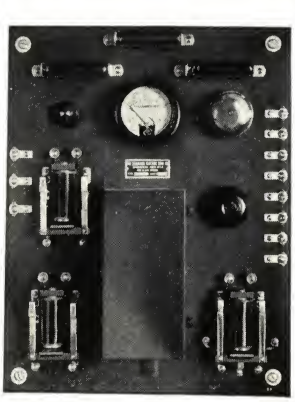
Vibrating bells of the cow gong type, available with 4 or 6-inch gong, are recommended, although single-stroke gongs or horns may be used. All signals are wired in multiple and there may be any number on a circuit. Nothing smaller than No. 14 wire should be used.

TYPE MC CLOSED CIRCUIT FIRE ALARM SYSTEM

General Description

A supervised, closed circuit system, comprised of Master Code Control Panel, Non-code "Break-Glass" Boxes, and single-stroke gongs or horns. Made for either battery, 110-volt D.C., or A.C. operation.

When box is operated (by breaking glass in case of fire, or opening door with key in case of drill), a common code of 2-3 is sounded for four rounds on all signals through code transmitter on control panel. At completion of alarm, emergency bell on control panel continues to ring until glass has been restored in station originating the alarm.



Type MC Control Panel

Control Panel

Made of ebony asbestos and contains supervisory milliammeter, relays, transmitter, pilot lamps, silencing switches, trouble bell, etc.

Cabinets—Made of steel, for surface or flush mounting. Furnished with knockouts in bottom and sides. Doors are provided with either full ¼-inch plate glass panel or a small glass window over meter. Cabinets are 18 ins. wide, 22 ins. high, 7½ ins. deep, with trim extending 2¾ ins. all around for flush type.

Double Supervision

When specified, system may be furnished with double supervision; that is, in addition to supervising the operating current, the trouble bell current is also supervised.

Switches and Pilot Lights

When so ordered, panels are furnished with switches for silencing the trouble bells, and at the same time causing red bull's-eye lamp to show until all trouble on system is rectified.

Fire Boxes

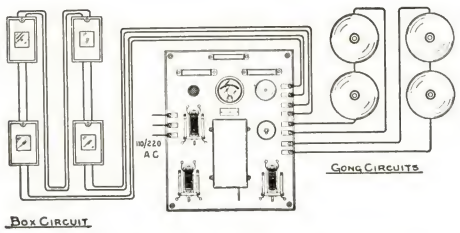
Same as used with Type 450 System above.

Signals

Either horns or single-stroke, electrically operated gongs in 6, 8, 10 and 12-inch diameters are used. Special outlet boxes furnished for gongs, permitting close setting to wall.

Single-Stroke Gong

Horn



Wiring Diagram for Type MC System

Current Supply

System may be operated from either 110-volt A.C. or D.C., or from 24-volt storage battery, CT or larger. When 110/220-volt service is available, power may be taken from one leg of the 220-volt service and neutral, with supervision taken from the other leg and neutral. When service is straight 110-volt, supervision may be had from 6-volt Telecell primary battery, or from any other reliable source of current, such as a storage battery. When battery-operated *double* supervision is used, a separate 6-volt storage battery is required for the supervision, as the Telecell battery can be used only on *single* supervision. A "Standard" charging panel is used to charge the storage batteries.

Wiring

All stations wired in multiple on 4-wire circuit as illustrated. All signals wired in series, with up to 10 on a circuit for 110 volts, and up to 5 on a circuit for 24 volts. No wire smaller than No. 14 should be used.

TYPE BCR PRE-SIGNAL CLOSED CIRCUIT FIRE ALARM SYSTEM

A supervised, closed circuit system arranged so that the normal operation of any box sounds signals (usually small tapper gongs) at certain designated places, such as superintendent's or engineer's office.

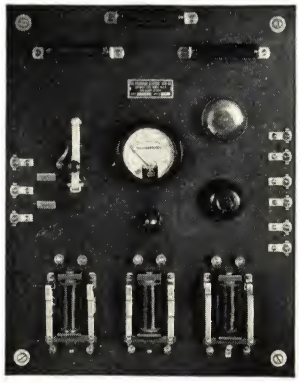
This signal first allows an investigation to be made and, if found to require a general alarm on all (or certain) gongs, an authorized person may insert the provided key in any box, pull the lever and sound the general alarm.

Type BC-450 (open-door, pull-lever type) and BC-550 ("Break-Glass") boxes are used with this Pre-signal system.

TYPE BC CLOSED CIRCUIT FIRE ALARM SYSTEM

General Description

A supervised, closed circuit system consisting of Central Control Panel, Coded Boxes, and single-stroke gongs or horns. Made for battery, or 110-volt A.C. operation.



Type BC Control Panel

Control Panel

Made of ebony asbestos, and contains supervisory milliammeter, relays, pilot lamps, silencing switches, trouble bells, time limit cut-outs, etc.

Cabinets—20 ins. wide, 24 ins. high, 5 ins. deep.

Double Supervision

Same as used with Type MC System.

Switches and Pilot Lights

Same as used with Type MC System.

Fire Boxes

Boxes used with this system are coded, furnished in two types; the open-door, pull-lever type, and the "Break Glass", pull-lever type. Either may be furnished for surface mounting (open conduit work) or for semi-flush mounting. Mechanism is furnished with code wheels cut for desired code for each box. When lever is pulled, four rounds of code signal are given.

All stations are provided with arrangements for running test signals by the use of a test key, indicating the perfect condition of the full operating circuit by giving one stroke on all the signals. The mechanism of the station may also be tested by holding the break springs closed with the test key turned in reverse position, and pulling the lever, without sounding the signals.

Special cast iron outlet boxes furnished, with proper provision made for terminating conduit.

Signals

Same as used with Type MC System.

Current Supply

Same as used with Type MC System above.

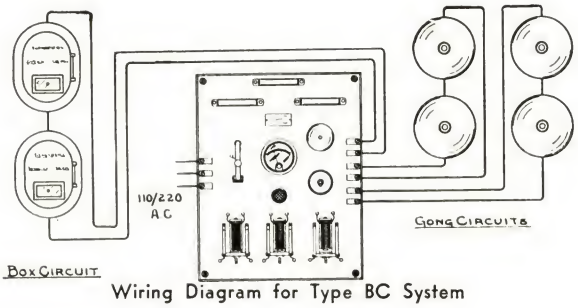
Wiring

Same as usual with Type MC System, except that all stations are wired in series on one 2-wire circuit as shown below.

Box Outlet

No. 355 "Break-Glass" Semi-flush Type

No. 150 Open-Door Semi-flush Type



Wiring Diagram for Type BC System

"STANDARD" HOSPITAL SIGNALING SYSTEM

THE STANDARD ELECTRIC TIME COMPANY manufactures four complete hospital signaling systems. Each one is safe, swift and certain of operation; each is a contributing factor to the efficiency that is essential to successful patient-care.

The Nurses' Calling System—Is designed for low voltage operation (12-volt A.C. or D.C.) and provides the means for patients to signal nurses that services are required (see below).

The Doctors' and Staff Register ("In" and "Out" System)—Informs whether doctors are in or out of the building (see pages 17-18).

The Doctors' Paging System—Flashes coded signals to doctors at strategic points throughout the building (see page 18-19).

The Toggle Switch Nurses' Calling System—Is essentially the same in purpose as the low voltage Nurses' Calling System except that it is designed for high voltage operation (110-volt A.C. or D.C.) and has a different method of originating the nurses' call (see page 20).

NURSES' CALLING SYSTEM

For Operation on 12-Volt A.C. or D.C.

General Description of Operation

Convenient to each bed is located a Patients' Bedside Calling Station containing a pilot lamp and a jack, into which is inserted the plug and cord connected to the Patients' Portable Calling Button. (If the plug and cord are not in use and are removed, the jack opening is covered with a hinged bakelite cover.)

The patient, desiring the services of the nurse, presses the Portable Calling Button. This action immediately causes Pilot Lamps to be illuminated on Bedside Station; over door on corridor side of room or ward from whence call originates; in Diet Kitchens and Utility Rooms; and indicates on a lamp Annunciator at Nurses' Stations. A Master Annunciator may also be installed in the Superintendent's office to receive lamp signals from all stations, if desired.

Upon reaching the Bedside Station, the nurse resets Portable Calling Button.

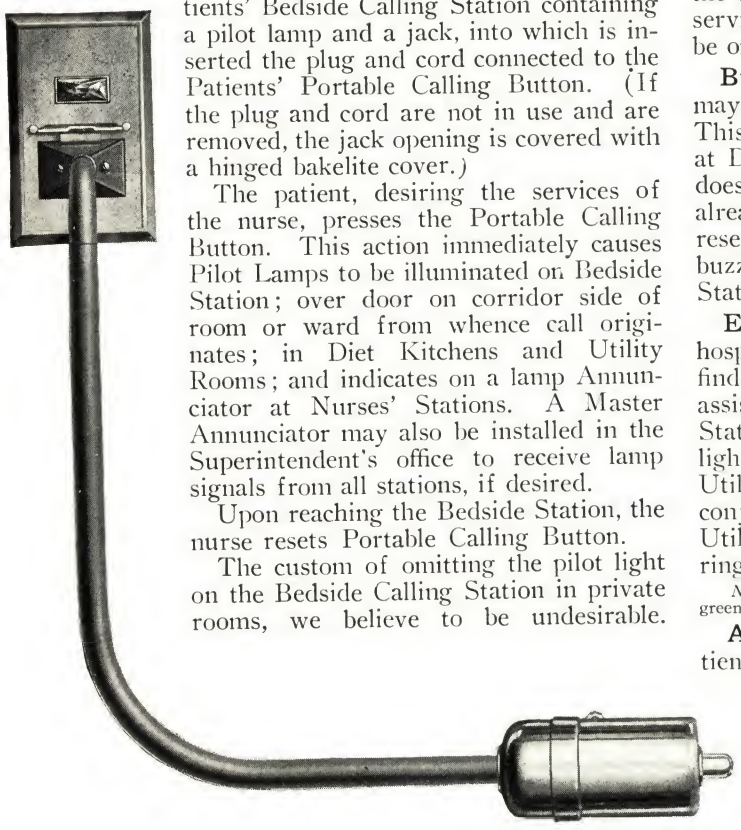
The custom of omitting the pilot light on the Bedside Calling Station in private rooms, we believe to be undesirable. There is considerable satisfaction and a quieting effect to the patient in knowing that when pilot lamp is lighted the call is being transmitted to the nurse, indicating that service will shortly be rendered. However, they may be omitted in private rooms, if desired.

Buzzer—A patient, not receiving prompt attention, may press the Portable Calling Button to the full limit. This action immediately sounds an audible buzzer signal at Duty Stations and Nurses' Annunciator. In no way does this interfere with the lamp signals which have already been made and which remain indicating until reset by the answering nurse at the Bedside Station. Any buzzer may be silenced by throwing of Switch on Duty Stations and Nurses' Annunciator.

Emergency Service—This is frequently requested by hospital authorities. Nurse, arriving at Bedside Station, finds patient in critical condition and needs additional assistance. An emergency button, located on Bedside Station, when pressed, will cause red Pilot Lamps to light in Corridor Dome over door, in Diet Kitchens, Utility Rooms and at Nurses' Stations. Bells operate in conjunction with the red lights in the Diet Kitchen, Utility Rooms and at Nurses' Stations, and continue to ring until emergency button on Bedside Station is reset.

Note: Some States require that red only be used for fire alarm, in which case green may be used.

Additional Service—It is possible to include on Patients' Bedside Calling Station such service as Public Telephone, Radio, Convenience Receptacles, etc. (see pages 14-15).



Patients' Portable Calling Button, Cord, and Plug Inserted in Ward Type Bedside Station

Patients' Portable Calling Button

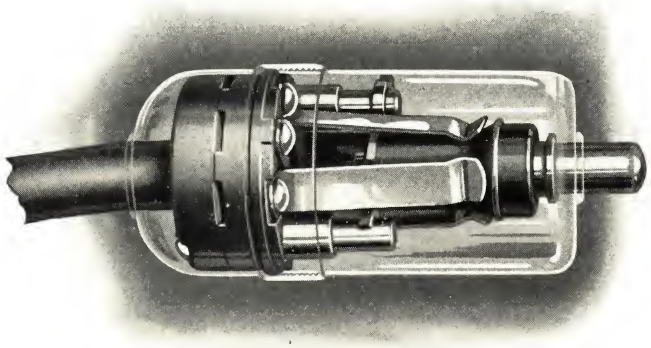
The successful operation of the Nurses' Calling System depends largely on the Circuit Closing Button for it is from this unit that all calls originate. It should be durably constructed to eliminate any possibility of grounds, short circuits and loss of adjustment. It should operate in the simplest manner possible.

Operation and Construction

The following actual-size illustrations and their respective descriptions explain the Portable Button mechanism in its three phases of operation. This mechanism is enclosed in a heavy gauge chromium plated brass shell. Line springs are mounted on genuine bakelite base by means of tubular eyelets. Connections to button are made by inserting individual conductors through tubular eyelets of line springs and are soldered, making permanent connection and eliminating use of binding screws. Strain is removed from individual conductors by bakelite cap that clamps outer covering of cable to base.

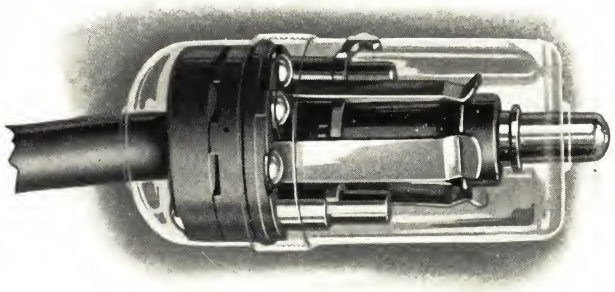
Bakelite plunger carrying circuit closing ring is held in either normal or lighting position by line springs. The metal button carries lamp circuit closing plunger to lighting position and continues on, closing the buzzer circuit. Button is restored to normal position by upward pressure on release which extends through metal casing. Buttons may be arranged so that they may be reset only by Nurse by means of special key.

Button is connected to plug with 6 ft. of "Tirex" five-conductor rubber-covered cable.



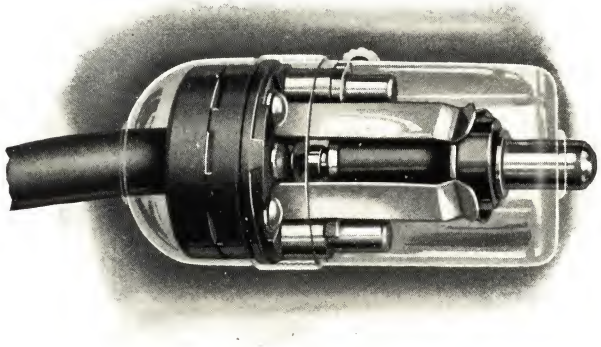
Normal Position

The switching mechanism in normal position, with circuit closing ring disengaged from line springs.



Lighting Position

The switching mechanism in lighting position with circuit closing ring engaged with the line springs, thus closing the lamp circuit.



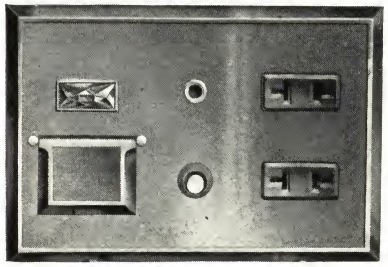
Ringing Position

The switching mechanism with plunger fully depressed, closing ringing or buzzer circuit. This does not in any way interfere with the lamp circuit.

Types of Patients' Calling Stations

Ward Type HN-300-F

HN-301-F Private Type



Special Bedside Station

Single Cord, Plug and Calling Station Furnished As Standard Equipment on Ward, Private and Special Bedside Stations

HN-302 Contagious Ward Types

HN-304 Wall Type

PATIENTS' BEDSIDE STATIONS

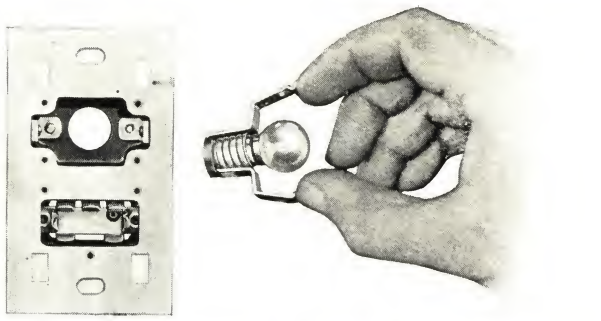
Ward Types

Styles—*Style HN-300-F Ward Type*—Comes with single cord, plug, portable calling button and is equipped with bull's-eye to designate bed from which call is made. *Style HN-300-FD Ward Type*—Is exactly the same as Style HN-300-F except that it is equipped with a double cord, double plug and two portable calling buttons. This is generally used where two or more beds in a ward (or private room) are located a few feet apart on the same side of the room.

Private Room Types

Styles—*Style HN-301-F Private Room Type*—Comes equipped with single cord, plug and portable calling button. Not equipped with bull'seye as it is self-evident who has called from private room. It is often desirable, however, to equip Private Room Type Stations with the bullseye so that patient may know, and be comforted thereby, that service is functioning properly. In such cases, Ward Type Stations may be used in private rooms.

Style HN-301-FD Private Room Type—Is exactly the same as Style HN-301-F except that it is equipped with double cord, double plug and two portable calling buttons for use where two beds are in close proximity.



Showing Ease and Convenience of Inserting Lamp Assembly into Housing

Constructional Data

Cover Plate—Genuine bakelite. Snaps on Back Plate and is held firmly in position by spring fingers which engage in rectangular openings in Back Plate, thus eliminating screws. Jeweled bull'seye mounted permanently on Cover Plate. Provided with hinged flap having projection on underside which, when closed, opens lamp circuits. This permits removal of portable calling button from unoccupied rooms without lighting lamp signals.

Back Plate—Cadmium plated steel, punched to permit mounting of various units, provided with slots to permit alignment, mounts on standard switch cover extending beyond opening, and sets flush to wall. May be removed with special tool for replacing of lamp.

Lamp Housing—Arranged to receive lamp assembly consisting of socket with two side spring fingers which make contact with terminals in lamp housing. Lamp assembly can be easily removed entirely for replacing lamp.

Automatic Circuit Closing Jack Assembly—Consists of molded block recessed to mount contact springs and circuit closing bridge. Is held in position by inserts molded in block. When hinged cover is lifted and plug is inserted, contact springs disengage from circuit closing bridge and complete the circuit from line terminals to portable calling button. When plug is removed, accidentally or otherwise, contact springs engage with circuit closing bridge and light the various signal lights, as is the case when portable calling button is pressed.

Plug—Consists of molded base with cap provided with one or two openings for "Tirex" cable which is connected to plug springs in same manner as portable calling button as described on previous page. Plug is held in jack by heavy phosphor bronze spring fingers which are not part of electrical circuit. Line contact springs of jack are self-cleaning to insure good electrical connection at all times.

Size

All stations fit standard single-gang switch box or cover having a square-cornered opening.

Finish

Standard finishes are natural brown bakelite. Other finishes can be furnished.

WALL TYPE CALLING STATION

Used in toilets, labor rooms, operating rooms, etc. Switching mechanism, same as used in portable calling button, is mounted on steel back plate. Front plate, of screwless bakelite type, snaps onto back plate. Station fits any standard single-gang switch box (depth at least 2⅛ ins.), or cover with square-cornered opening and is available in natural brown bakelite. Other finishes can be furnished.

CONTAGIOUS WARD CHAIN-PULL STATION

Used in wards or private rooms of a contagious section of hospital. Attached to chain is a silken cord with pendant. When patient has been released, cord is removed and new cord inserted. Station can be equipped with double cord if desired. Bakelite front cover snaps into steel back cover, on which apparatus is mounted. Available in natural brown bakelite finish. Other finishes can be furnished. Fits standard single-gang switch box (depth at least 2⅛ ins.) or cover having square-cornered opening.

SPECIAL BEDSIDE STATION

On the preceding page is shown a Special Bedside Station equipped for Nurses' Call with bull'seye, Emergency Service, Radio, and Duplex Convenience Outlets. This is one of the numerous arrangements that might be required on Patients' Bedside Station. Apparatus is mounted on steel back plate and front bakelite cover of screwless type snaps onto this back plate, eliminating screws. Finished in natural brown bakelite. Other finishes can be furnished.

Special stations equipped for Telephone Service or with Duplex Convenience Outlets must have partitions in outlet boxes for such service. The Steel City Electric Company, Pittsburgh, Pa., manufacture a box of this type. May be supplied with stamped or solid brass or bronze plates as required.

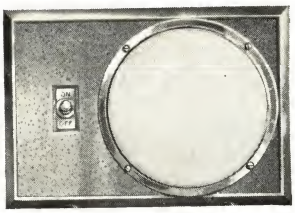
Pilot Stations

Single Dome Type

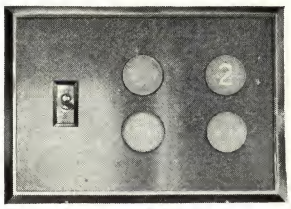
When portable calling button at patients' bedside station is pressed, it is necessary that lamp signals should guide nurse from her duty station to source of call. This is accomplished by placing pilot lights in the Duty.

Left: HN-310 Corridor Pilot Lamp Station

Right: HN-311 Duty Station



Right: HN-312 Duty Station



Stations, at Corridor intersections and over the door on the Corridor side of the room. The number of pilot lamps required and whether one or more lamps under one dome should be used depends on location of Duty Stations and arrangements of Corridors in different wings of the hospital.

General Construction

Cover Plate—Moulded bakelite of the screwless type, having mounted thereon an opalescent glass dome. Duty Station has mounted, in addition, a switch for silencing buzzer. Cover Plate is connected to Back Plate by loose hinge which allows Cover Plate to be swung open for lamp replacement.

Back Plate—Cadmium plated, punched to mount standard candelabra sign receptacles with lamps. For duty Stations, Back Plate also contains buzzer for audible indication that call has been made.

Dome Partitions—We recommend that domes in Corridor and Duty Stations be equipped with a partition arranged horizontally, making two compartments, each one having a clear lamp; lamps wired in multiple. One half of dome showing dark, indicates loose or defective lamp that should be replaced.

For emergency service, domes are partitioned to have upper half show red for emergency and lower half white for regular service.

Domes are sometimes equipped with double partitions to make four compartments, used at corridor intersections to indicate directions, or when used with Duty Stations, to indicate to nurse the section calling.

CORRIDOR PILOT LAMP STATIONS

HN-310—Used over door on corridor side of room where call originates. Also used at corridor intersections.

HN-310-2M—Single dome, partitioned, with two lamps wired in multiple as safeguard feature.

HN-310-2E—Single dome, partitioned, with two lamps. Upper partition of dome for emergency service; the lower partition for regular service.

HN-310-4L—Single dome, with four lamps. Partitions can be furnished if desired.

Above stations fit any standard 2-gang switch cover having square-cornered opening.

DUTY STATIONS

HN-311—Single dome, with one lamp, buzzer and silencing switch. Used in Diet Kitchens, Utility Rooms and other locations where nurses are on duty. Indicates call has been made from bedside station, but does not designate room or ward.

HN-311-2M—Same as HN-310-2M Corridor Station with buzzer and silencing switch added.

HN-311-2E—Same as HN-310-2E Corridor Station with buzzer and silencing switch added.

HN-311-4L—Same as HN-310-4L Corridor Station with buzzer and silencing switch added.

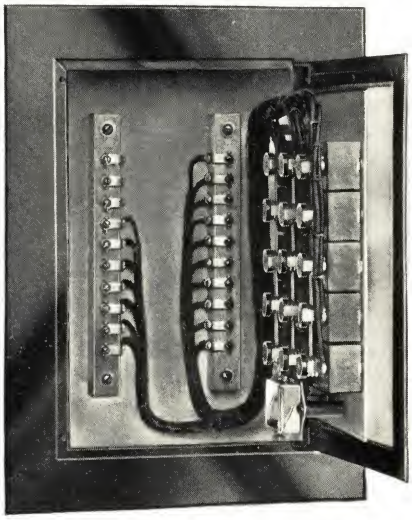
HN-312-4L—Bull's-eye type; buzzer and silencing switch. Add 1-gang for each two lamps up to and including six.

Above stations fit any standard 3-gang switch cover having square-cornered opening.

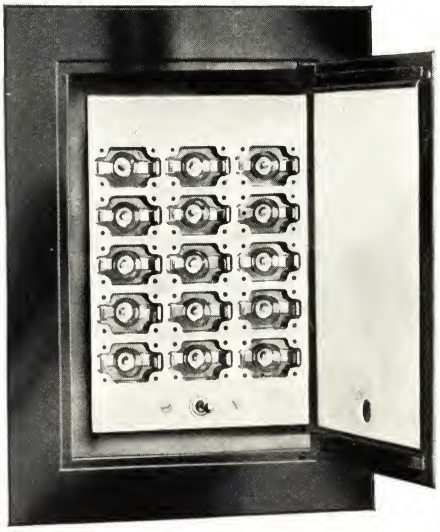
Nurses' Station Lamp Annunciator

Usually installed at Nurses' Station on each floor or section to indicate by lamp annunciation and audible buzzer, room or ward where call originates. Buzzer silencing switch is mounted in front of Annunciator. A Master Annunciator, wired in multiple with all Nurses' Station Annunciators may be installed in Superintendents' office, providing supervision of entire system.

Room Indications Illuminated to Show Pyralin-Covered Panel



Cabinet Door, Numbered Panel and Lamp Panel Open, Showing Terminals and Wiring



Lamp Panel, With Numbered Panel and Cabinet Door Open

Features

The illustrations (on preceding page) show the following new features now embodied in the "Standard" Nurses' Station Lamp Annunciator.

Numbered Panel—Mounted on cabinet door. Made of metal, having room indications stenciled therein, the face of which is covered with dull white pyralin. This covering is washable and does not reflect lights or windows, giving perfect visibility of room indications.

Lamp Panel—Back of Numbered Panel is an assembly of lamp housings on a steel plate panel hinged to the cabinet door. Lamps are thus easily accessible and may be removed as shown on page 15. Lamp housings are so molded and mounted that minimum space is occupied and leakage of light between room indications is impossible.

Finish

The flush trim and door are finished in brown, or as required. All hinges, screws, etc., are concealed. Door lock is only unit visible.

DATA

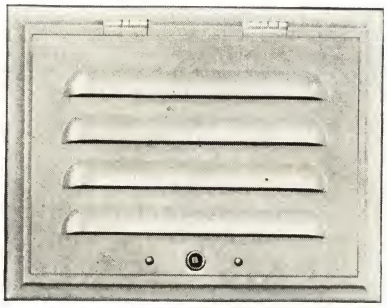
No. of lamps	Arrangement of max. No. of lamps		Trim Size, in.		Case size, inches		
	High	Wide	High	Wide	High	Wide	Deep
6-9 10-15	5	3	13 3/8	12 1/4	11 3/4	10 5/8	3 5/8
16-20 21-25 26-30	10	3	19 3/8	12 1/4	17 3/4	10 5/8	3 5/8
31-35 36-40 41-45 46-50	10	5	20 1/2	17 1/8	17 5/8	14 1/4	3 5/8

Source of Current and Wiring

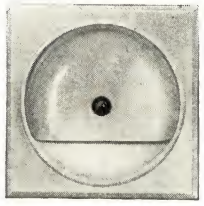
The "Standard" Nurses' Calling System operates on any reliable source of alternating current in the building. Such current is reduced to 12 volts by means of an approved transformer furnished by us.

Feed wires must be at least No. 14 B. & S. rubber covered. Wires running to calling stations from the feed wires may be No. 16 B. & S. rubber covered, if adequate to provide sufficient current to the station as to properly operate it.

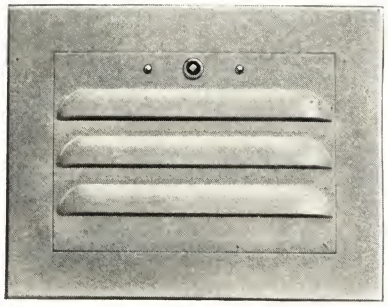
NIGHT LIGHTS



HG-300 Louvered Semi-flush Type



HG-303
Room Type
with
Revolving Shield



HG-302 Louvered Flush Type

To adequately supply the soft, non-glare illumination desired at night in private wards, corridors and for guide lights, "Standard" Night Lights have been especially designed. They are available in two types as follows:

ROOM TYPE NIGHT LIGHT WITH REVOLVING SHIELD

This type of Night Light, HG-303, has a glass dome and has fitted over the upper portion of the dome, a revolving metal shield that throws the subdued light left or right simply by the turning of the shield in that direction. Designed primarily for use in rooms, it is often used in corridors and for guide lights.

Size

Over-all size is 4 9/16 ins. wide by 4½ ins. high. Fits standard 2-gang switch box.

LOUVERED NIGHT LIGHTS

Designed for use in corridors or in areas where sufficient illumination without brightness is desired for staff or patients' requirements. Available for flush or semi-flush mounting. Both types have louvered fronts; louvers being set at angle that directs light downward. Fronts are hinged for easy access to lamp. Both types are finished in white-enamel, but other finishes may be had as desired. Outlet boxes are furnished.

DIMENSIONS

No.	Trim, ins.		Case, ins.		
	Wide	High	Wide	High	Deep
HG-300 (Flush)	8 1/2	6 1/2	7 3/4	5 3/4	3 1/2
HG-302 (Semi-flush)	8 3/4	6 3/4	7 3/4	5 3/4	3 1/2

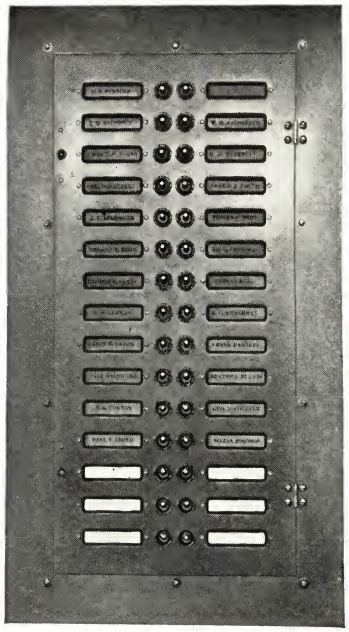
DOCTORS' AND STAFF REGISTER
"In" and "Out" System

Purpose

In every hospital it is always important to know whether certain doctors or staff members are in or out of the building. The "Standard" Illumination Type Annunciators are designed for this service.

Description and Operation

In the doctors' room is a Master Annunciator, panel of which has toggle switch and card holder for each doctor. Name cards can be typewritten or printed on white paper and each is covered with glass. Behind each card holder is an individual lamp.

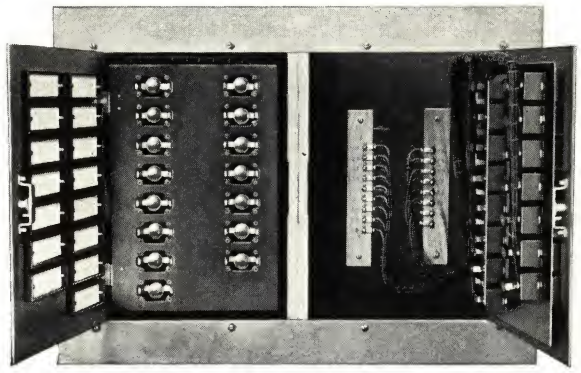


Master Annunciator

On registering "In" by means of the toggle switch, the name card is illuminated from the back and stays so until doctor registers "Out".

At telephone operators' desk is usually placed a Sub-Annunciator, similar in appearance to the Master Annunciator but without toggle switches. The lamps of these two Annunciators are wired in series; in case a lamp is burnt out in Sub-Annunciator the corresponding lamp in the Master Annunciator is also out. This indicates to doctor that his circuit is not functioning and should be reported to the operator. The operator thus knows always the "In" and "Out" of any member of the staff.

Lamps are easily accessible (see illustration), and are readily replaced, as lamp housings are located on panel immediately behind cabinet door.



Interior View of Sub-Annunciator

Data

No. of Names	Master Annunciator		Sub-Annunciator	
	Height, ins.	Width, ins.	Height, ins.	Width, ins.
10	13¾	15¾	13¾	14¼
20	22	15¾	22	14¼
30	27½	15¾	27½	14¼
40	35¾	15¾	35¾	14¼
60	27½	27¾	27½	24¾
80	35¾	27¾	35¾	24¾
100	41¼	27¾	41¼	24¾
120	48⅛	27¾	48⅛	24¾

Case is 1½ inch smaller than above dimensions all around and 3½ inches deep

DOCTORS' PAGING SYSTEM
3-Circuit Flashing Lamp Type

Purpose

Permits telephone operator to set up coded calls for as many as three doctors at a time and alternately flash the three predetermined codes to lamp annunciators placed throughout corridors of building.

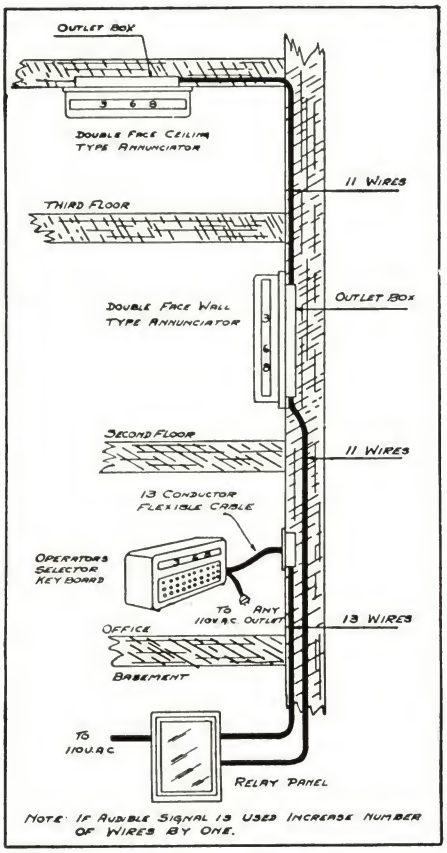
Description

System consists of portable Selector Keyboard placed near the telephone operator for setting up the coded calls; Wall or Ceiling Type Lamp Annunciators, as required, placed at strategic positions throughout the corridors; and Control Panel.

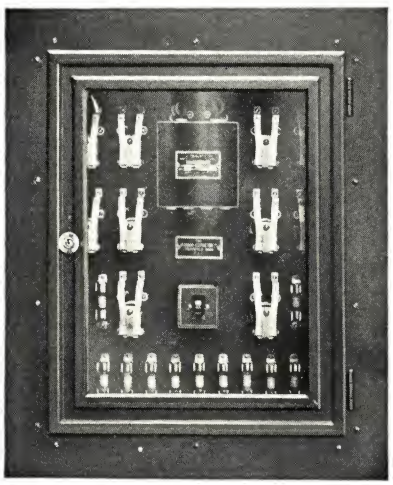
Selector Keyboard

Selector Keyboard

We present something entirely new in this type of apparatus as the flashing unit is an integral part of the Selector Keyboard. The Keyboard contains three banks of numbered keys, and above top bank of numbers is a row of numbered lamps that flash in synchronism with the codes in the annunciators so that operator can see if proper code has been set up. Depressing the keys raises contacts to neutral position, making contact with common rocker bar actuated by cam shaft timed to give codes proper sequence. If audible buzzer is used in conjunction with



Typical Doctors' Paging System Installation



Relay Panel

code flashes, buzzer is controlled by a button placed on the keyboard. Switch buttons at each end of each row of code buttons start and reset the code signals. The mechanism is driven by a 110-volt A.C. motor similar to those used in calculating machines. Keyboard is connected to floor outlet, furnished by us, by means of a flexible cable that plugs in baseboard receptacle. This arrangement eliminates the usual motor-driven sign flashes. Standard size is 13⅝ ins. wide x 10¾ ins. high x 8¼ ins. deep.

Control Panel

Consists merely of ten relays with the necessary fuses and transformer. The trim size is 20¾ ins. wide x 24¾ ins. high. Its case size is 18⅛ ins. wide x 22⅛ ins. high x 7½ ins. deep.

Codes

Usual custom is to establish a code of three numbers for each doctor. Three codes can be set up simultaneously by the operator, these being flashed alternately. Any code can be cancelled independently of the others. Where buzzer is used it is controlled by operator, and is usually momentarily sounded in each Annunciator after each code is flashed.

Wall Type Annunciator, Double Face Style (Also Made 3-Face)

Annunciators

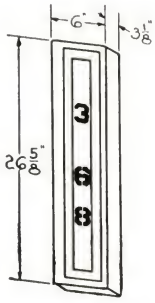
These are made in various sizes and styles to meet mounting requirements, as illustrated below. All are sturdily constructed of metal, finished in white enamel or as desired.

Numerals are stenciled on metal plate covered with washable, dull white pyralin. Numerals are thus practically invisible when not lighted, yet clear, sharply defined and readily discernible from a distance when illuminated. Numeral panels are hinged, providing easy access to lamps located in separate compartments. Compartments prevent leakage of light to adjacent numbers.

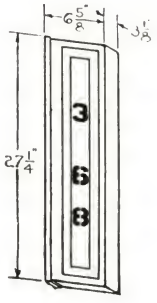
Wiring

Thirteen wires are run from Selector Keyboard to the relays in Control Panel and eleven wires from the relays to the Annunciators. When buzzer is used, an extra wire is required both from the Keyboard to the relays and from relays to Annunciators.

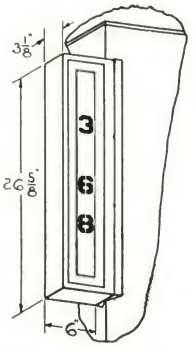
PAGING ANNUNCIATOR MOUNTING STYLES



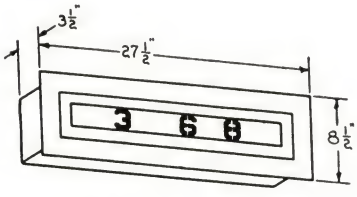
Double Face Partition Type, Mounted Vertically (or Horizontally)



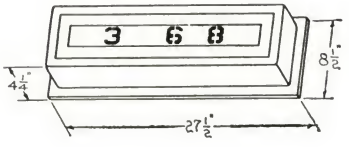
Double Face Type, Side Wall Mounted



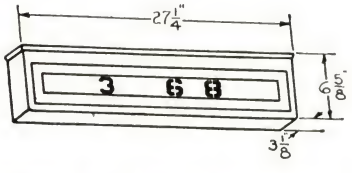
Double Face Type, Corner Mounted



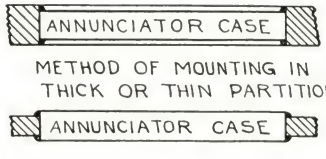
Single Face Type, Flush Mounted



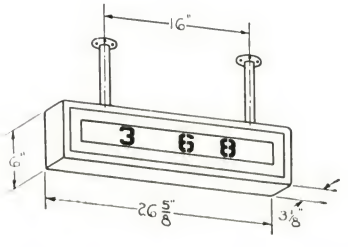
Single Face Type, Surface Mounted



Double Face Type, Ceiling Mounted



Double Face Type, Partition Mounted



Double Face Type, Ceiling Mounted With Pipe Supports

TOGGLE SWITCH NURSES' CALLING SYSTEM
(For Operation on 110-Volt A.C. or D.C.)

Because of its comparatively low first cost and because it is designed primarily for use on 110-volt D.C. or A.C. (may be used on 12, 18 or 24-volt operation), the Toggle Switch Nurses' Calling System, is often favored over the Patients' Portable Calling Button System previously described (see page 13).

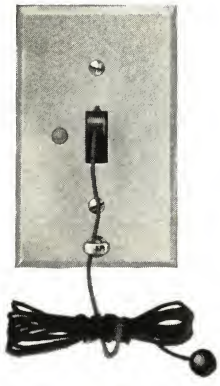
Both systems are identical in purpose and result. The difference is in the method of originating the call. Instead of pressing the plunger on the Portable Calling Button, in this system the patient pulls a linen cord which is attached to the toggle fitted in the plate of the station. As in the Button System, pilot lights are immediately flashed to the Nurses' Duty Stations and Corridors.

The nurse, answering the call, resets the station simply by pushing the toggle back to the "off" position.

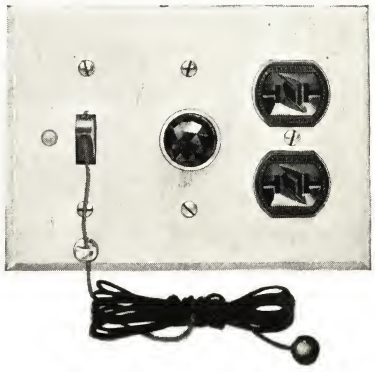
Due to its pull-cord operation, care must be taken that the switch be placed in a position near the patient to give greatest ease and efficiency of operation. This is usually accomplished by installing the switch in the wall at the head of the bed at a height that gives patient a direct pull on the cord. Cord should be arranged for convenient procurement by patient.

All necessary equipment for efficient operation of the Toggle Switch System can be furnished to meet any requirement.

HT-300
Ward Type Station



HT-301
Private Room Station



Special Station

Ward Type Toggle Switch Station

As illustrated, consists of brass plate containing toggle switch having 6 ft. of linen pull cord and pendant, and a bullseye pilot light to call nurses' attention to patient calling. Buzzer contact is disconnected by means of key through opening provided. Pull-cord runs from toggle through cord guide for easy operation. Fits standard 2-gang switch box or outlet box cover.

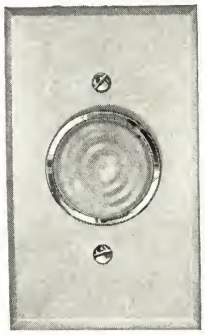
Private Room Toggle Switch Station

As illustrated, consists of brass plate containing toggle switch having 6 ft. of linen pull-cord and pendant. Pull-cord runs through cord guide for easy operation. Bullseye pilot light not used as it is evident to nurse, receiving private room call, who has called. Buzzer contact is disconnected by means of key through opening provided. Fits standard 1-gang switch or outlet box cover.

Special Toggle Switch Station

As illustrated, consists of brass plate containing toggle switch having 6 ft. of linen pull cord and pendant running through cord guide; bullseye pilot light for nurses' guidance; two convenience receptacles; and opening for inserting key to disconnect buzzer contact. Fits standard 3-gang switch box or outlet box cover. This is but one of various arrangements possible in Special Stations for Toggle Switch Systems.

BEEHIVE TYPE CORRIDOR DOME STATION



HT-310
Beehive Type
Corridor Dome
Station

Used over door on corridor side of room where call originates. Also used at corridor intersections. Generally used in conjunction with Toggle Switch System, it indicates to nurse the room or section requiring her attention. Instead of the larger glass dome, single-gang brass plate is equipped with the semi-opalescent "Beehive" type of corrugated glass dome. Receptacle and 115-volt carbon filament lamp are standard equipment. Fits any standard single-gang switch box or outlet box cover.

BULLSEYE ANNUNCIATOR

Used wherever it is desired to indicate to nurse the room, ward or section, originating the call. Bullseye pilots are opalescent with room ward or section numbers engraved thereon. Buzzer sounds momentarily whenever an indicator is illuminated. Pilots and buzzer silencing toggle switch are mounted on brass plate behind which are the receptacles and lamp housings. Annunciators fit roughing-in boxes furnished by us.

HT-314
Bullseye Annunciator

SETH THOMAS CLOCK CO.

107 Lafayette Street
NEW YORK, N. Y.

CHICAGO, ILL., 111 North Canal Street

SAN FRANCISCO, CAL., 278 Post Street

Products

TOWER CLOCKS of every description for public buildings, churches, factories, schools, private estates, etc.; SELF-WINDING CLOCKS; STREET CLOCKS; BRACKET CLOCKS; HANGING and MANTEL CLOCKS.

Tower Clocks

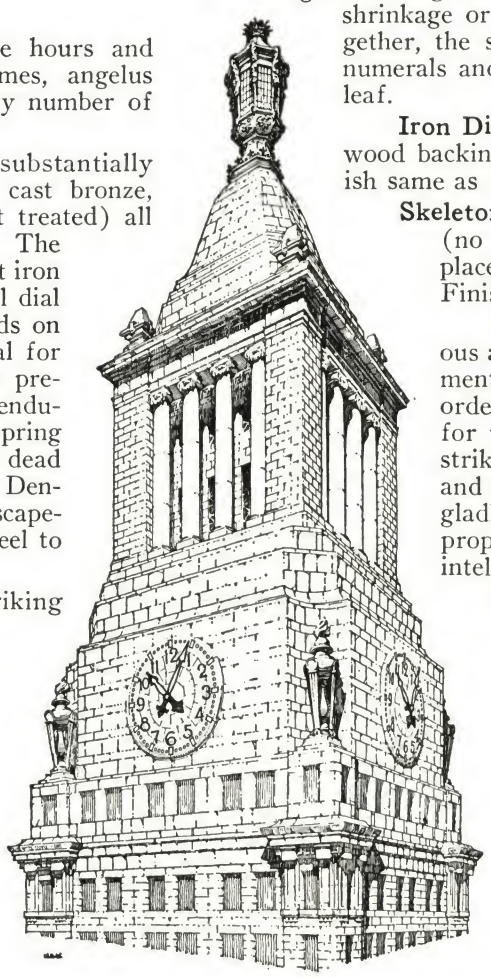
Both time and strike. Strike hours and half-hours; also Westminster chimes, angelus and shipbells; quarter-hours on any number of bells up to eleven.

Description—Movements are substantially constructed. The wheels are of cast bronze, machine cut, pinions of steel (heat treated) all steel parts heavily copper plated. The mechanism mounted on a heavy cast iron bed frame. On the clock is a small dial to indicate the position of the hands on the outside dial; also a seconds dial for close regulation; a safety catch to prevent the fall and breakage of the pendulum rod should the suspension spring break. Escapement either Graham's dead beat, mahogany pendulum rod, or Dennison's double 3-legged gravity escapement, the pendulum of zinc and steel to insure accurate compensation.

Silencing Devices—On all striking movements we can fit an automatic attachment to silence the striking train for whatever hours desired; or a hand switch to silence the clock for special occasions.

Automatic Light Switch—We can attach a double pole single throw Trumbull switch operated by a 24-hour wheel for automatically turning on and off the lights for illuminating the dials.

Self-winding Movements—(See illustration). We can equip movements with motors to operate on any current with automatic double pole single throw Trumbull switches in weatherproof iron boxes automatically operated by the rise and fall of weight for automatic winding.



Consolidated Gas Building, New York, N. Y.
WARREN & WETMORE, Architects

Size of Dials—As a guide in planning dials, we suggest that a good proportion is 1-ft. diam. for every 10 ft. in elevation.

Glass Dials—For illumination, dials may be safely used in whole plate not exceeding 4 ft. 6-in. diam.

For large sizes we advocate sectional glass and iron dials. The frame of the dial is cast in 6 sections with numerals and minute dots a part of the casting. The frame has rabbeted back to secure the glass which is installed in sections and fastened with brass clamps. All glass is ⅜ in. thick and ground on both sides.

Wood Dials—Two layers of ⅞-in. seasoned wood, tongued and grooved with grain crossed to prevent shrinkage or warping, the two layers bolted together, the surface painted and smalted; metal numerals and minute dots painted black or gold leaf.

Iron Dials—Heavy galvanized iron with a wood backing 1½ in. thick. Numerals and finish same as for wood dials.

Skeleton Metal—Cast Roman or Arabic (no minute dots) mounted on 2 rings placed 2 or 3 in. from face of the wall. Finish to be in contrast to color of wall.

Estimate—On account of the various arrangements and individual requirements, each clock is made to order and in order to make an estimate it is necessary for us to know whether it is a time or strike movement, the number, diameter and style of dials. On request we will gladly send a question sheet which, when properly filled in, will enable us to quote intelligently.

Guarantee—Our tower clocks are of first class material and workmanship and guaranteed against original mechanical defects for a period of 5 years, and, when fitted with Graham's escapement, to run within a variation of 30 seconds per month, or with Dennison's double 3-legged gravity, 10 seconds per month if given proper attention.

Information Required for Estimates—When asking for estimates the following facts will be of much assistance to us:

Size and number of dials.
Wood, glass, metal, or stone dial wanted.
Is clock to strike hours?
Is clock to strike quarter-hours?
Weight of bells.

Mammoth Clock Installations—

Consolidated Gas Building, New York, N. Y.—4 dials, 22-ft. diam.
Paramount Building, New York, N. Y.—2 dials, 25-ft. diam. and 2 dials, 22-ft. diam.
Colgate & Co., Jersey City, N. J.—1 dial, 50-ft. diam.
Emerson Drug Co., Baltimore, Md.—4 dials, 24-ft. diam.
Maryland Casualty Co., Baltimore, Md.—4 dials, 17-ft. diam.
C. Schmidt Sons, Philadelphia, Pa.—4 dials, 23-ft. diam.

Seth Thomas Street Clocks

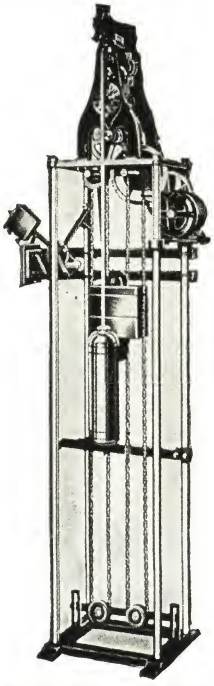
Of bracket or post type with 30 and 40-in. dials operated mechanically by the smallest size tower clock movement. These movements can be furnished in the 8-day weight driven, hand wind type or with automatic electric power wind, as illustrated.

Movement measures 2 ft. square and 5 ft. high, and may be enclosed in wood cabinet of neat design to match surrounding trim. In case of post clocks, movement is mounted in base or, if ornamental column is required without base, movement may be installed under sidewalk or in basement.

Four dials of 3 ft. each in diameter, 3 dials of 3½ ft. each, 2 dials of 4 ft. or 1 dial of 5 ft. may be satisfactorily operated by this movement which carries a 5-year guarantee, and will last a lifetime.

These movements may be equipped with automatic lighting switch for turning on and off the lights used for illuminating the dials.

Clock may be equipped with illuminated sign ornaments.



Electrically Wound Movement
For post or bracket type clocks

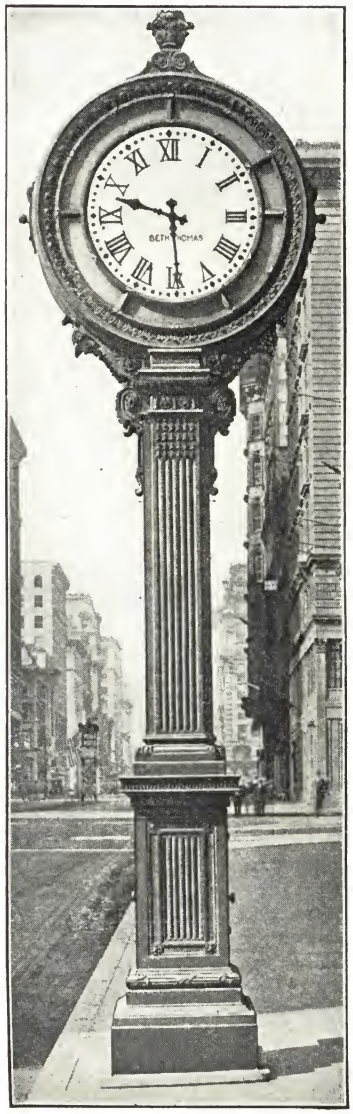
Special Designs

We specialize in sheet bronze and cast bronze outside clock cases to suit the architects' conception of what is proper for each individual building.

We recommend honed vitrolite glass dials which have the appearance of marble, with raised bronze numerals, hands, and minute marks. Also, we can furnish raised bronze letters as shown on cut directly below.

Seth Thomas Electric Clocks

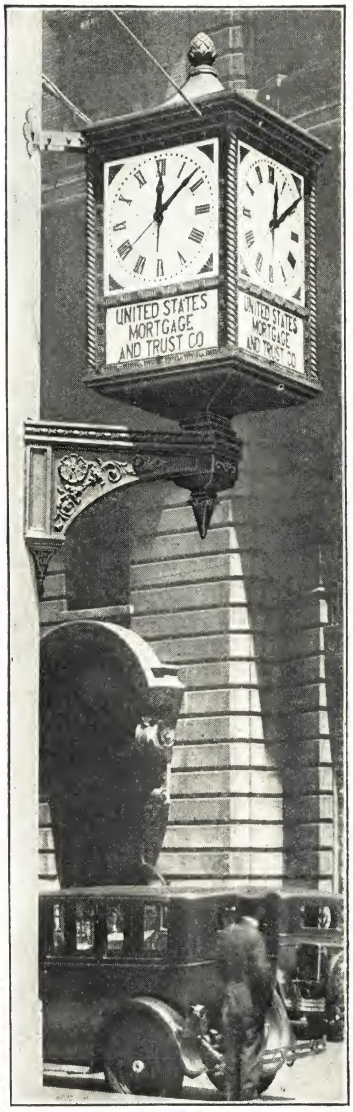
In conjunction with the General Electric Company, we have recently developed one of the most efficient electrically operated clocks for inside use. These clocks operate on the lighting current and are so designed that as much as a five hour interruption in current supply will have no effect on its operation.



Two-dial Post Clock
With illuminated dials

Bracket Clock
Many different designs

Bracket Clock
Harmonious with architecture of building



Four-dial Bracket Clock
Illuminated dials and signs

ACME ELECTRIC HEATING CO.

Manufacturers of Electric Heaters for Every Purpose

1217 Washington Street, BOSTON, MASS.

BRANCH OFFICES

NEW YORK, N. Y., 126 Liberty Street

PHILADELPHIA, PA., 2401 Chestnut Street

Products

ELECTRIC RADIATORS for every purpose; WATER HEATERS; HOT CLOSETS, PLATE WARMERS, THERMOSTATS, etc.

Service

We maintain a special service department to co-operate with architects and engineers for Electric Heat Development.

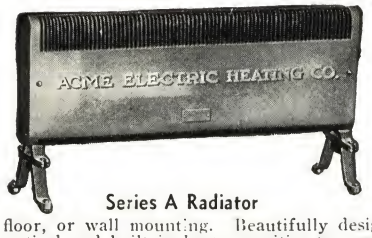
ELECTRIC RADIATORS

The Acme line of electric radiators is complete, and will meet every requirement for domestic or industrial heating safely, economically and permanently. It is one of the few lines of electric radiators built specifically for heating space.

Acme Radiators are handsomely made to harmonize with any equipment and are practically indestructible.

A three-heat switch is provided for regulating the temperature. Made in capacity to meet any requirement.

Also made to order in any metal, finish, or dimensions.



Series A Radiator

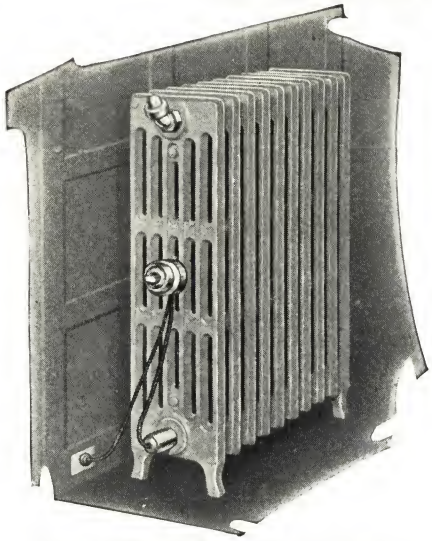
For floor, or wall mounting. Beautifully designed, very practical and built in heat capacities to meet the requirements in the home, office, etc. Dimensions, 27 ins. long, 14 ins. high.

From 1½ to 4½ kw.

Series B Radiator

Particularly well suited for heavy duty where requirements for heating are considerable—church, meeting hall, large living quarters and reception halls. Dimensions, 27 ins. long, 23 ins. high.

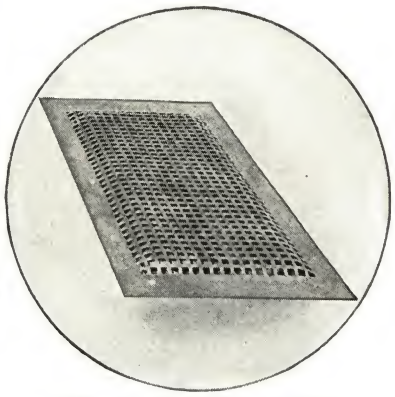
From 3 to 12 kw.



Series E Electric Steam or Hot Water Radiator

Each radiator, a complete heating plant, can be operated as a hot water radiator or a 15-lb. steam pressure radiator. Provided with a safety plug.

Standard sizes: 20 sq. ft. radiation; 30 sq. ft. radiation; 45 sq. ft. radiation. Made to order in any size or capacity.



Series D, Flush Type Radiator

Supplied complete with grille and adapter casing finished in bronze or aluminum. Made with special *AcRom* heating element that will last a lifetime. Safe to use anywhere.

Made in two standard sizes: 1½ and 3 kw.

Dimensions for wall opening:

D339—19⅛ ins. wide, 13¼ ins. high.

D340—29¼ ins. wide, 13¾ ins. high.

WATER HEATERS, HOT CLOSETS AND PLATE WARMERS

Left:

Circulation Water Heater

Acme Circulation Water Heaters are the result of our painstaking efforts to introduce an electric water heater correct and complete in every detail. Liquid flow is completely surrounded by the heating element, thus providing instantaneous heat the full length of the heater. A beautiful appliance of correct design and sturdy construction.

ACME CIRCULATION WATER HEATERS

Cat. No.	Dimensions, in.		Watts	Price
	Diam.	Length		
421	3	15	125– 500	$22.00
422	3	15	188– 750	24.00
423	3	15	250–1000	26.00
424	3	24	375–1500	30.00
425	3	24	500–2000	35.00
426	3	24	750–3000	40.00
427	3	24	1000–4000	45.00
428	3	24	1250–5000	50.00
429T	Tee	Non-by-pass		2.50

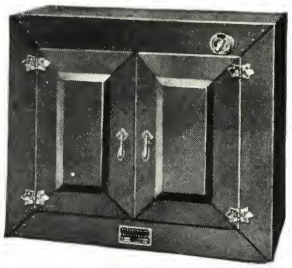
Furnished 110-125; 220-250 volts.

Threaded for ½-in. standard iron pipe thread at each end.

Hot Closets and Plate Warmers

Acme Hot Closets are designed for butler's pantry, restaurant, club, etc. as a warming closet for food and dishes. Heating element is of the *AcRom* grid-type. Heat is distributed efficiently and exactly throughout the entire cubic dimensions, insuring a perfect and efficient heat distribution. Will not crust food.

Made of black planished iron with nickelplated trimmings, consisting of hinges, latches, name plate, and switch. Interior is made of heavy gauge galvanized iron and is provided with two galvanized iron perforated shelves. Insulated throughout with heavy asbestos shell board, eliminating every possible heating loss. A three-heat switch is mounted for the successful operation, and a prism light is built directly in the closet to indicate the operation.



Hot Closet
Cat. No. 1622

Made to order to any dimension, any metal, any finish, thermostatic or manual control.

ACME HOT CLOSETS

Cat. No.	Outside dimensions, in.			Watts	Price
	Width	Depth	Height		
1621*	25	14	24	150– 600	$ 90.00
1622†	30	17	26	220– 880	115.00
1623†	35	20	28	400–1200	150.00

Furnished 110-125; 220-250 volts.

*Single door. †Double door.

THE ANDERSON-PITT CORPORATION

209 Goodrich Place, KANSAS CITY, MO.

ANDERSON-PITT AUTOMATIC IMMURED TYPE HEATER

Electric Wall Inset Heater

This heater was designed to meet the growing demand for an electric heater of beauty that is operated entirely automatically, and will turn itself on and off at any desired time.

The entire installation is designed to harmonize with modern home interiors.

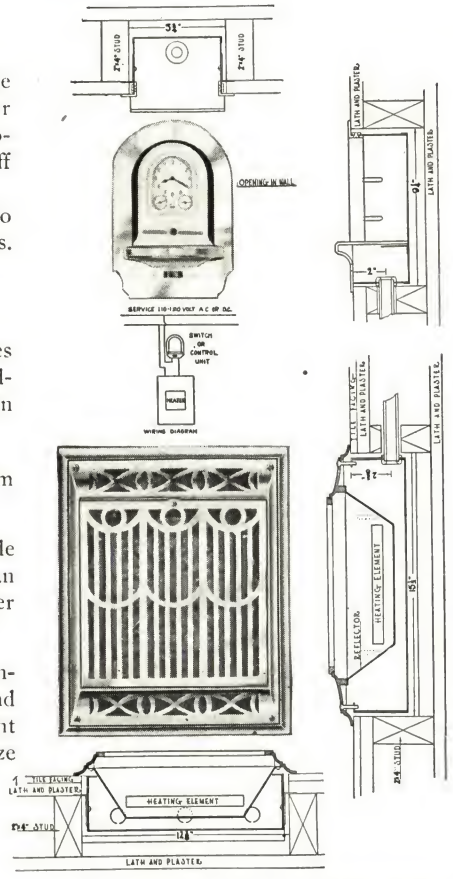
Features

Front Grille—The front grille plates are castings, hand ground and hand polished. Supplied in bright chromium, satin chromium and bronze finish.

Reflectors—Reflectors are chromium finished.

Heating Unit—Heating unit is made of Heat-Co refractory material with an open coil resistance wire of either chromel A or nichrome IV.

Control Unit—The frame of the control unit is a casting, hand ground and hand polished. It is supplied in bright chromium, satin chromium and bronze finished.



Time Control—It consists of high grade clock which is an accurate timepiece with a Romanized arch top. It is to set into a control unit frame. Clock is wound by hand and may be set to turn the heater on and off automatically at any desired hour. The time control unit is also provided with a manual switch for independent operation of the heater when so desired.

WALL-INSET HEATER

No.	Volts*	Watts	Price
Complete with Time Control			
BC-15-TC (bright chromium)	115-230	1500	$55.00
SC-15-TC (satin chromium)	115-230	1500	55.00
SB-15-TC (solid bronze)	115-230	1500	55.00
Without Time Control			
BC-15 (bright chromium)	115-230	1500	35.00
SC-15 (satin chromium)	115-230	1500	35.00
SB-15 (solid bronze)	115-230	1500	35.00

**Important:* Specify voltage required.

Time control—Net weight, 8½ lb.; shipping weight, 9 lb.

Wall insert heater—Net weight, 16¼ lb.; shipping weight, 17 lb.

ANDERSON-PITT VENTILATOR

The Anderson-Pitt Ventilator is in reality an air pump with twin units and not just an ordinary fan adapted to move air. It is designed for the specific purpose of exhausting air in uniform volume, regardless of the outside wind velocity or direction.

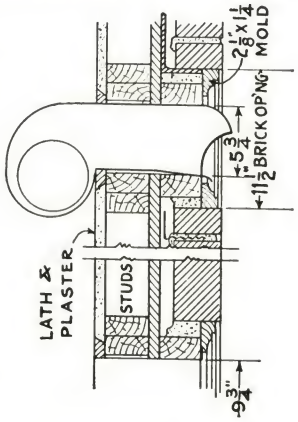
Ventilating engineers recommend an air change every four minutes for the kitchen. The Anderson-Pitt Ventilator exhausts over 400 cu. ft. of air per minute. This will provide a complete air change every 2½ minutes in a kitchen having 1000 cu. ft. of air space.

It gathers air uniformly from all parts of the room instead of in a straight narrow line, directly back of the unit.

Nos. L40 and L50
For wall mounting

Because this exhaust unit delivers air at a uniform, definite pressure, it is ideal for discharging directly into flues or chimneys, as well as to the outdoors.

Finish—Anderson-Pitt Ventilator is finished in sea foam green with high luster nickel-plated caps. It can be refinished to harmonize with any color scheme if green is not desired.



Louver Model for Wall Mounting

The "L" type for wall mounting is furnished complete with louvers, sheet metal duct and hooded cap for finishing the opening in the outside wall.

Drawing shows method of mounting an Anderson-Pitt Ventilator in a brick veneer wall. Architects' detailed blue prints, showing mountings for frame, frame and stucco, brick veneer and solid brick or stone walls will be sent on request.

This unit is also furnished for window mounting

Outside Wall View

Showing appearance of the wall-mounted unit with hood cap which is supplied for finishing the opening on outside wall

Motor—1/30 hp. 1750 r.p.m. When ordering give current characteristics in full. Over-all size of ventilator without window panel or duct extension pieces—9½x9½x8½ ins.

WINDOW MODELS

No.	Panel adjustment, in.	Weight, lb. Net	Weight, lb. Shipping	Price each
P-26	26 to 36	25	32	$39.50
P-36	36 to 46	27	35	39.50

Furnished with 10 ft. of cord, attachment cap and feed-through switch. Mounting panel packed in separate carton.

BUILT-IN MODELS

No.	Duct extension adjustment, in.	Weight, lb. Net	Weight, lb. Shipping	Price each
L-40	6 to 10	25	32	$49.50
L-50	10 to 14	27	35	49.50

EDISON GENERAL ELECTRIC APPLIANCE CO., INC.

5600 West Taylor Street, CHICAGO, ILL.

For Branches and Factory Service Stations, see our pages on Commercial Cooking Equipment

Products

HOTPOINT BUILT-IN and PORTABLE ELECTRIC HEATERS. Architect's hand book on request.

Also manufacturers of Hotpoint Electric Household Appliances.

For Edison Electric Commercial Cooking and Baking Equipment, Hotpoint Electric Water Heaters and Electric Ranges see Manufacturers' Index.

A GENERAL ELECTRIC ORGANIZATION

Hotpoint

Distinctive Features

Hotpoint Room Heaters are made in two distinct types—Radiant and Convection—each of which has a definite field of use. The convection heater is used in places where with steam or hot water heating, radiators are used. For continuous heating the convection heater is paramount; for intermittent heating of small rooms, such as bathrooms, or for cool days during the off heating season, radiant heaters are desirable and give instant heat.

(1) **Cleanliness**—Definite deflection of heated air away from the wall, and low intensity radiation; no dust is burned nor is dust or soot deposited on walls.

(2) **Low Intensity Radiation**—Quicker and more uniform room heating results from reduction of the "chimney effect" which the ordinary radiator produces. Due to re-circulation the floor is comfortably warmed and less heat is lost to cold walls.

(3) **Definitely Controlled Heat**—Tumbler switches furnished on A35, A38, and A39 heaters give one, two, and three heats, thus giving great flexibility. A direct acting thermostat—TC150—can be furnished to provide automatic, thermostatic control under any conditions.

Types

A35 Wall Type Convection Heater—For permanent location and connection to provide continuous heat. Finished in statuary bronze and decorated with cast brass trimmings. For other information see A38.

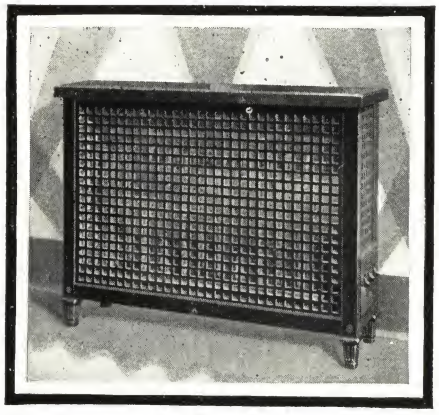
A-38 Portable Room Heater—Each heater provided with 6 ft. of heater cord. Since these heaters take from 2000 to 5000 watts they *cannot be connected to lighting circuits*—we recommend standard 30-ampere heavy duty plug and receptacle. A location directly under a window will permit the heated air to rise from the heater and mix with the colder air column always prevalent at this location and prevent drafts. Standard finish—baked brown mahogany enamel with gold stripe outlining top. Special two-tone finishes (tan-red) (green-red) (blue-gold) are available. Also furnished with brackets for wall mounting.

A-39 Built-in Bathroom Heater—Tested and listed as standard by National Board of Fire Underwriters to be permanently built-in. Furnished with wall box to fit into 4-in. partition walls of standard construction. Recommended location about knee high, preferably, so that space directly in front of heater is clear of obstructions or doors. Where possible, locate under windows for reasons explained under Type A-38. Switches self-contained.

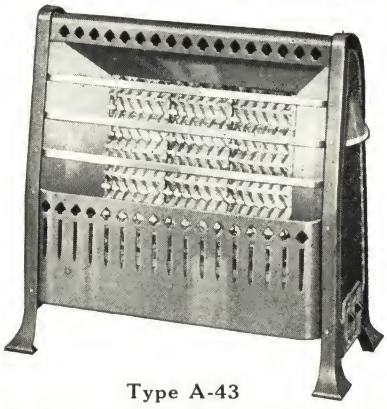
Standard finishes—white, green or orchid vitreous enamel.

A-43 Portable Radiant Heater—For home, apartment or office use. May be used in a fireplace, or is light enough to be moved anywhere. Finished in statuary bronze and rich brown enamel in two-tone effect. Has two tumbler switches and safety switch.

These heaters solve the apartment problem of varying temperatures to suit tenant needs.

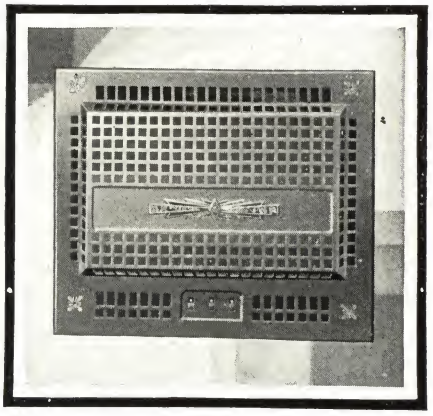


Type A-38



Type A-43

Cat. No.	Length, in.	Height, in.	Depth, in.	Watts	Voltage
122 A43	15⅝	19¼	10	2000	115-230
123 A43	19⅝	19¼	10	3000	115-230



Type A-35

Cat. No.	Watts	Voltages	*Wall box dimensions, in.
332 A35	2000	115,230	18½ long
333 A35	3000	115,230	25½ long
334 A35	4000	115,230	32½ long
335 A35	5000	115,230	39½ long
336 A35	6000	115,230	45½ long

*Height in each case 20⅝ in. Depth 3¾ in.

Note: Wall boxes and units with covers will be boxed and shipped separately, permitting the builder and contractor to order and install the equipment as required.

Short Method for Estimating Heater Sizes

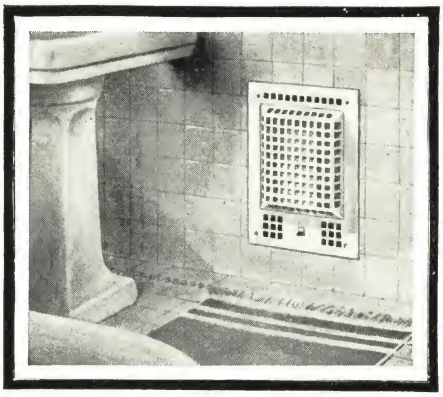
The data given below may be used to roughly estimate the heater capacity required. The values are based on average residence construction with 70° F. inside and zero outside temperatures. Approx. 30° F. rise per hr. may be expected.

(1) Interior rooms with little or no outside exposure—0.75 to 1.25 watts per cubic foot.

(2) Average rooms with moderate window and door space, and not having extreme exposure to prevailing winds—1.25 to 1.75 watts per cubic foot.

(3) Rooms with severe exposure or very great window area—2.0 to 4.0 watts per cubic foot.

(4) Isolated rooms, such as cabins, watch houses and similarly exposed buildings—3.0 to 6.0 watts per cubic foot.



Type A-39

Cat. No.	Wide, in.	High, in.	Watts	Voltage
211 A39	15	19¼	1200	115-230
212 A39	19	19¼	2000	115-230

TYPE A-38—SIZES

Cat. No. with legs	Length, in.	Height, in.	Width, in.	Voltage
232 A38	20½	22¼	9¾	2000
233 A38	27¼	22¼	9¾	3000
235 A38	41½	22¼	9¾	5000

115-230 volts. 235 A38 230 volts only.

D. H. GOWING

Electric Wall and Portable Heaters

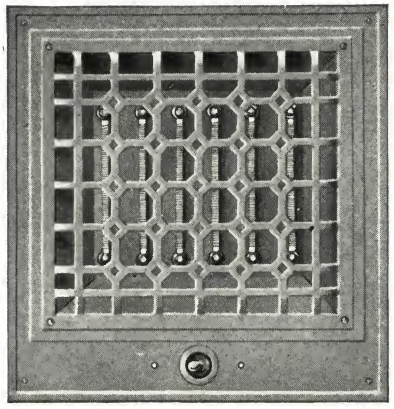
995 Monroe Avenue
ROCHESTER, N. Y.

"Ideal" Electric Heaters

The "Ideal" circulates the heat. It furnishes instant heat. There are no hot spots, no cold corners. It will not burn out like ordinary types of heaters. The first cost provides for years of satisfactory service.

It has been listed by the Underwriters' Laboratories, Inc. It consumes a minimum amount of electric current, yet does the work of higher priced heaters. It is 100% efficient. The "Ideal" Electric Heater may also be obtained in the portable style.

Ideal
TRADE-MARK



Type B "Ideal" Bathroom Heater

Easy to Install

It is only necessary to fit it into place and connect it to a number 14 wire line, single circuit. Fasten it with screws that come with the heater, and from then on, it is at your service whenever needed.

Type B—size over all: width 14⅛ in.; height 15 in.; depth 3½ in.; width between screw centers 12¾ in.; height between screw centers 13⅝ in.

Features

The *new* heating element is *exclusive* to the "Ideal," using only 990 watts; the "Ideal" construction proves an efficiency of outstanding merit in the electrical field.

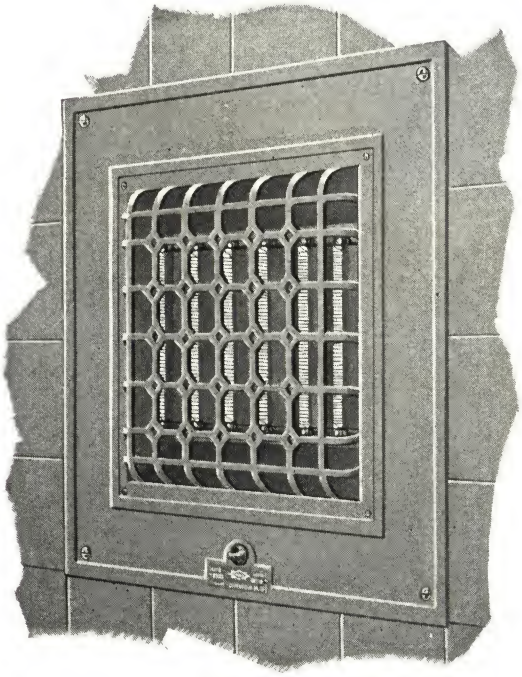
Six vertical elements, scientifically mounted, generate uniform heat flow, accentuated by a new type of reflector which *throws* the heat from 4 to 6 ft. into the room. This is made possible by ample air circulation between the heating elements and the reflector.

Finishes

The "Ideal" electric heater is regularly finished in white or ivory. It also can be finished to match as close as practical any color submitted; or in chrome nickel, bright polish or pewter finish.

Specification Suggestion

We recommend that the bathroom heater specification be placed through the tile contractor in order to assure correct matching of color.



Type A "Ideal" Heater

Tile Fronts for Type B

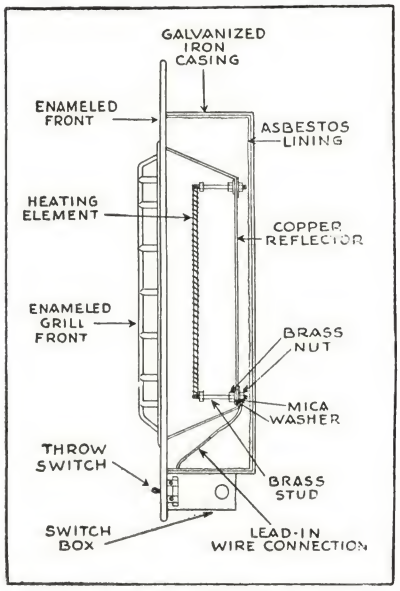
The "Ideal" electric heater can be furnished with tile fronts made by the following:

Architectural Tile Co., Keyport, N. J.
S. A. Weller Co., Zanesville, Ohio
A. E. Hull Pottery Co., Crooksville, Ohio
Flint Faience & Tile Co., Flint, Mich.

Type A Heater

For mother's or wife's dressing room; for an enclosed porch or for any other place where *safe, sure, dependable heat is desired,* this moderate priced heater will answer every need.

Size over all: width 17½ in.; height 16$\frac{11}{16}$ in.; width between screw centers 15½ in.; height between screw centers 14½ in. Will fit standard wall studding.



Details of the "Ideal" Heaters

ESTABLISHED 1827

WM. H. JACKSON COMPANY

Electric Fires and Electric Wall Heaters

FACTORIES AND FOUNDRIES
335 Carroll Street, BROOKLYN, N. Y.
Telephone—**CUmberland 6-4252**

NEW YORK Showroom,
2 West 47th Street—Telephone, BRyant 9-8430

CHICAGO Showroom,
318 No. Michigan Avenue—Telephone, Dearborn 8150

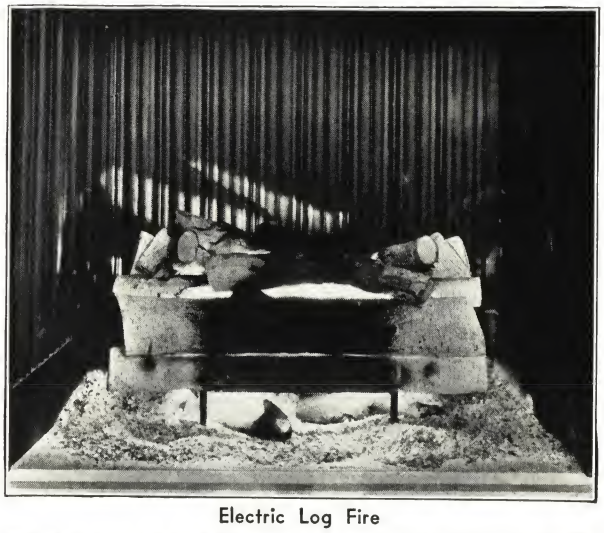
LOS ANGELES Showroom,
5514 Wilshire Boulevard—Telephone, Oregon 0302

Representatives in Most Large Cities—For List, See Our Page on Mantels

Electric Log Fires

Amazing realism is achieved in the WM. H. JACKSON COMPANY'S imitation birch and imitation oak Electric Log Fires in which each log is individually made by an exclusive process. These Log Fires cost practically nothing to operate, are scarcely distinguishable from real logs either when burning or when extinguished, and eliminate the labor and dirt connected with real fires. Made in sizes to suit all fireplaces. Can be used with any andirons. Furnished complete even to the ashes; ready to be connected to the nearest electric outlet. Approved by Underwriters' Laboratories, Inc. Installed in some of the country's finest homes, clubs and hotels.

Electric Coal Grate No. 209



Electric Log Fire

Electric Coal Grate No. 223

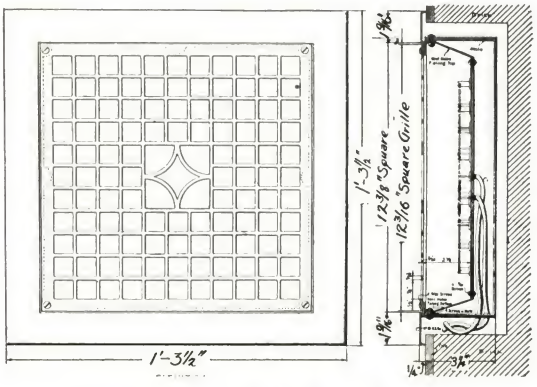
Electric Coal Grates

WM. H. JACKSON COMPANY also equips its many unique and beautiful period and modern grates with electric coal fires. Artfully contrived to simulate faithfully the flicker and glow of burning coal. Concealed heating elements provided when desired so that only the closest scrutiny will distinguish these fires from burning coal. Specified by leading architects for such jobs as new Waldorf Astoria Hotel, Savoy-Plaza Hotel and Sherry-Netherlands Hotel, New York, and in the finest homes throughout the country. Approved by Underwriters' Laboratories, Inc.

Electric Coal Grate No. 229

Electric Bathroom Heaters

WM. H. JACKSON COMPANY patented Electric Wall Heaters provide instant warmth and occupy no space in the room. Made with nickel or chromium plated grille front or with faience tile grille to match tile work. 1,000 or 2,000-watt capacity; 110 or 220 volts. Approved by Underwriters' Laboratories, Inc. Send for details.



Jackson Electric Bath Room Heaters

Other Products and Services

(See Manufacturers' Index for page numbers)

Mantels—Antique and modern—in marble, stone, wood and cretan stone.

Fine Tile Work—Swimming pools, bath rooms, terraces, loggias.

Fireplace Fixtures—Andirons, fire tools, screens, fenders, wood-holders, electric fires, iron plaques and linings, rolling fire screens.

Architectural Metal Work—Bronze and aluminum windows; ornamental bronze, aluminum and wrought iron; bronze tablets.

Garden Features—In marble and stone—Benches, urns, well heads, fountains, pergolas, sun dials, columns.

Art Objects—Lamps, book-ends, smoking stands, ash trays, coffee tables, mirrors.

F. W. SHEPLER STOVE CO.

"Heaters of Merit"

1308-1310 Sheffield Street, PITTSBURGH, PA.

"RADIA" ELECTRIC HEATERS

A Style and Size for Every Requirement

RADIA Electric HEATERS

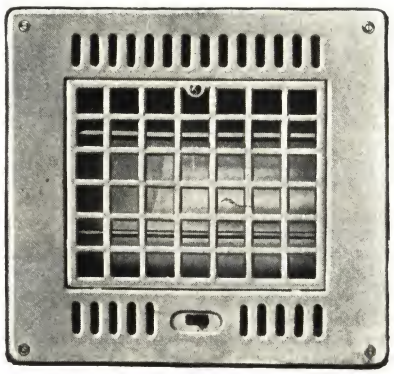
Radia Heaters are designed to provide instant, safe, clean, odorless heat in bathrooms, bedrooms, dressing rooms, nurseries, etc., by a combination of the most efficient principles of heating—convection and reflection. How these principles are utilized in Radia Heaters is clearly shown in the drawing below. The Globar elements are unaffected by water or moisture, guaranteed for a minimum of 1500 hours' service, and are as quickly and easily replaced as a cartridge-type fuse. In every detail of construction, Radia Heaters are designed for lasting service.

There is a style and size for every requirement. All models are finished in vitreous porcelain enamel in white, black and *six popular colors to meet current demands.* Write for color chart. Reflectors are chromium plated. Insert boxes are baked enamel. Prices range from $12.50 to $35.00.

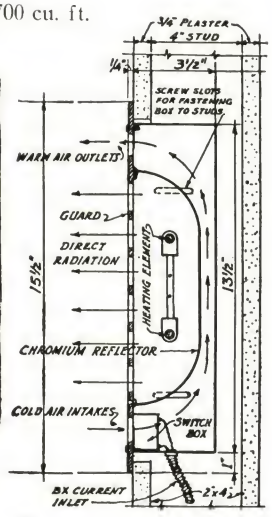
Radia Heaters are listed as standard by the Underwriters' Laboratories, Inc.

Capacities Recommended for Auxiliary Heating

660-watt heaters for rooms up to 400 cu. ft.
1000-watt heaters for rooms of 400 to 750 cu. ft.
1500-watt heaters for rooms of 750 to 1200 cu. ft.
1980-watt heaters for rooms up to 1700 cu. ft.



Wall Insert Type (Series 1000)
The heater that made the Radia reputation. Adapted to the finest bathrooms.
Wall opening, 13½x13½x3½ in.



The latter capacity is found only in our No. 1350 series, having the three-heat feature, which makes it practical for any size room. Turned on full, this heater will quickly bring a room to the desired temperature, which can then be maintained by turning the switch to a point requiring less current consumption.

A Few Prominent and Typical Installations of "Radia" Heaters

Co-Operative Apartment, 960 Fifth Avenue, New York, N. Y. —Warren & Wetmore, Rosario Candela, Associate Architects; Anthony Campagna, Builder—6 to 11 Radia Heaters in each suite.

S. S. "Pennsylvania," Panama Pacific Liner—world's largest electric-propelled vessel; Newport News Shipbuilding & Dry Dock Co., Builders—Over 300 Radia Heaters used in staterooms and bathrooms.

Ward Liners—"Morro Castle" and "Oriente"—also equipped with Radia Heaters.

Flatbush Centre Development, Brooklyn, N. Y. —Realty Associates, Inc., Builders—2700 residences with a Radia Heater in the bathroom of each.

Shaker Heights, Cleveland, Ohio — over 200 Radia Heaters used by Clarence Mack, Keyes & Treuhaft Co., Raymond D. Hummer, Nelson D. Cann and Walter Smith.

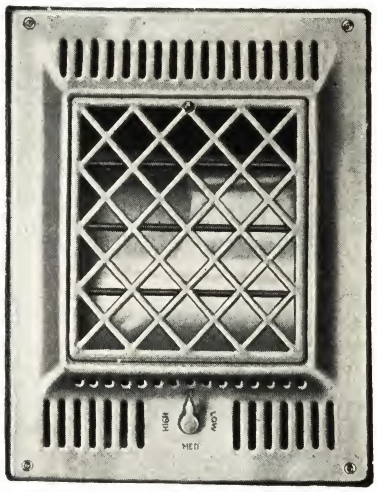
Left:

Details of Installation and Heating Principle

Insert box is fastened in wall by means of four screws that pass through slots in side and into studs.

Heater is secured to box by means of four screws that pass through corners of face plate and engage tapped holes in lugs of insert box.

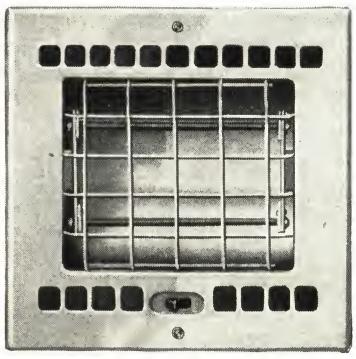
Conduit and electrical wires are brought in through bottom knockout. Switch has special terminal posts on back to which electrical wires are attached



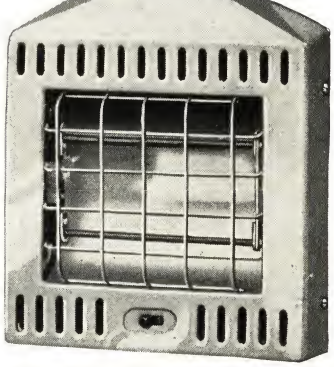
Wall Insert Type (Series 1350)
3-Heat
Low 660-watts; Medium 1320-watts; High 1980-watts
A beautiful heater. Current consumption can be regulated to produce practically any desired temperature

"RADIA" ELECTRIC HEATERS

Cat. No.	Watts	Volts, a.c. or d.c.	Wall opening, in. Wdth. Hgt. Dpth.	Face plate, in. Height	Face plate, in. Width	Price White	Price Color
Series 1000 (Wall Insert Type)							
660	660	110	13½x13½x3½	15½	16¼	$17.50	$20.00
1000	1000	110	13½x13½x3½	15½	16¼	21.00	23.50
1020	1000	220	13½x13½x3½	15½	16¼	21.00	23.50
1500	1500	110	13½x13½x3½	15½	16¼	23.00	25.50
1520	1500	220	13½x13½x3½	15½	16¼	23.00	25.50
Series 1350 (Wall Insert Type)							
1350	1980	110	13½x19 x3½	21	15¼	35.00	39.00
1350	1980	220	13½x19 x3½	21	15¼	35.00	39.00
Series 1110 (Wall Insert Type)							
1110	660	110	11½x11½x2½	13½	13½	12.50	14.00
1112	660	220	11½x11½x2½	13½	13½	15.00	16.50
1120	1000	110	11½x11½x2½	13½	13½	15.00	16.50
1122	1000	220	11½x11½x2½	13½	13½	15.00	16.50
Portable Wall Type (for Surface Mounting)							
			Hgt., in.	Wdth., in.	Dpth., in.		
1210	660	110	14	13	3	17.50	19.50
1212	660	220	14	13	3	20.00	22.00
1220	1000	110	14	13	3	20.00	22.00
1222	1000	220	14	13	3	20.00	22.00



Wall Insert Type (Series 1100)
Compact size. Supplies demand for low priced electric heaters for use in competitive developments, and where wall space is limited.
Wall opening required, 11½x11½x2½ in.



Portable Wall Type (Series 1200)
For Surface Mounting
Ideal for use in the marine field, elevators, offices, homes, etc., where it is not practical or desirable to use the wall insert type. Attaches permanently to wall or suspends on hook

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue
For References to Other Products, see Index to Manufacturers

WESTINGHOUSE ELECTRIC SOLAR GLOW HEATERS

With the increasing demand of prospective builders for the latest refinements and conveniences in their homes, it devolves upon the architect to advise his clients on the installation of electrical devices.

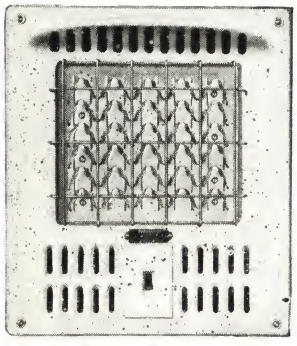
The cleanliness, safety and efficiency of electric heat particularly adapt it to the modern home as is evidenced by the number of electric room heaters now in use and giving satisfactory service. Electric heat is absolutely clean and safe; it heats without producing soot, fumes or gases and does not take any oxygen from the air. The air it heats is simply changed from cold air to warm air without any change in its chemical state. The construction of electric heaters makes them easily adapted for installation in any room or any type of building.

Solar Glow—Bathroom Type

The most ideal application of electric air heating is in the bathroom, where an auxiliary heater is desired that will combine the characteristics of both the radiant type and the convection type, throwing a beam of heat out from the element as soon as it is turned on and at the same time starting convection currents that gradually bring the whole room to a comfortable temperature. Westinghouse Solar Glow does this.

The Solar Glow is designed not to subject parts in contact with wood, plaster or studding to more than 194° F., which is 400° below the point where ignition is possible. A vent forces the hot air away from the wall, preventing damage to tile or plaster.

When home builders desire a heater done in color to match a colored tile in bathroom, Westinghouse makes arrangements to have the Solar Glow supplied with a tiled front to match any tiling.

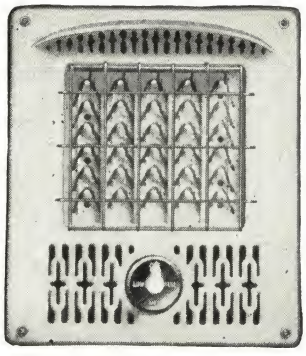


Single White Enamel, 1-Heat

Total Maximum Input: 1200 watts.
Heat Control: Single heat.
Over-all Dimensions: 15 in. wide, 17½ in. high, 4⅛ in. deep

COMPLETE HEATERS
(Style Numbers)

395759	110 volts
395760	220 volts



Single White Enamel, 3-Heat

Total Maximum Input: 1500 or 1750 watts.
Over-all Dimensions: 15 in. wide, 17½ in. high, 4⅛ in. deep.

HEATER UNIT WITH SWITCH
(Style Numbers)

Wattage	110 volt	220 volt
1500	470820	470821
1750	470822	470823

Sheet metal wall box.....497480
Frame complete.....497483

Detachable Solar Glow

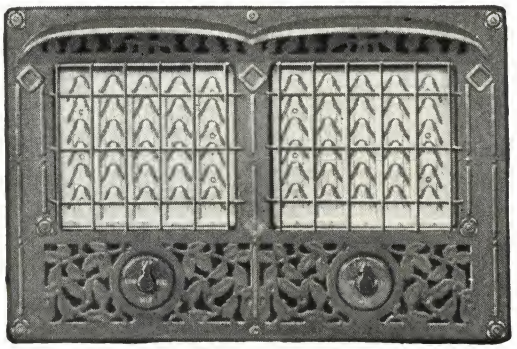
A new type of Solar Glow, designed principally for homes which are being modernized. Can be easily and quickly attached without an adaptor or without making an opening in the wall.

Over-all Dimensions: Cat. No. WN-24, 17 in. high; 10⅛ in. deep; 110 volts. Total maximum input, 1250 watts.

Cat. No. WN-28, 220 volts, 1250 watts, same size as above.

Solar Glow—Other Types

The Westinghouse Solar Glow line includes, in addition to the bathroom and floor types, styles designed for the bed and living rooms, finished in antique bronze and carrying a decorative leaf design. The construction, except the front casting, is the same as the bathroom types; the box and heating unit can be used interchangeably with either type of heater. The hot air currents set up by the passage of air through the grates and over the back of the heating unit carry the heat to all parts of the room and thus raise the average temperature. In addition, radiant heat is thrown directly to the front from the porcelain brick.



Double Bronze, 3-Heat

Total Maximum Input: 3000 or 3500 watts.
Heat Control: 3-heat switch on each unit.
Over-all Dimensions: 26¼ in. wide, 17½ in. high, 4⅛ in. deep.

	Number req.	Wattage	Style Nos. 110 volt	Style Nos. 220 volt
Heater unit complete.....	2	1500	470820	470821
Heater unit complete.....	2	1750	470822	470823
Sheet metal wall box.....	.....	.....	.....	497481
Frame	.....	.....	.....	497486

The Solar Glow can be controlled from a switch any distance from the heater.

Westinghouse also makes a floor type Solar Glow for fireplaces or for use where the installation of wall type is not desired.

Installation

For the convenience of contractors, Solar Glows are made in three units: sheet metal box; porcelain brick, element and switch; and front frame casting. Each unit is packed in a separate box so that it can be handled individually as it is needed.

Similarly, the method of installing the Solar Glow eliminates the danger of injuring or damaging the porcelain brick and heating element, and keeps the front frame from being defaced in the course of building construction. At the time the rough work is being done, the sheet-metal box is inserted in an opening in the wall, this opening being regulated by the dimensions of the heater. At this time, the wiring is pulled into the box. Then, when fixtures and other electrical equipment are being installed, the heater unit can be slipped into place, the connections made, and the frame screwed to the wall box. Complete instructions for installing are provided with each heater.

CALCULATING HEATER CAPACITIES FOR BATHROOMS

In estimating heater capacity from table below a comfortable inside temperature is usually about 75° F.

Size of bathroom, cu. ft.	Location of bathroom	Watts req. at difference in deg. F. between inside and outside temperature when other heating system is going on cold winter days: 10° F.	35° F.	60° F.	90° F.
400	Protected	1200	1200	1200	1200
	Not protected	1200	1200	1200	1500
700	Protected	1200	1200	1200	1500
	Not protected	1200	1200	1200	1750
1000	Protected	1200	1200	1500	3000
	Not protected	1200	1200	1750	3500

If a bathroom has more than one side exposed to outside temperature it is considered as being "not protected."

Example:

Size of bathroom	700 cu. ft.
Location of bathroom	Not protected
Temperature desired in bathroom	75° F.
Average low outside temperature	15° F.
Difference in degrees	60° F.
Capacity of heater required	1200 watts

GRAYBAR ELECTRIC COMPANY

INCORPORATED

Electrical Equipment for Home, Office and Industry

Graybar Building, Lexington Avenue and 43rd Street
NEW YORK, N. Y.

DISTRIBUTING HOUSES

AKRON	CINCINNATI	GRAND RAPIDS	MILWAUKEE	PHILADELPHIA	SAVANNAH
ALBANY	CLEVELAND	HAMMOND	MINNEAPOLIS	PITTSBURGH	SEATTLE
ASHEVILLE	COLUMBUS	HARRISBURG	MT. VERNON	PORTLAND	SPOKANE
ATLANTA	DALLAS	HARTFORD	NASHVILLE	PROVIDENCE	SYRACUSE
BALTIMORE	DAVENPORT	HOUSTON	NEW HAVEN	READING	TACOMA
BEAUMONT	DAYTON	INDIANAPOLIS	NEW ORLEANS	RICHMOND	TAMPA
BIRMINGHAM	DENVER	JACKSONVILLE	NEW YORK	ROANOKE	TOLEDO
BOSTON	DETROIT	KANSAS CITY	NEWARK	ROCHESTER	TRENTON
BROOKLYN	DULUTH	KNOXVILLE	NORFOLK	ST. LOUIS	WASHINGTON
BUFFALO	DURHAM	LOS ANGELES	OAKLAND	ST. PAUL	WICHITA
CHARLOTTE	FLINT	LOUISVILLE	OKLAHOMA CITY	SALT LAKE CITY	WORCESTER
CHICAGO	FORT WAYNE	MEMPHIS	OMAHA	SAN ANTONIO	YOUNGSTOWN
	FORT WORTH	MIAMI	PEORIA	SAN FRANCISCO	

Products

ELECTRICAL HOUSEKEEPING APPLIANCES; SUNBEAM MAZDA LAMPS; SOUND REPRODUCER SYSTEMS; PUBLIC ADDRESS and MUSIC REPRODUCER SYSTEMS.

Also Fans; Motors, Generators; Wiring Materials; Wire; Cable; Safety Switches; Signal Call Systems.

Through 76 distributing points listed above, this company makes available everything electrical—everything to transmit, control and apply electricity in factories, hotels, apartments, stores, theaters, offices and homes.

Among those appliances particularly adapted to "The Home Electrical" are the Graybar Electric Stimulator, Health Lamp, Radio Sets, Clothes Washer, Vacuum Cleaner, Portable Sewing Machine, Electric Range, and the New Ironer.

For Graybar Intercommunicating Telephone Systems; also Graybar Commercial, Industrial and Floodlighting Equipment, see Manufacturers' Index.

Provision for Housekeeping Appliances

In homes, the popular demand for electrical housekeeping appliances suggests ample provision for installation space and convenience outlets.

The Graybar Electric clothes washer is 26 ins. wide and 26 ins. long. Ironer is 18 ins. wide and 36 ins. long. Alternating or direct-current motors are supplied according to local conditions.

The Graybar Electric sewing machines and vacuum cleaners, being portable, need be considered only when locating the convenience outlets. They are equipped with universal motors operating on either direct or alternating current.

Sunbeam Mazda Lamps

These famous lamps are standard for practically every use in home and industry, all over the country. They are available in all sizes and types wherever Graybar Electric supplies are sold.

Public Address and Music Reproduction System

Graybar offers the famous Western Electric system for electrically amplifying voice or music and "piping" through a wiring system to any designated part or parts of a building or group of buildings.

The source of the sound may be a standard phonograph record, an actual human voice, orchestra, etc., on the premises, or a "picked-up" radio program. Apparatus includes amplifying and distributing panels, making possible the proper amplification and the distribution of sound to one or as many outlets as desired.

A wide variety of applications have been found for the Public Address and Music Reproducing Systems. They have proved particularly useful in hotels, schools, hospitals, convention halls, newspaper offices, amusement parks, restaurants, airports, railroad stations, public buildings and auditoriums.

All of the apparatus is of the highest quality—the same high quality usually associated with the Western Electric name. Graybar is prepared to offer experienced advice and information to those interested in the installation of Public Address and Music Reproducing Systems. The services of Graybar experts are readily available upon request.

For more detailed description of the apparatus, see pages of the Western Electric Company in this issue.

Quality Supplies

"*Electrical supplies from Graybar*" is assurance of quality products, intelligent service and fair price.

The name Graybar Electric is a guarantee of quality covering the great variety of electrical supplies for building requirements. Everything for wiring installations, from wire and conduit to switch and fixture, may be had at any one of Graybar's 76 distributing houses.

Graybar has supplied all or part of the electrical equipment for many important buildings in every part of the nation. Among these buildings are included office buildings, schools, hospitals, apartments, buildings, industrial plants, auditoriums and convention halls, theatres and churches.

Graybar's reputation for quality materials goes back 62 years, to the very beginnings of the electrical industry in America. A national system of distribution makes Graybar Electric supplies obtainable everywhere.

A Few of the 60,000 Items Listed in the Graybar Electric Year Book

The above products cover only a very small portion of the 60,000 supplies mentioned in the Graybar Electric Catalogue 100, a book of 1012 pages, which has proven its value to engineers and architects.

Write for your copy, mentioning SWEET'S ARCHITECTURAL CATALOGUES, to our nearest office.

D 5307

REFRIGERATION

BABCOCK-DAVIS CORPORATION

Mortuary Slides, Special Blanket Warmers, Bed Pan Racks, Sanitary Legs and Cabinets

474 Dorchester Avenue, BOSTON, MASS.

For Flag Poles, see Manufacturers' Index

BABCOCK-DAVIS SELF-SUPPORTING FULL LENGTH MORTUARY SLIDES

Patent Applied For

Mortuary racks and trays shown here and manufactured by us were carefully designed for rigidity, ease of operation and accessibility. They are self-supporting and insulation is not damaged in erection.

Heavy ball bearings are placed in every moving part so that the racks will move with the least possible effort.

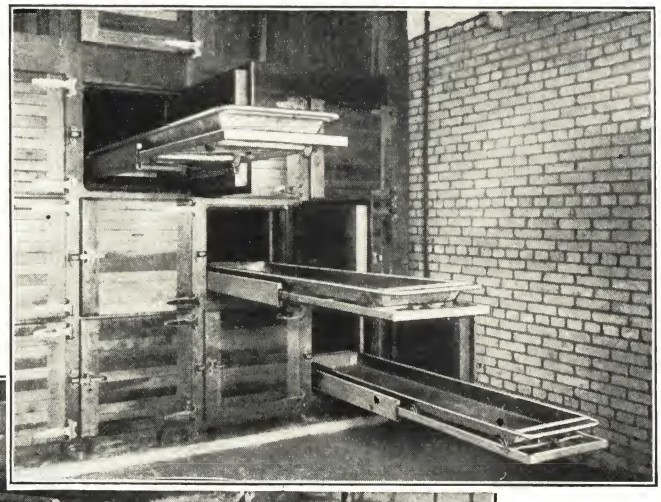
With our equipment, when it is desired to view the cadaver, the easy moving ball bearing carriage is drawn out with tray on it fully supported its entire length. The tray remains in a horizontal position and is not released unless it is desired to remove it.

Trays cannot be pulled off the carriage accidentally. They are arranged so that at no time is it possible for fluids or acids to flow towards the head; thus eliminating head rests. The entire rack is hot galvanized, double dipped.

All ball bearings are enclosed so that moisture or dampness cannot reach them.

The trays are manufactured in one piece and can be used for a stretcher; also they can be put on the carriage either way.

If you have any special problems, our engineers would be glad to confer with you.



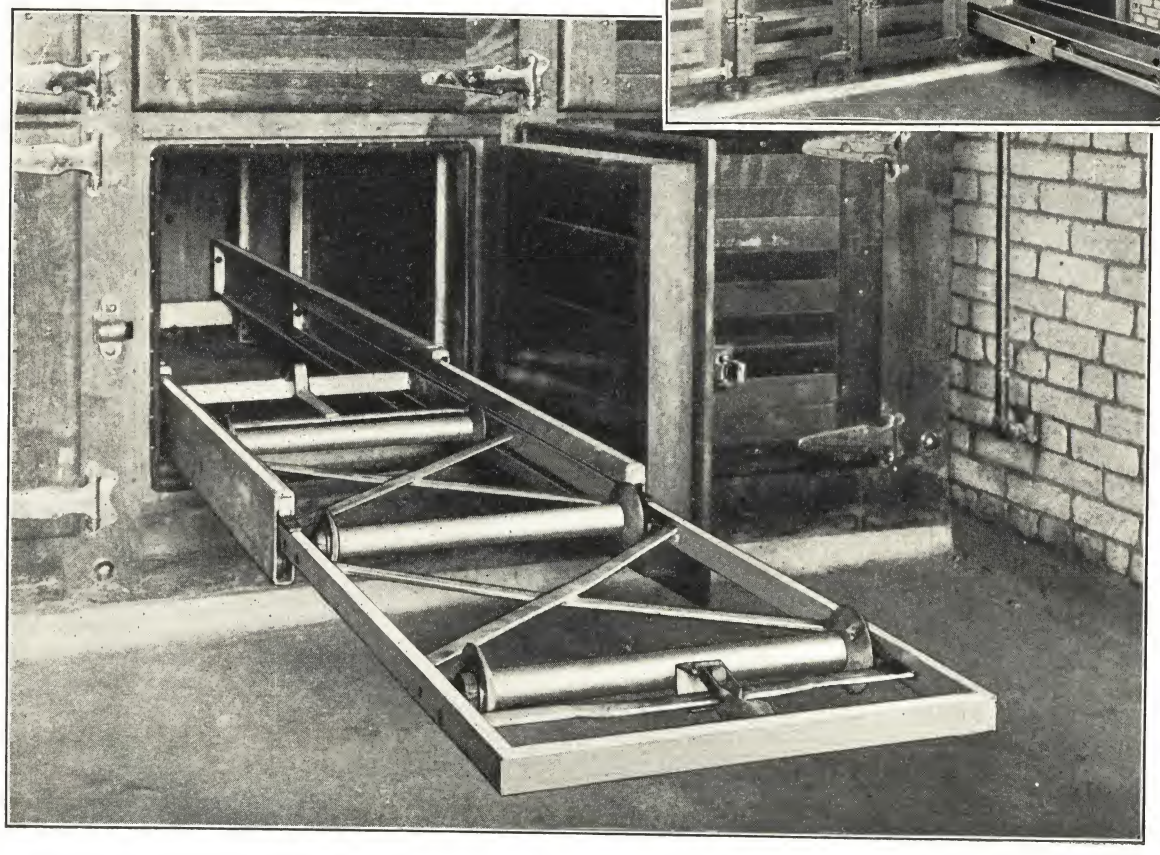
Right:

Part of Battery of 15 Mortuary Racks

Showing trays extended in various positions at Admission Building, Sanatorium Division, Mattapan, Mass., Boston City Hospital. Tray supported full length

Below:

Tray Removed to Show Sturdy Construction of Tray Support and Guides



Specification

Each opening shall be equipped with a removable mortuary tray telescoping track and rigidly braced tray carriage as manufactured by BABCOCK-DAVIS CORPORATION, 474 Dorchester Avenue, Boston, Mass.

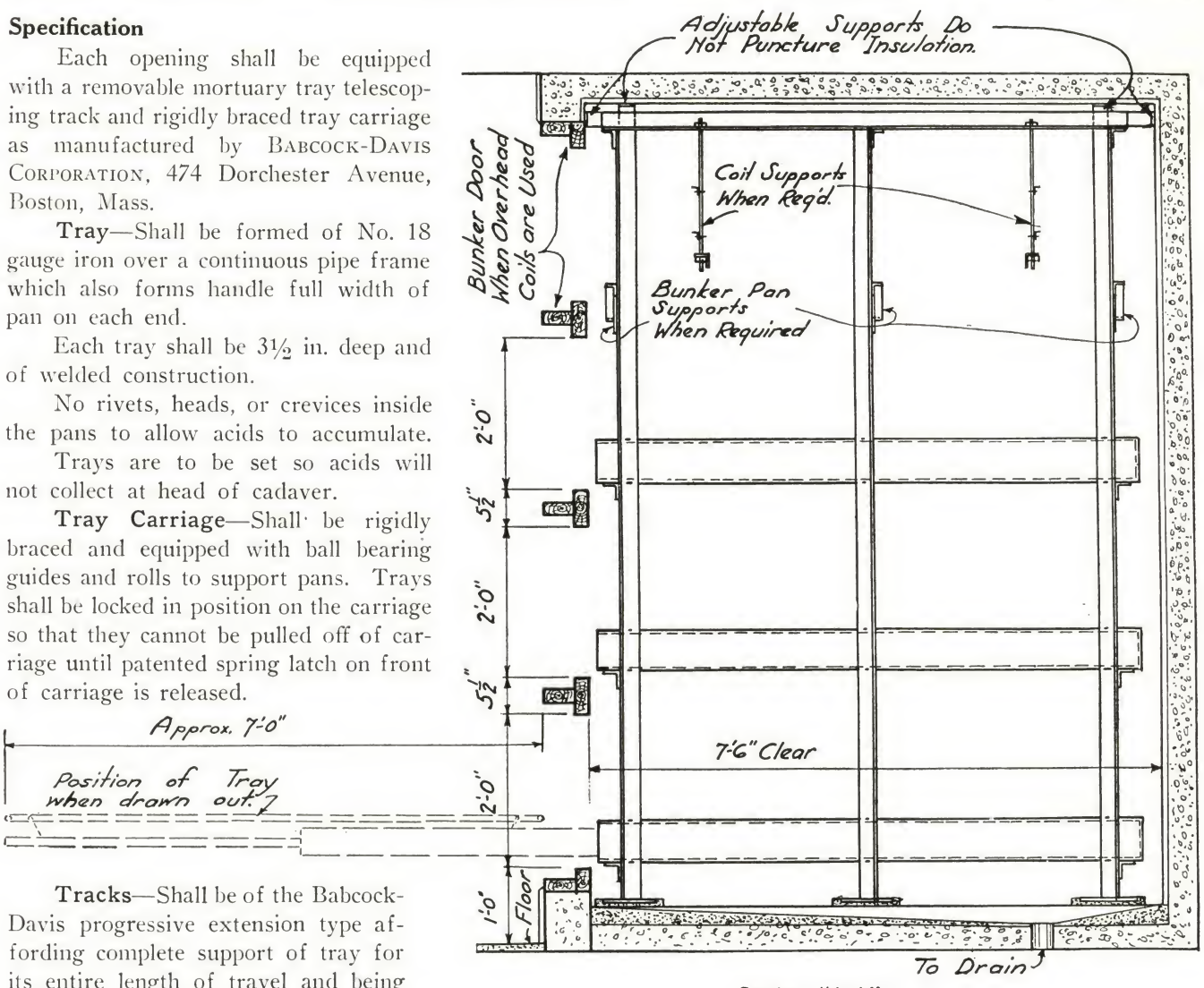
Tray—Shall be formed of No. 18 gauge iron over a continuous pipe frame which also forms handle full width of pan on each end.

Each tray shall be 3½ in. deep and of welded construction.

No rivets, heads, or crevices inside the pans to allow acids to accumulate.

Trays are to be set so acids will not collect at head of cadaver.

Tray Carriage—Shall be rigidly braced and equipped with ball bearing guides and rolls to support pans. Trays shall be locked in position on the carriage so that they cannot be pulled off of carriage until patented spring latch on front of carriage is released.



Section "A-A"

Tracks—Shall be of the Babcock-Davis progressive extension type affording complete support of tray for its entire length of travel and being equipped with specially designed ball bearings in bronze rollers. And be practically frictionless in their operation.

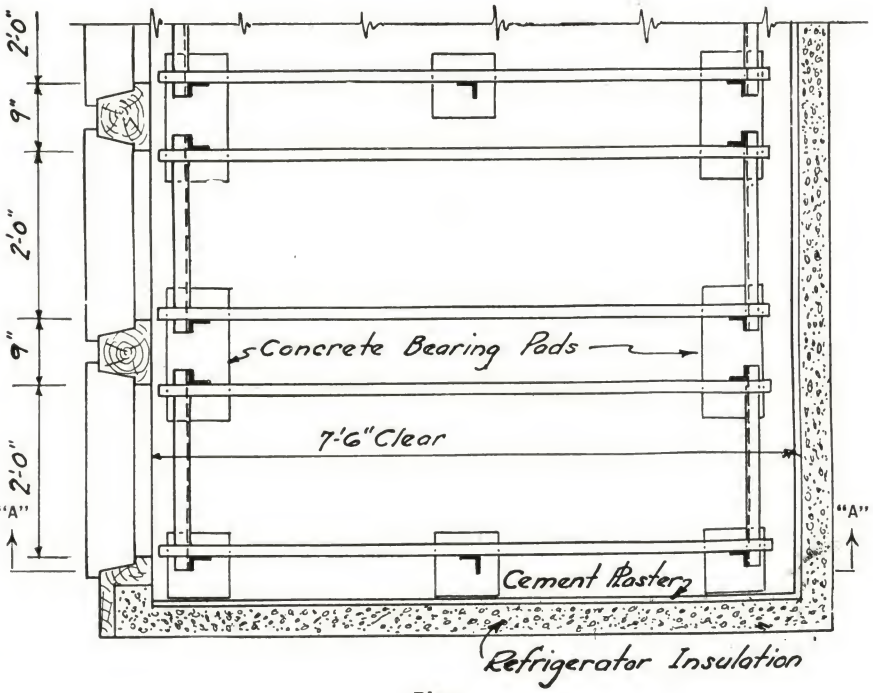
The tracks shall be equipped with rubber stops to insure quiet operation.

Supports—Shall be of angle iron construction held in position without puncturing the insulation in any way.

Note: Should the refrigerating system require overhead coils, track supports which can be extended to support the coils and bunker pans may be specified.

All parts shall be heavily hot galvanized to prevent corrosion and special composition bronze shall be used on rolling parts to insure the longevity of the mechanism.

The refrigerator front, insulation, equipment, construction of the coils and chest, are not in this contract.



Plan

ESTABLISHED 1897

MARKET FORGE COMPANY

EVERETT, MASS.

AGENCIES

ATLANTA, GA., Robert McKnight Pardee Co., 509 Walton Building
BALTIMORE, MD., Edward J. Seager, 909 Baltimore Life Building
BUFFALO, N. Y., Howard T. Cary, 293 Voorhees Avenue
CHICAGO, ILL., F. A. Boettcher, 500 Diversey Parkway
CINCINNATI, OHIO, Wm. P. Ridgway, 901 Gerke Building
CLEVELAND, OHIO, Carl Sprigade, 924 Keith Building
DETROIT, MICH., H. W. Reindel, Marquette Building
HOUSTON, TEX., C. M. Grundstein, Box 1686
KANSAS CITY, MO., J. F. Carter, 1718 Wabash Avenue
NEW YORK, N. Y., L. W. Tracy, 152 West 42nd Street
PHILADELPHIA, PA., E. F. Johnson, 1700 Walnut Street
PITTSBURGH, PA., Harry H. Frank, 207 Fulton Building
ST. LOUIS, MO., Herbert Golterman, 717 Louderman Building
ST. PAUL, MINN., R. E. Stanton Co., 2694 University Avenue
ENGLAND, York Shipley Ltd., North Circular Road, LONDON N. W. 2

SPECIALISTS IN SANITARY SPACE SAVING INTERIOR EQUIPMENT FOR ALL TYPES OF REFRIGERATION STORAGE AND GENERAL STORAGE

Refrigeration Storage Equipment

The MARKET FORGE COMPANY was founded in 1897 and has since that time gradually and carefully developed its original line of refrigerator shelving to include the most complete, thoroughly satisfactory and practical designs to meet the needs of any and all types of refrigeration storage requirements.

Walk-in shelving; reach-in shelving; hook rails; cork insulated baffles; combined bunker equipment and coil supports; insulated and plain front drawers of all types, for all purposes; cheese drums; oyster and pastry pans; complete garde manger equipment. Drip pans and coil supports, fur storage racks and trucks, mortuary racks and trucks, rug storage racks.

The general and widespread acceptance of this equipment has led the MARKET FORGE COMPANY to develop equally desirable products for general storage requirements.

There is now a standard type "Maforco" storage equipment to serve every conceivable storage requirement.

General Storage Equipment

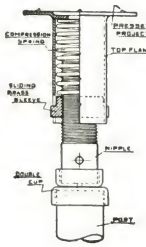
Trunk storage racks; picture storage racks; tapestry racks; silver storage racks; florist fixtures; department store shipping room racks and trucks; hotel and hospital storeroom shelving; expanded metal and wire mesh partitions; linen room shelving and counters; and coffin storage racks.

Metal tables, trucks and skids for handling all material.

THE NEW IMPROVED TYPE "MAFORCO" SELF-EXPANSION FITTING

The new Type 28 "Maforco" Self-expansion Fitting presents one of the greatest improvements ever made in refrigerator equipment construction. Its design obviates the possibility of damage to the interior finish of the refrigerator which is resultant from the application of too much pressure. It eliminates the necessity of adjustment to make posts rigid, due to contraction from reduced temperatures. It adjusts itself to lengthened posts due to increased temperatures.

Old style type expansion fittings made it necessary for periodical adjustment due to changes in temperatures and the resultant changes in the lengths of the posts. It meant not only extreme care in original installation, but it meant the subsequent requirement of the labor of adjustment to take care of the first contraction.



The new type "Maforco" Self-expansion Fitting eliminates all of these difficulties. The compression spring removes entirely the necessity of any adjustment either way. This expansion fitting is made only by the MARKET FORGE COMPANY. Be sure to specify and use equipment which gives you the benefit of these many desirable features.

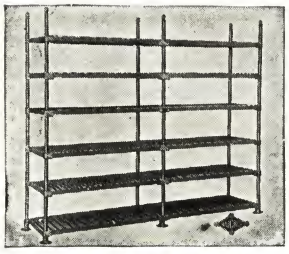
"MAFORCO" WALK-IN REFRIGERATOR EQUIPMENT

All Supports and Fittings Designed to Eliminate Puncturing of Insulation

Rigid and self-supporting, eliminating anchorage to refrigeration construction. This avoids puncturing of insulation and resulting disintegration. Racks assembled without bolts.

Vertical adjustment of post brackets to meet any need.

Shelves are continuous angle-bound units of strong construction. Straps are 1 in. wide, 1 in. apart, flush riveted to frame with edges well rounded and chamfered. It is vitally important that you insist upon riveted shelves. This construction leaves the slats permanently in place and should one come off, it can easily be repaired. Spot-welding is not satisfactory for the slats come off easily, particularly after the action of hot galvanizing, and are difficult to repair in the field. Slatted construction permits a free circulation of air. Shelves are also furnished perforated or solid as desired. Standard finish, hot galvanized; also furnished in monel or Allegheny metal.



Typical Shelf Rack

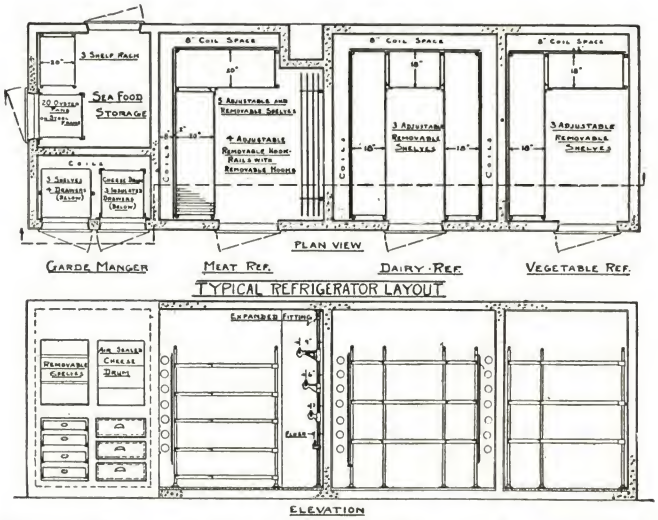
Typical Installation

Posts are round, set on liberal diameter floor flanges and neatly finished with acorns.

Shimming under posts is avoided by vertical adjustment of brackets to meet slope of floor.

Valuable refrigeration space is conserved because the equipment fits snugly into all corners and every inch of space is available.

Rail rack uprights are expanded between floor and ceiling.



Typical Plan and Elevation of Refrigerator Layout Where Wall Coils Are Used

Indestructible rail brackets of stamped steel are vertically adjustable, also removable without disturbing uprights. Hooks are removable or rigid, as desired.

Where wall coils occur, "Maforco" cork insulated galvanized steel baffle boards supported by shelf posts are recommended.

These shields assist circulation of cold air—making the refrigerator more efficient, protecting products from the coil frosting and at the same time providing a stop at the rear of the rack.

"Maforco" equipment is all heavily hot galvanized after assembly, except meat hooks, which are tinned.

Note: See our last page for wall coil supports.

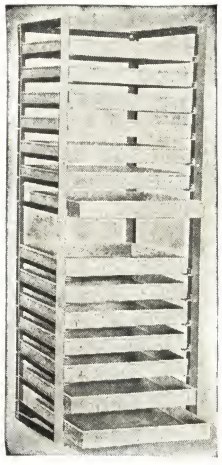
"MAFORCO" REACH-IN REFRIGERATOR EQUIPMENT

Drawers operate upon ball bearing extension supports and may be withdrawn their full length outside the front of refrigerator and yet remain in a horizontal position. Galvanized ball bearing steel wheels turning on bronze axles are attached to the sides of each drawer. Wheels ride in hot galvanized telescoping channel construction rigidly attached to hot galvanized substantial angle frame. Insulated front drawers are provided with 2-in. cork insulation sealed in sheet metal. All drawers constructed of galvanized sheet iron or monel metal soldered watertight.

Insulated Front Drawer Cabinet Type 113

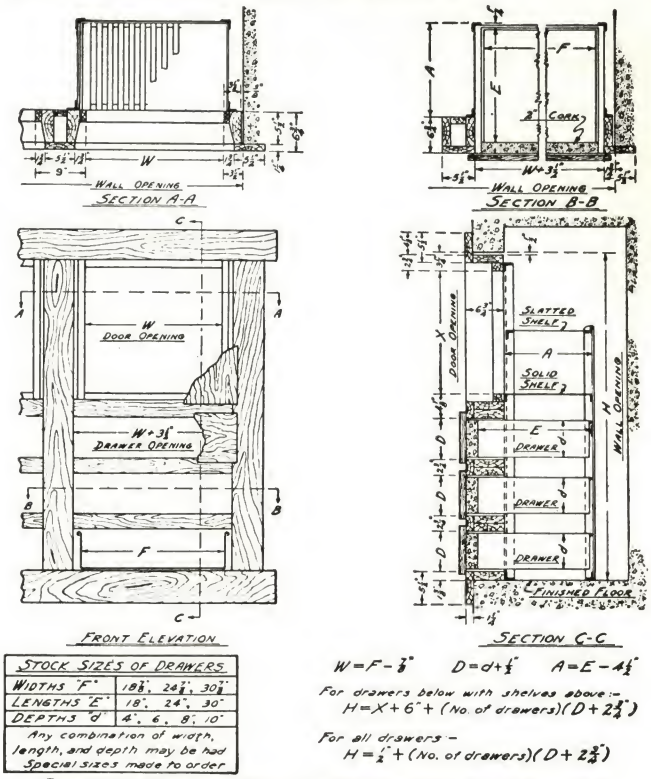
Drawers are furnished with perforations in the sides—also perforated false bottoms if desired. Front has overlapping galvanized steel plate for attaching wood facia and gasket. (Wood facia and gaskets not included by MARKET FORGE COMPANY.)

Where shelves are furnished over drawers, they are of "Maforco" standard slatted construction with no side angles and have front angles turned down to provide a stop, and back angles turned up to permit free sliding of shelves on angle bearers. This also prevents stored stuffs falling in back of refrigerator. The shelf separating drawers and slatted shelves is of solid sheet metal to avoid any dripping into drawers below.



Oyster or Pastry Pan Cabinet No. 109

Oyster or pastry pans are made of galvanized sheet steel or monel metal with double bent top edge soldered watertight if required. Pastry pans regularly furnished 7 to a half door, oyster pans, 10 to a half door. "Maforco" galvanized angle framework construction is applicable where all shelves, drawers, pans or any combinations are required. Framework is self-supporting but is provided with holes in front angles so that it may be fastened to inside face of door frame to insure rigidity.



STOCK SIZES OF DRAWERS	
WIDTHS "F"	18⅜", 24⅜", 30⅜"
LENGTHS "E"	18", 24", 30"
DEPTHS "d"	4", 6", 8", 10"
Any combination of width, length, and depth may be had Special sizes made to order	

$W = F - \frac{3}{8}"$ $D = d + \frac{1}{2}"$ $A = E - 4\frac{1}{2}"$

For drawers below with shelves above:—
$H = X + 6" + (\text{No. of drawers})(D + 2\frac{3}{4}")$

For all drawers —
$H = \frac{1}{2}" + (\text{No. of drawers})(D + 2\frac{3}{4}")$

Standard Construction of Refrigerator Fronts to Fit Standard "Maforco" Cabinets

Fits stock cold storage door sizes

Unless otherwise specified, "Maforco" equipment is furnished hot-galvanized. As an alternate we use and advocate monel metal or Allegheny metal.

The importance of proper handling and storage of food can not be overemphasized; "Maforco" equipment in every detail lends itself to all requirements.

Specify—"Maforco" Refrigerator Equipment as made by the MARKET FORGE COMPANY, Everett, Mass.

"MAFORCO" VERMIN-PROOF SHELVING AND SUPPORTS FOR FINEST INSTALLATIONS

Originally designed for those who seek the finest type of shelving made, its many desirable features have led to a generally popular demand for its use in better grade projects.

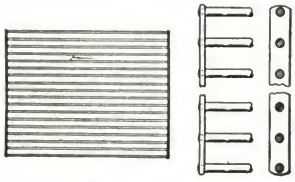
Made of polished monel metal in gauges proportioned to size of shelves. All edges doubled and soldered at all joints. Brackets of stamped monel metal vertically adjustable on posts.

Generally used for reach-in shelving. The same design has been and is readily adaptable for those who require a superior class of equipment for walk-in refrigerators.

Supported on monel metal tubular posts expanded between floor and ceiling. All fittings and brackets of polished monel metal.

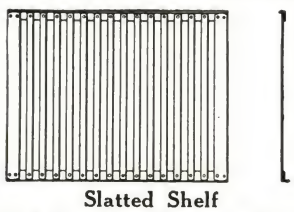
Other types of rust-resisting metal may be adapted to this construction. In this respect the industrial shapes and sizes available of material to be used should be borne in mind.

IMPROVED TYPES OF "MAFORCO" STANDARD REACH-IN SHELVING



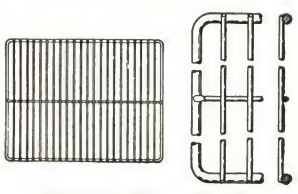
Aluminum Rod Shelf

Desirable construction for hospital work. Furnished with ¼-in. or ⅜-in. rods 1⅛ in. on centers machine riveted to flat stock aluminum end bars. Exceptionally strong and light



Slatted Shelf

Slats 1 in. wide, 1 in. apart. Front angle has flange down to act as stop, back angle has flange up to permit free sliding on angle bearers, also to prevent stored stuffs dropping in back of refrigerator



Welded Wire Shelf

Made with wire electrically welded 1 in. on centers to frame. Finish hot-galvanized or tinned. Especially desirable where monel metal is required. Its strength and light weight make for utmost economy.

"MAFORCO" IMPROVED DESIGN BUNKER EQUIPMENT

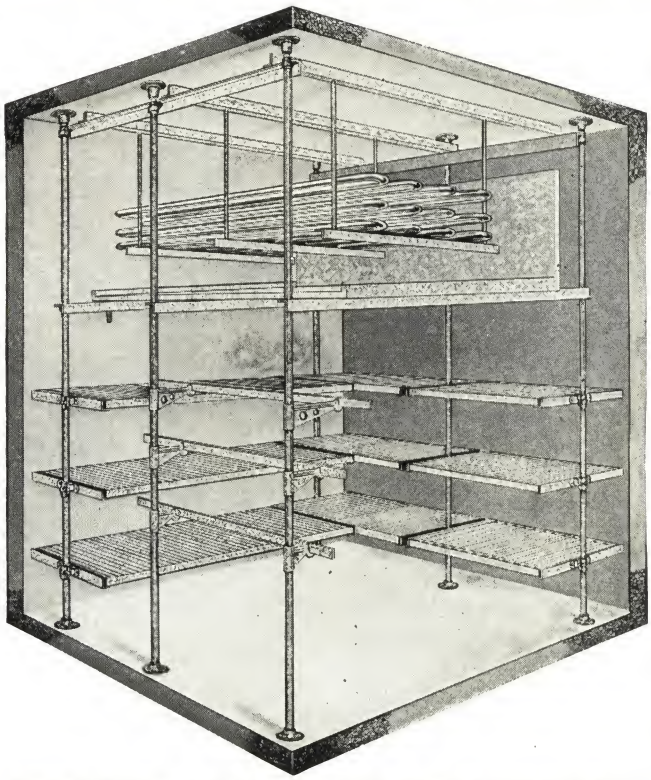
Affords Longer Life at Less Cost and Eliminates Puncturing of Insulation

All equipment is adjustable and removable—a very valuable feature allowing ready access to refrigerating equipment repairing service. Expensive built-in work is entirely avoided and the use of hot-galvanized material throughout insures long life at the lowest cost consistent with sensible economy.

Uprights are of 1¼-in. iron pipe size rigidly expanded between floor and ceiling. Uprights along sidewalls spaced approximately 4 ft. on centers.

Longitudinal angles "A" supported by angle bearing brackets carry heavy cross angles "B" through which are bolted hangers for lower angles "C" on which refrigerating equipment is supported. Threads on trapeze rods allow for liberal vertical adjustment.

Bunker pan is furnished as shown in section. Construction eliminates any possible sag between supporting angles. Bunker pans and baffles are carried on angles "D" resting on vertically adjustable angle bearing brackets.



Typical Bunker Pan Complete with Baffle Board and Coil Supports for a Single Cycle Box

same type of construction is readily applicable to rooms requiring double cycle construction.

For reach-in boxes the same construction may be used. Also the same uprights may be used to carry "Maforco" shelving, thereby effecting a considerable saving.

Likewise same uprights used for supporting the bunker pan construction in walk-in boxes are also used to support rail racks and shelving where specified.

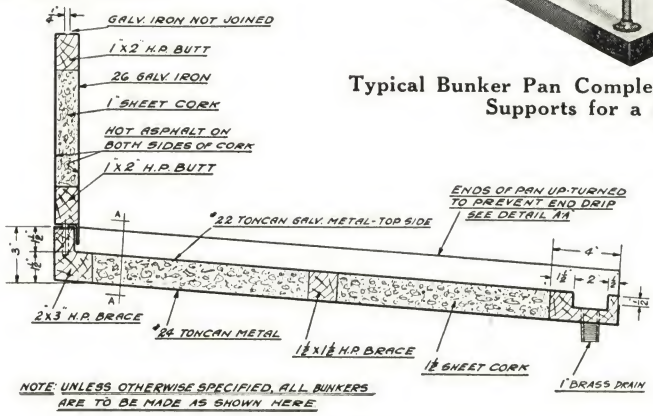
In addition to economy and satisfactory design, your attention is further directed to the very fine appearance of a box equipped completely with "Maforco" all-steel hot-galvanized bunker pan construction and shelving.

Where available ceiling height permits it, always use overhead location of refrigerating equipment.

This assists circulation and good circulation is one of the vital requisites of proper refrigeration.

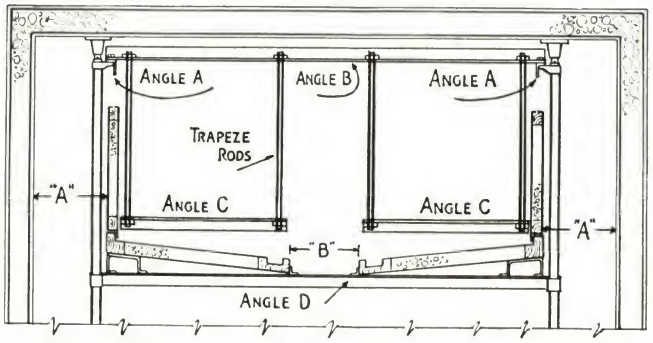
For the finest installations specify monel metal lined and covered "Maforco" bunker equipment.

We suggest you specify "Maforco" bunker pan baffle board and coil support equipment as made by the MARKET FORGE COMPANY, Everett, Mass., wherever overhead coils are possible.



STANDARD CONSTRUCTION "MAFORCO" BUNKER PAN & BAFFLE FOR SINGLE OR DOUBLE CYCLE CIRCULATION
PAT. APPLIED FOR

Section Through Bunker Pan and Baffle



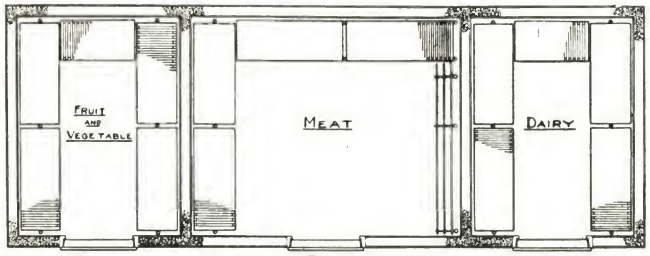
Section Through Double Bunker Pan Baffle and Racks

"A"—1 in. per foot of refrigerator width
"B"—1½ in. per foot of refrigerator width

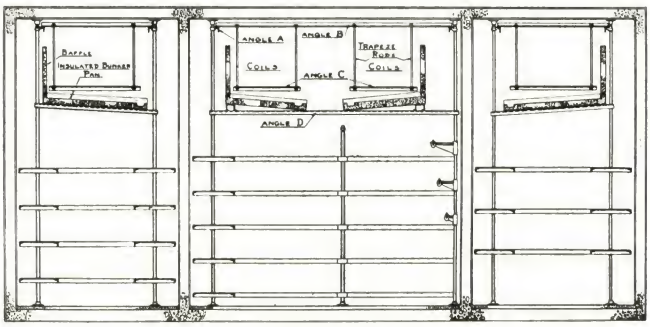
Adjustability of brackets, angles supporting bunker pan, provides necessary tilt for proper circulation, approximately ¾ in. per ft.

Bunker pan is watertight and furnished with threaded outlet ready for attachment of drain pipe.

Width of bunker depends upon allowance for cold and warm air flues. We suggest a cold air flue allowing 1½ in. per ft. of cooler width and 1 in. per ft. warm air flue. This



Plan



Elevation

Typical Refrigerator Layout Showing Combined "Maforco" Storage Racks and Bunker Equipment

"MAFORCO" EQUIPMENT FOR FUR STORAGE

All Equipment Designed to Allow Maximum Storage Capacity with Every Garment Readily Accessible and Protected from Damage in Handling

Single post construction, made possible by the use of "Maforco" fur fixtures, makes for the utmost in simplicity, economy of construction and low cost of erection.

Expensive pipe fittings are entirely eliminated; single posts also allow greater trucking space. Brackets are vertically adjustable for any desired spacing. Brackets added or removed without disturbing uprights.

Centers of robe rails made 24 in. for double brackets and 12 in. for single brackets.

Posts expanded between floor and ceiling eliminate puncturing of insulation. Posts are 1½-in. iron pipe size. Robe rails, 1¼-in. iron pipe size.

For ceiling heights from 14 to 20 ft. 2-in. iron pipe size uprights should be used. On greater ceiling heights uprights should be proportionately heavier.

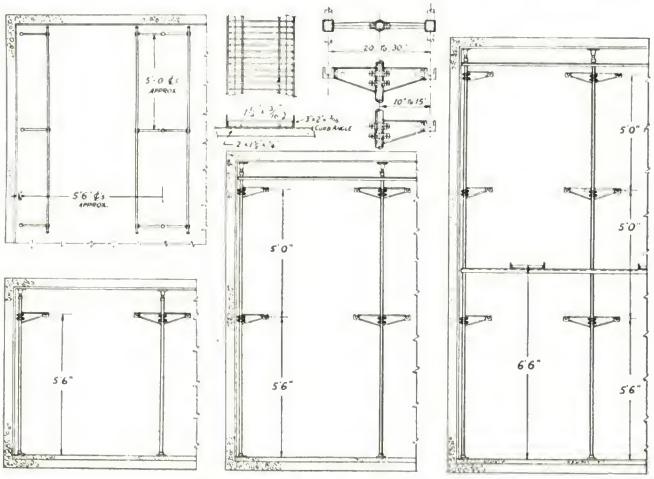
A Typical Installation of Fur Storage Racks

Ends of robe rails are neatly finished with end caps serving the double purpose of stopping garments from slipping off the ends of rails and giving the equipment a finished appearance.

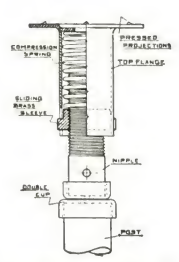
All equipment is built to eliminate projecting sharp corners, thus avoiding any possibility of damage to garments when handled in the vaults.

Posts are expanded between floor and ceiling avoiding puncture of insulation.

Do not puncture insulation to support sprinklers, ducts, and electric conduit. Same posts carrying fur storage racks provided with single and double angle bearing brackets are readily furnished with light angles laid out to carry this equipment.



Standard Layout Practice



Type 28 Self-Expansion Fitting

Top Flange, Lock Nut, and Bottom Flange

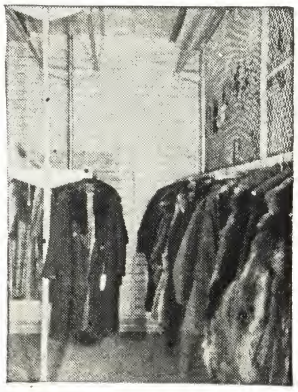
Bracket for Close Mounting

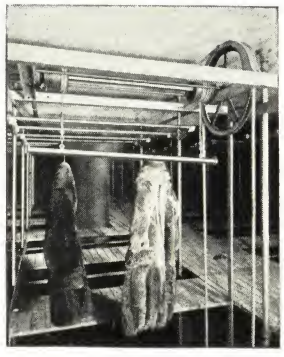
Posts adjacent to walls furnished with half round top and bottom flanges. Other posts with full round flanges

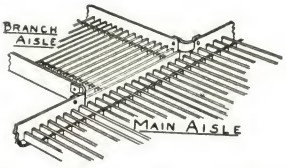
In many vaults, where space is sublet to individual users, separate compartments are economically and readily made available by the use of expanded metal partitions. The same posts which carry the fur storage racks are provided with special stamped steel brackets to which partitions are rigidly clamped. Construction allows relocation of equipment to suit revised space requirements.

In planning vaults make the rack layout first and from this work out wiring, duct, and sprinkler system.

To simplify loading and unloading upper tiers we recommend our standard fur storage hoist. This is manually operated and equipped to automatically stop at any desired height.







View Showing Curved Corners at Main and Branch Aisle

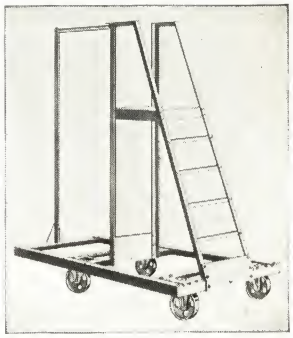
"Maforco" Garment Trucks

Always specify type and quantity of trucks required.

STANDARD SIZES

	No. 497	No. 492
Length	5'–0"	3'–6"
Width	1'–6"	2'–0"
Height	5'–6"	6'–6"

Garment Truck No. 497



Garment Truck No. 492

Hot Galvanized Finish on "Maforco" Equipment

We unconditionally advocate the use of hot galvanized finish throughout and unless otherwise specified "Maforco" Equipment is so furnished.

"MAFORCO" MORTUARY EQUIPMENT FOR HOSPITALS, MUNICIPAL MORGUES, AND MEDICAL SCHOOLS

Specifications for "Maforco" Mortuary Racks Including Slides and Trays

Each mortuary rack shall consist of a tray supported by ball bearing rollers mounted in a removable telescoping carriage which operates on ball bearing wheels in a special galvanized steel channel frame. Rack is to be 7 ft. 1 in. long by 2 ft. wide over all with rear angle for supporting the rack capable of 1-in. extension.

Tray shall be of No. 20 gauge galvanized sheet metal rolled over a one-piece, hot galvanized pipe frame approximately 1 in. outside diameter. No rivets or bolts shall pass through the pan of the tray.

Note: As an alternate we advocate trays of Allegheny, monel, or equally rust resisting metal.

Telescoping carriage shall be made of two specially formed channels with two ball bearing wheels on each side and four 1¼-in. outside diameter ball bearing steel rollers on which tray rolls. Special formed channels shall be flanged to serve as vertical and horizontal guides to keep tray in proper position. Front end of carriage is to be provided with trip catch to hold carriage and tray securely locked into place.

Frame shall be of two special formed channels with two ball bearing wheels in the front member on which the channels of carriage operate. Frame shall be made so that it can be supported by (a) attaching front end to inside face of door jambs and rear end to studs set in position for the purpose; or (b) either or both ends to rest on adjustable brackets mounted on posts securely held in position by expansion fittings without puncturing the insulation.

Rear of carriage shall be provided with two rubber bumpers to take shock of tray, and rear of stationary frame shall be provided with two rubber bumpers to take the shock of the carriage.

The rack shall be made so that the tray may be withdrawn entirely outside of the refrigerator, sustaining its load in a horizontal position without sagging.

Tray shall be a close fit in the carriage and shall be flared for easy cleaning. Pipe frame of tray shall extend beyond the pan full width at both ends to serve as handles.

Carriage shall be provided with one handle at one end. Pivoted steel stop is to be attached to the stationary frame to stop the extension of the carriage at the desired point.

All equipment not otherwise specified shall be hot galvanized after fabrication.

Mortuary racks shall be as made by MARKET FORGE COMPANY of Everett, Mass. or equal.

Cook County Morgue, Chicago, Ill.
Capacity 135 cadavers

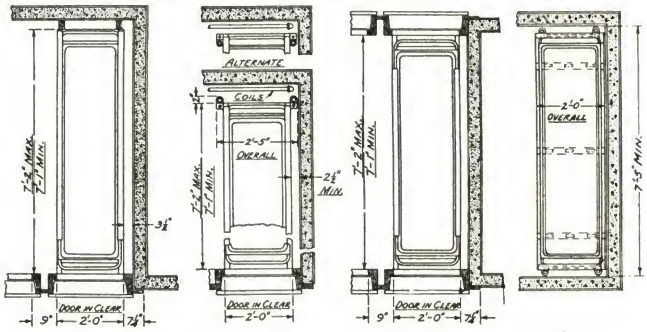
General Information

All mortuary racks are built in sizes shown carried in stock ready for immediate shipment. Refrigerators should be built to conform with these specifications. Units are designed to conform with standard cold storage door sizes thereby lowering costs through the use of standard equipment and eliminating delay of securing special sizes.

Style No. 1 shows method of supporting the type which slides one way, by lagscrewing the front end to the inside of the door frame and the rear end to studs.

Style No. 2 construction shows mortuary units supported in rear by attachment to brackets vertically adjustable on 1¼-in. iron pipe size uprights expanded between floor and ceiling. If desirable, same construction may be used at both front and rear.

Style No. 3 unit is the type that is furnished to slide both ways. This makes it practical to have the mortuary refrigerator installed between the receiving room and the post mortem laboratory. The cadaver is then readily accessible from either room at a saving of much time and labor.



Style 1 **Style 2** **Style 3** **Style 4**

Style No. 4 is the unit which operates from the side. Many times space available does not permit the use of the end operating units. We advocate, however, the use of end operating units wherever possible.

Where installations are more than two units high the upper units are made accessible by means of a tiering machine furnished with a roller platform.

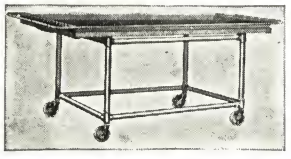
Furnished with crank for manual operation or with ½ hp. motor and equipped with automatic stops. Machine is mounted on rubber tired wheels making it readily portable. Finished in baked-on white enamel.

Where overhead coils occur we suggest the use of "Maforco" bunker pan equipment in conjunction with the mortuary units. There is the two-fold advantage of more desirable construction simpler to install yet low in cost.

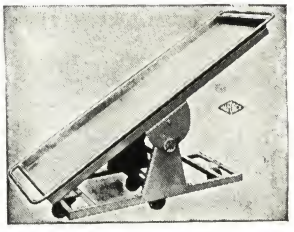
Every morgue large or small for human or animal storage presents a different engineering problem. Let the MARKET FORGE COMPANY as specialists work with you.

"Maforco" Tilting and Tray Carrying Mortuary Trucks

Designed especially to eliminate unnecessary handling of cadavers on and off of trays. Tilting type truck No. 525 especially desirable for use in viewing room of municipal and large hospital morgues. Regularly furnished mounted on rubber tired wheels and finished hot-galvanized or in baked-on white enamel.



"Maforco" Tray Carrying Truck No. 526



"Maforco" Tilting Mortuary Truck No. 525

Both types built to carry standard "Maforco" Mortuary Trays

Recent Installations

Baltimore City Morgue, Baltimore, Md.
Cook County Morgue, Chicago, Ill.
University of Virginia, Charlottesville, Va.
Sacramento Hospital, Sacramento, Cal.
Hillman Hospital, Birmingham, Ala.
Cleveland Clinic Hospital, Cleveland, Ohio
Hebrew Home for Invalids, Brooklyn, N. Y.
Denver Hospital, Denver, Colo.
Sing Sing Prison, Ossining, N. Y.
Presbyterian Hospital, Philadelphia, Pa.
Bell Memorial Hospital, Kansas City, Kan.
U. S. Veterans Hospital, Miscellaneous
U. S. Naval Hospital, Miscellaneous
Bronx General Hospital, New York, N. Y.
University of Michigan, Ann Arbor, Mich.
Smith's Funeral Home, Gary, Ind.
Pierce County Hospital, Tacoma, Wash.
French Hospital, New York, N. Y.
Harbor View Hospital, Seattle, Wash.

"MAFORCO" CRYPT RACKS FOR COFFIN STORAGE

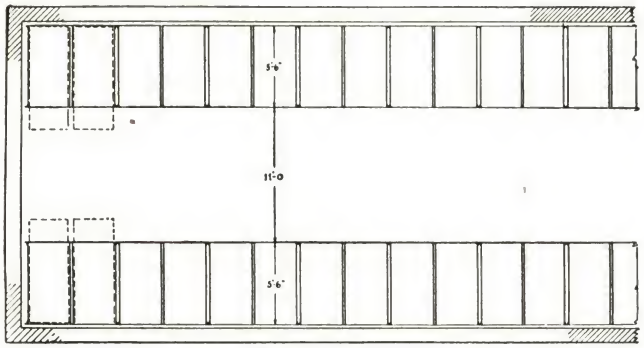
Racks are of angle iron uprights substantially gussetted and reinforced. Coffins slide on 1-in. tube rollers provided with ball bearings at each end.

End operated units are most practical, but where space available warrants it, side operated units are also furnished. Standard size racks are shown. Special sizes also may be secured.

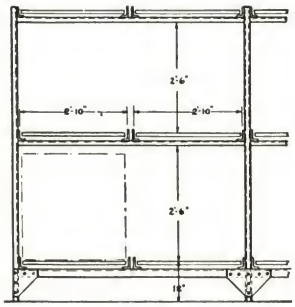
All equipment is hot galvanized after fabrication and may be painted in the field to match finish. All equipment is self-supporting, requiring no anchorage to walls, floor or ceiling.

Where installations are more than two units high, the upper units are made accessible by means of hand or electrically operated 500-lb. capacity tiering machine designed especially for this type of storage.

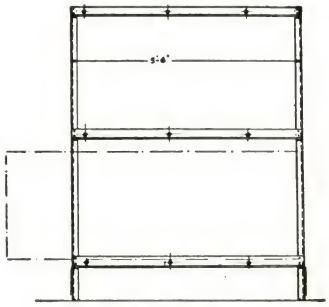
Specify "Maforco" Crypt Racks for coffin storage.



PLAN



ELEVATION



SECTION

"MAFORCO" LINEN ROOM SHELVING AND COUNTERS

Front uprights are 1¼-in. pipe equipped with cast brass nickel-plated sanitary base (fitting No. D9), which allows vertical adjustment with no threads showing or crevices for dirt and vermin to collect.

Rear uprights are 1¼-in. pipe furnished with flush socket elbow flange to provide for attachment to angle framework set in walls.

This construction keeps material away from walls and allows plenty clear space for cleaning.

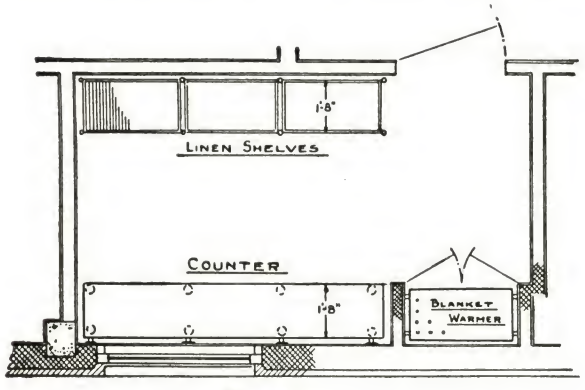
Aluminum shelves are made with 1-in. aluminum tube frames with ¼-in. aluminum rods spaced 1⅛ in. on center. Shelves rest on pressed steel section rigidly welded to uprights. They are removable and exceptionally light and easy to handle.

Shelves are furnished in natural finish. All other parts with one coat of flat white enamel baked on.

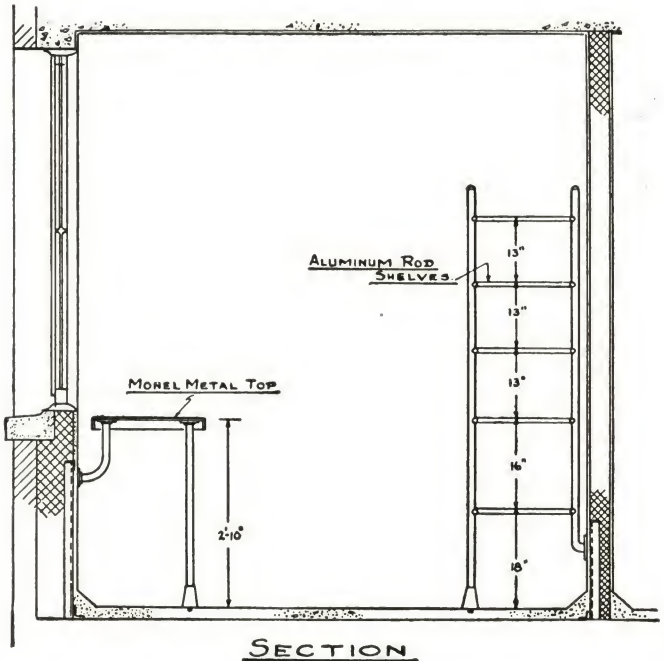
Monel counters are of No. 20 gauge polished monel rolled over No. 16 gauge galvanized iron, supported on front and rear legs similar in design to shelving.

Alternate layouts with shelves over monel counter also practical where space available is limited.

Specify "Maforco" linen room shelving and counters for linen rooms.



PLAN



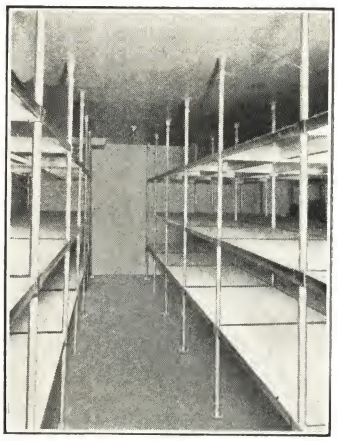
SECTION

"MAFORCO" TRUNK STORAGE

For Use in General Storage or with Expanded Metal Compartments for Individual Storage

Uprights 1¼-in. outside diameter tube expanded between floor and ceiling. Shelves of sheet steel with reinforced edges are supported by means of malleable iron brackets vertically adjustable on the uprights. Shelves are readily removable. Standard size 4x3 ft. wide. Other sizes to conform with conditions. Furnished to conform with contour of room making "U" or "L" shaped racks, eliminating inside corner posts by means of a special fitting. This allows full sweep around all corners with no interfering posts.

Four-way brackets at junction of four shelves and double brackets at junction of two shelves allow installation of racks in two or three sections in width and any number of sections in length.



Trunk Rack Tubular Construction

Shelves may be spaced on any desired vertical centers but for trunk storage we suggest 30-in. centers.

To simplify loading and unloading shelves many users favor a roller along the front line of shelves.

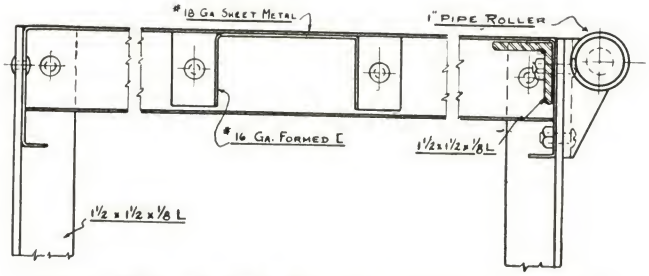
A slightly more economical design of trunk racks is effected by the use of angle iron uprights instead of tubular uprights. If this construction is used all fittings are eliminated and shelves are furnished to bolt in place. Uprights are punched 2 in. on centers to allow for vertical adjustment. Same type of roller is furnished where required.

Many times large spaces equipped are allotted to individuals or separate business houses. Either type of "Maforco" Trunk Rack lends itself readily to answering this requirement by the use of expanded metal partitions. They are clamped to the uprights by means of standard clamps and do not in any way interfere with the storage space.

Oval head carriage bolts hold partitions rigidly in position, all nuts are on inside of compartments thereby formed obviating the possibility of tampering by others. This construction permits separating individual shelves or entire tiers of shelving for separate users. Doors are furnished with approved cylinder locks, each with two keys and mastered if desired. Hasp is provided for use of additional padlock if specified.

Finish—We cannot advocate too strenuously the desirability of hot-galvanized finish for all storage racks. It does not scratch or mar readily and lasts indefinitely. It costs slightly more than an enameled finish but is well worth the small additional investment involved.

As an alternate, all racks may be finished in either air-dry or baked-on high gloss enamel.



Section Through Shelf Showing Application of Roller

"MAFORCO" RUG STORAGE RACKS

The desirable features of single post construction are well illustrated in connection with "Maforco" Rug Storage Equipment.

Cantilever brackets single or double arm are vertically adjustable and removable. Standard single brackets 30 and 36 in. Standard double brackets 60 and 72 in.

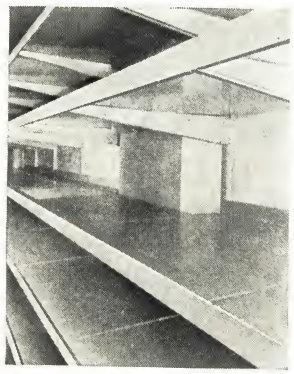
Solid sheet steel shelves are removable and vertically adjustable on the cantilever brackets. Standard length shelf 5-ft. width to suit brackets.

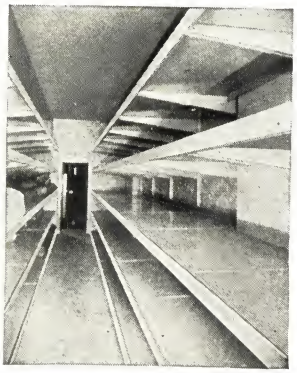
Pipe uprights varying in size according to ceiling height, are rigidly expanded between floor and ceiling.

Utmost care has been used in the design of this equipment. There are no sharp corners to mar rugs. Any size rug may be stored. Construction makes available tiers of continuous open shelving with no crevices between shelves easily loaded or unloaded.

Finish hot-galvanized throughout.

Specify—"Maforco" Rug Storage Racks as made by the Market Forge Company, Everett, Mass.





Installation Rug Storage Racks—Lincoln Storage Warehouse, East Orange, N. J.

"MAFORCO" UPHOLSTERED FURNITURE RACKS

Standard "Maforco" post fittings and brackets have been readily adapted to the most economical and practical type of upholstered furniture racks built.

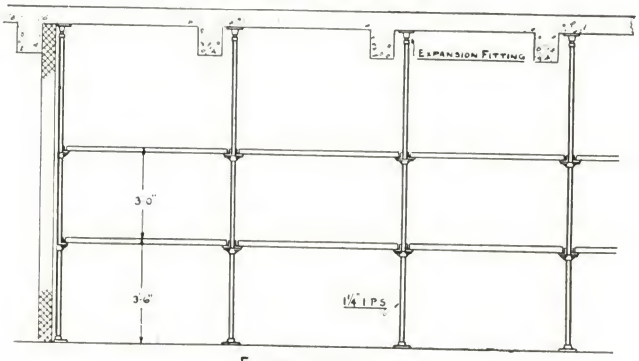
Posts are 1¼-in. iron pipe size, expanded between floor and ceiling. Shelves are of galvanized sheet iron built-in sections as shown for strength, ease of handling and installation.

Shelves rest on angle iron bearers bolted to cast iron brackets vertically adjustable to any desired spacing.

Standard size sections are 6x6 ft. wide. Other sizes may be furnished to suit requirements.

There are no sharp corners to injure or mar in any way stored materials.

Standard finish of racks throughout hot galvanized. For obvious reasons there is no other finish so completely desirable.



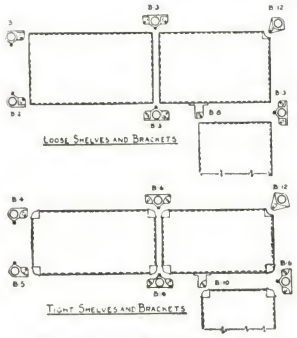
ELEVATION

"MAFORCO" HEAVY GENERAL STORAGE SHELVING

For Hospitals, Hotels, Schools, Institutions, Warehouses, and Manufacturing Plants

For heavy duty storage the usual type of commercial shelving is not rugged enough. The MARKET FORGE COMPANY has adapted its standard posts, brackets and fittings to satisfy this common requirement. It is not only the heavy loads carried that makes this heavier type of shelving necessary but years of rough abuse it must withstand.

"Maforco" construction allows vertical adjustment to the last fraction of an inch. Ordinary steel shelving is not adjustable to this fine point. This means in many cases inches of valuable space lost at every shelf. When you multiply this by total shelf areas the loss is amazing. Space in any building, anywhere, is valuable and should not be wasted.



Standard Post Fittings

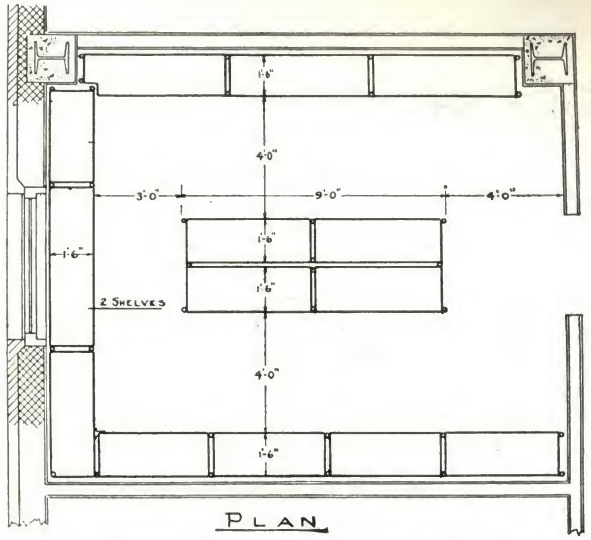
Racks are built with shelving having all "loose" corners with posts expanded between floor and ceiling or furnished with "tight" corners where necessary, to make self-supporting where posts cannot extend to ceiling.

Furnished any number of sections long, wide or any number of shelves high. Racks readily furnished to fit around wall projections or in any shape room.

Shelves made in any width up to 36 in. and in any length up to 6 ft. to suit individual requirements. They are vertically adjustable and removable. Shelves over 24 in. wide are reinforced longitudinally with a stamped steel channel shaped member.

Posts are of 1¼-in. outside diameter tubing of heavy gauge. All brackets are malleable castings.

Shelves of galvanized sheet iron, all other parts hot-galvanized after fabrication.



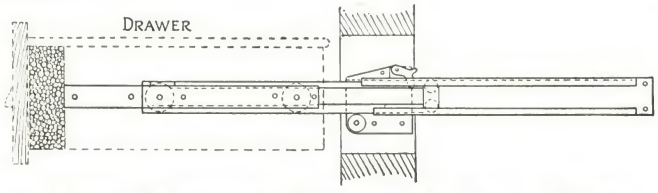
Typical Layout of Hospital Kitchen Storage for Canned Goods

SPECIAL "MAFORCO" FITTINGS AND FIXTURES

Our many years of close connection to this specialty field has led to the development of many special types of fittings and fixtures of sanitary and adjustable nature.

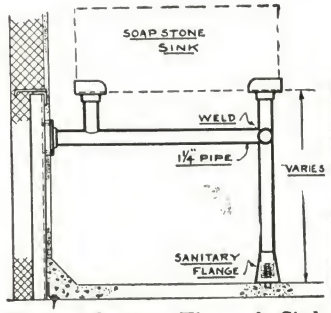
Wherever heavily loaded drawers are required specify them to be equipped with "Maforco" telescoping drawer slides. Their use permits easy operation and allows drawers to be withdrawn full length without sagging.

Slides are made in black iron, enameled or hot-galvanized after fabrication, or of monel metal, with chromium plated ball bearing rollers.

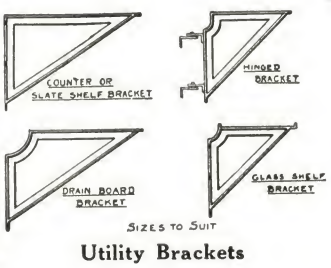


"Maforco" Telescoping Slides with Ball Bearing Rollers

Fittings D9, D10, L13 and D14 (see opposite column) are exceptionally fine for hospital, hotel and kitchen equipment work. They permit adjustment with no exposed threads and are verminproof. Their uses for tables, racks and stands are readily seen and need not be itemized here.

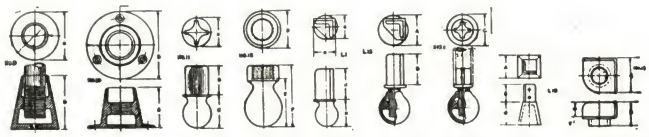


Typical Section Through Sink Support



Utility Brackets

These fittings are made for any size pipe or angle. Furnished in cast iron, cast brass, white metal, monel metal, and nickel or chromium plated and polished as desired.



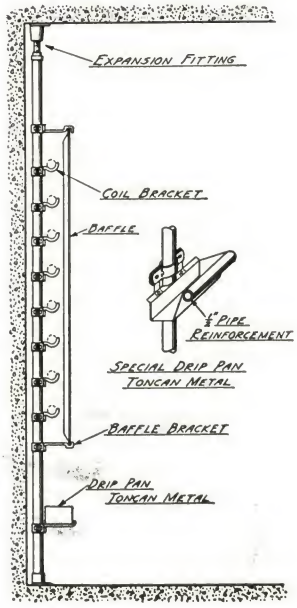
Wall Coil Supports

"Maforco" coil supports satisfy the demand for a simple economical method of hanging coils. By their use valuable refrigerator space is conserved since it is possible to bring coils nearer the wall than by old methods.

Coil brackets are furnished with 1¼-in. iron pipe size uprights expanded between floor and ceiling, eliminating puncturing of insulation.

This construction does away entirely with built-in supports and expensive special work.

Coil brackets are made to carry pipe coils of any size with hook offset, so drip will not run down the upright. Same type of clamp is furnished with hooks to carry special sections and drip pans. Standard brackets are also available to carry baffles on same posts.



VICTOR PRODUCTS CORPORATION

FORMERLY VICTOR COOLER DOOR CO., INC.

Steel Shelving

MAIN OFFICE AND FACTORY
HAGERSTOWN, MARYLAND

SALES OFFICES

ATLANTA, GA., 231 Healey Building
CHICAGO, ILL., 1005 Conway Building
HOUSTON, TEX., 2033 Semmes St.
NEW YORK, N. Y., 366 Madison Avenue
ST. LOUIS, MO., 369 Paul Brown Bldg.
SEATTLE, WASH., 2410 First Ave., South

Products

STEEL SHELVING for cold storage.
MEAT RACKS.
DRAWERS and SHELVING for refrigerators.
FUR STORAGE RACKS and TRUCKS.
Also Aluminum Shelving, Welded Wire Shelving, Bunker Pans and Supports.

For our pages on Refrigeration Doors and Ice Chutes, see Manufacturers' Index.

Guarantee and Facilities

Victor shelving has behind it our regular guarantee against defective materials and workmanship and to satisfactorily do the work for which it is intended.

The Victor plant is located in the heart of Maryland, excellent railroad facilities to all points.

A large stock of Victor standard products is always available for immediate shipment.

Steel Shelving

Victor standard steel shelving equipment comprises practically every type and kind of equipment required for the handling and storage of articles in cold storage from meats and vegetables to furs, rugs or flowers.

Victor steel shelving can be purchased very economically. It is extremely easy to erect and the shelves and racks are vertically adjustable. Additions can be made without disturbing your present Victor equipment.

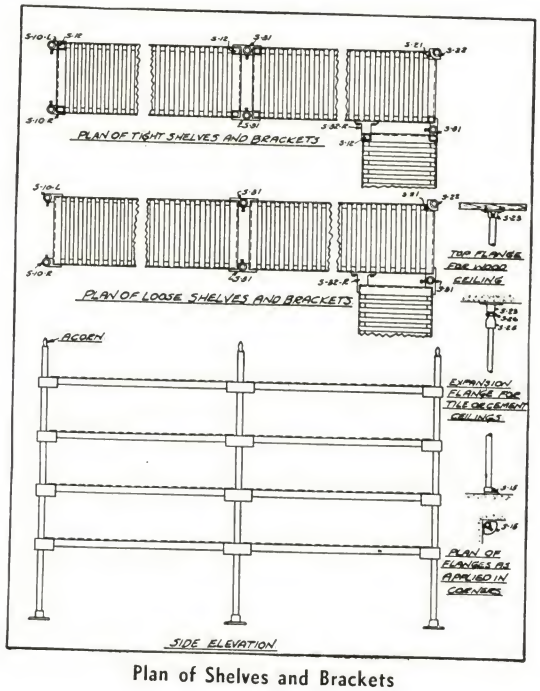
All equipment is galvanized after assembly to prevent rust, uprights and robe rails of fur racks are made of high carbon steel tubing. Supporting brackets are pressed steel or malleable iron. Shelving is made of No. 12 gauge by 1 in. steel flats spaced 1 in. apart and riveted or welded to angle irons.

How Furnished—Shelves can be furnished either single or double section as desired but we do not recommend that any single shelf be more than 7 ft. 6 ins. long. Furnished any number of shelves high. If shelving is to be only 2 or 3 shelves high we recommend that posts run to ceiling. See method of expanding post between floor and ceiling to prevent puncturing insulation and plaster.

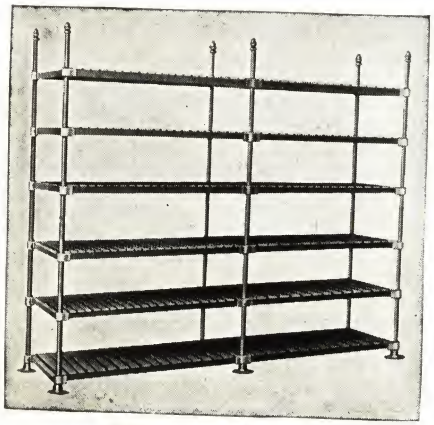
Arrangement of Shelving—An arrangement of shelving for two sides of room is shown in illustration. Shelves could be extended to third side of room if desired (see typical layout, following page). Shelves are so constructed as to fit close to wall, leaving no cracks behind through which articles can fall.

Where space will permit shelves in the center of refrigerator, the style of rack shown gives maximum storage capacity with no loss of space. Can be furnished as single shelf if desired to a maximum of 2 ft. 6 ins. wide. This type shelf gives access from either side, and insures rigidity.

Racks can be furnished to any length desired and any number of racks high.



Plan of Shelves and Brackets



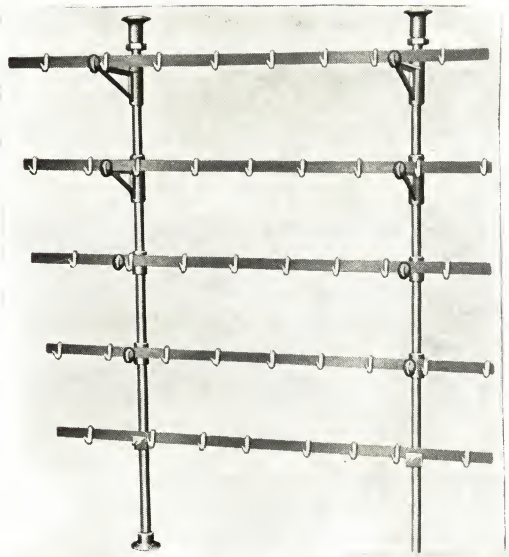
Victor Double Section

Victor Shelving Along Two Sides of a Room

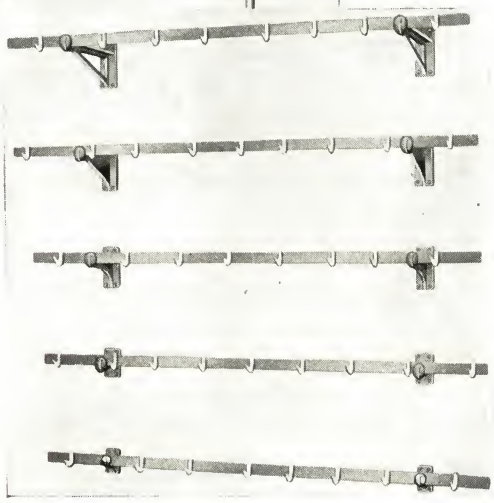
Victor Refrigerator Shelving

Meat Rails and Brackets

Meat rails and brackets for use where it is permissible to attach direct to walls. Bracket extension, flush 3, 6, 9 and 12 ins. from wall. Meat rack supported by posts expanded between ceiling and floor. Brackets are vertically adjustable and have the same extensions as the wall type brackets. 1⅝-in. posts for heavy duty. Rails either 1½x⅜ or 2x⅜ in. Hooks either loose, attached with setscrews or riveted.



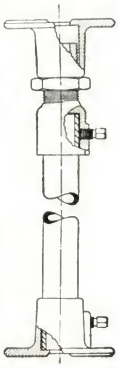
This style of rack recommended for cement-sealed refrigerators or coolers. Expanding posts afford anchorage. Rails are removable



This style of rack is recommended wherever wall attachment is feasible. Rails are removable

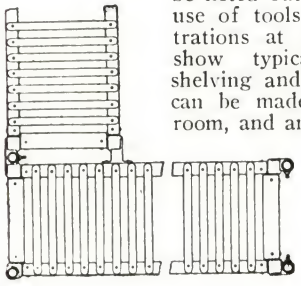
Expansion Stud

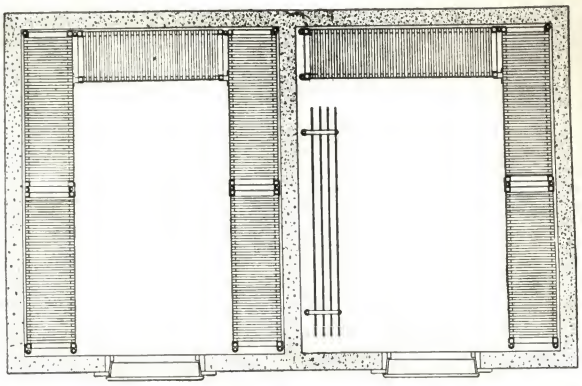
Detail of expansion stud used on shelves, meat racks, fur racks, etc. Studs expand, giving ample space for adjustment. This device eliminates necessity of puncturing insulation and plaster.

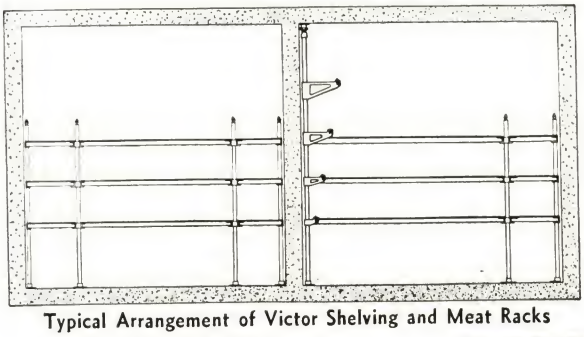


Detail of Shelving

Victor steel shelving is made of angles with 1 in. by No. 12 gauge straps riveted 1 in. apart and mounted on vertically adjustable malleable brackets. Shelves are galvanized after assembly. They can be lifted out for cleaning without use of tools of any kind. Illustrations at top of next column show typical arrangement of shelving and meat racks. Standard shelving can be made to fit any character or shape room, and any number of shelves high. Note how closely shelves fit to walls. All Victor Shelving is galvanized under our own control by hot dip process after fabrication in our own plant. This makes possible unsurpassed service and quick shipments.







Typical Arrangement of Victor Shelving and Meat Racks

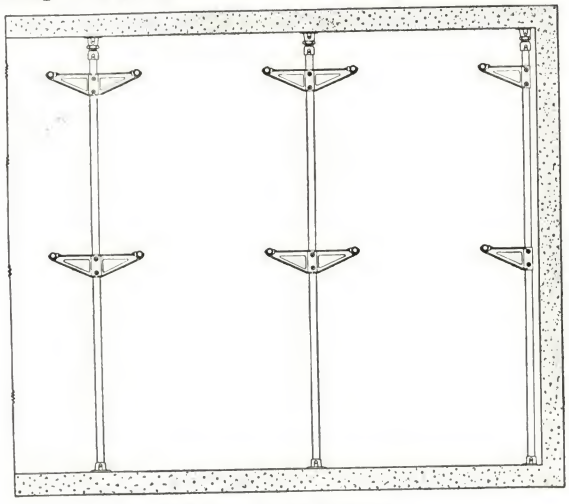
Drawers for Refrigerators

Victor products include three types of insulated drawers for refrigerators; namely, telescoping, self-closing and plain rollers. The equipment illustrated is for a reach-in refrigerator, and includes three telescoping drawers and slatted shelves above. Victor reach-in refrigerator equipment is so flexible that it readily adapts itself to any desired arrangement. Drawer can be placed above with shelves below, or the shelf just above. The drawers can be made solid to prevent dripping from contents. Drawers are wire-bound and soldered watertight. Sides are perforated for air circulating and bottoms can be perforated if desired.

Fur Racks

Fur racks are also part of our standard products furnished to meet any condition.

We manufacture a complete line of fur storage equipment, including lifts, garment trucks and racks, walkways, etc.



Engineering Service

The Victor Refrigeration Engineering Service is available without cost. We are only too glad to give you the benefit of our years of experience on any problem of shelving or refrigeration equipment. Of course you will not be obligated in any way.

JAMISON COLD STORAGE DOOR CO.

CONSOLIDATING JAMISON COLD STORAGE DOOR CO., INC., and STEVENSON COLD STORAGE DOOR CO.

HAGERSTOWN, MD.

BRANCH OFFICES

NEW YORK, N. Y., 300 Madison Avenue
CHICAGO, ILL., Builder's Building
CHESTER, PA., 116 W. 24th Street
ST. LOUIS, MO., Railway Exchange Building
DALLAS, TEX., 4019 Gaston Avenue
LOS ANGELES, CALIF., Gay Engineering Co., 2650 Santa Fe Avenue
MARIETTA, GA., Southern Ice Supply Co.
SAN FRANCISCO, CALIF.
SEATTLE, WASH., D. E. Fryer & Co.
SPOKANE, WASH., D. E. Fryer & Co.

FOREIGN

LONDON, ENG., Armstrong Cork Co., Ltd.
HONOLULU, The von Hamm-Young Co., Ltd.
JAPAN, Okura & Co.

Products

INSULATED DOORS for all purposes of temperature control. Two distinct types—with double or single seals of contact and *extra* heavy hardware.

STEVENSON VESTIBULE DOOR ("Door That Cannot Stand Open").

TRACK DOORS.

COOLER DOORS.

SUPER FREEZER DOORS (Overlapping type).

ICE CHUTES.

METAL DOORS, MISCELLANEOUS: Double, Vertical Sliding, Auto-close (double-swing batten doors), Dutch Track, Wicket.

WOOD or METAL REFRIGERATOR FRONTS: for built-in refrigerators.

CAN-PASSING VESTIBULES.

WINDOWS: for refrigerated spaces.

Any of the above can be furnished fireproofed.

The Company and Experience

JAMISON COLD STORAGE DOOR CO. combines the largest and oldest manufacturers of cold storage doors—the Jamison Cold Storage Door Co., Inc., of Hagerstown, Md., and the Stevenson Cold Storage Door Co., formerly of Chester, Pa.

Their products, by an exclusive humidity control system, embody the scientific solution of the problems of shrinking and swelling of wood under refrigeration, the amount and character of insulation, the type of construction, and the hardware for long hard service—backed by 44 years of experience.

Jamison Advantages

Employs double seals, forming a dead air insulating space between. Material is extra heavy, insuring the extra strength and stamina for which all Jamison products are noted.

Jamison Hardware

Weighs 60 lbs. for the standard cooler door, and is *bolted* to the door and frame. Its extra weight and strength make it practically indestructible.

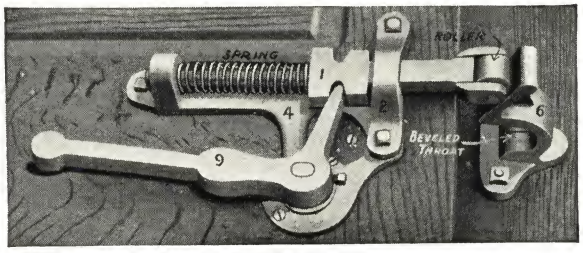


Fig. 1

Jamison Automatic Self-tightening Fastener

Is of the roller type, especially designed to draw heavy doors tighter with use.

Positive in action—it cannot rebound—holding door fast till the lever handle is released, from inside or outside.

OLDEST and LARGEST makers of Cold Storage DOORS

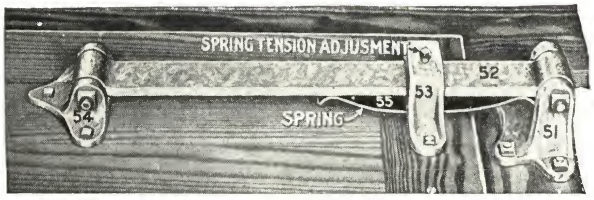


Fig. 2. Jamison Spring Hinge

Jamison Adjustable Spring Hinge

A heavy steel bow spring exerts constant pressure against the heel of the door. Adjustable to force the door tight against its seals regardless of shrinking or swelling (Fig. 2). Swings the door clear of the opening. Furnished with ball bearings when specified.

In a test by engineers, a Jamison Door was thrown open and slammed shut for the equivalent of 85 years of service, at which point the test was discontinued as the door was still efficient in every respect and showed no signs of weakening.

Stevenson Advantages

Employs a single soft gasket seal (double seal optional) which flattens at point of contact. Equipped with hardware; strong, serviceable and elastic.

Stevenson Roller Fastener (Automatic)

An improved efficient roller type that operates positively, quickly and noiselessly and *does not slacken or rebound as it latches.* No wrist-spraining kick. (Fig. 3.) Reaches locked position the instant the gasket seals are most tightly compressed. Operates with a straight pull outside and a straight push from inside.

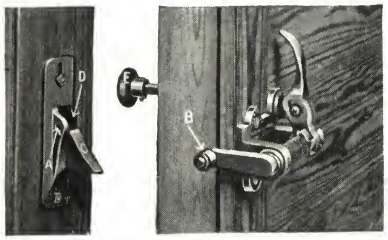


Fig. 3 (Patented)

Stevenson Self-adjusting Elastic Clamping Hinge

Consists of a strong spring-tempered-steel hinge-leaf, riding on a hardened washer. Follows the yielding gasket at all times maintaining a tight seal. Bolted to the frame. Swings door clear of the opening. Moves as easily as ball-bearing hinges and ball bearings furnished when specified. Note photograph of Stevenson Door, on following page.

Stevenson Hinge Guard (Patented)

A great rigid lower hinge-leaf plate applied on the face of the elastic hinge, protecting the door from all excessive strains, but not interfering with the clamping operation of the Spring Hinge-leaf.

Its oblong bearings engage only when the strain makes extra strength necessary. Note bottom hinge on Stevenson Door.

Jamison Wedgetight Fastener (Patented)

A new straight push-and-pull type with the following outstanding advantages: (1) closes the door tighter, (2) keeps it tighter, (3) does not slacken as it latches—cannot rebound, (4) no moving part in operator's hand in closing—eliminates wrist-spraining kick-back, (5) *always* fastens tightly, (6) automatically compensates for wear, sag and twist of door, adding years to door's life, (7) few moving parts, (8) opens easier from outside or inside, (9) essential moving part bolted to frame.

A heavy spring-driven wedge drives home *at the instant of impact* against the inner bar bolted to the door, *forcing* the door to compress the gasket seals always. Made extra heavy, conforming to Jamison standards of strength and durability.

Optional on Jamison Doors at no extra cost; on Stevenson doors at slight extra cost. Obtainable for replacements on any make of door at reasonable price. Also available in polished bronze, chromium plated, or with any other desired finish—prices quoted.

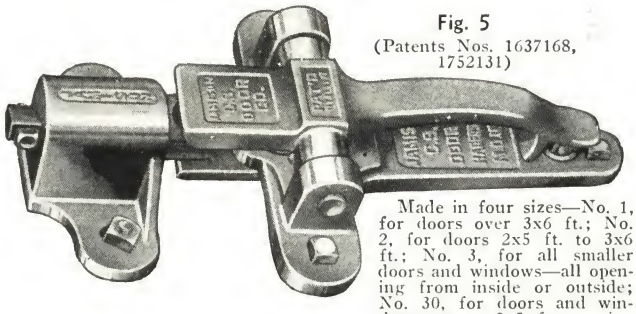


Fig. 5
(Patents Nos. 1637168, 1752131)

Made in four sizes—No. 1, for doors over 3x6 ft.; No. 2, for doors 2x5 ft. to 3x6 ft.; No. 3, for all smaller doors and windows—all opening from inside or outside; No. 30, for doors and windows up to 2x5 ft. opening from outside only

Representative Jamison and Stevenson Installations

F. G. Vogt & Sons, Philadelphia, Pa.
Florence-Citrus Growers Assn., Florence Villa, Fla.
Terminal Refrigerating and Warehouse Corp., Washington, D. C.
Armour & Company—various plants.
Bowman Dairy Co., Chicago, Ill.
Eastman Kodak Co., Rochester, N. Y.
Procter & Gamble, Co., Long Beach, Cal.
Produce Terminal C. S. Co., Chicago, Ill.
R. H. Macy, New York, N. Y.
Wilson & Company—various plants.
National Tea Co., Chicago, Ill.
Presbyterian Hospital, Philadelphia, Pa.
Federal Cold Storage Co., Pittsburgh, Pa.
Swift & Company—various plants.
Philadelphia City Morgue.
Cudahy Packing Co.—various plants.

Stevenson Enclosed Man-Size Door Closer

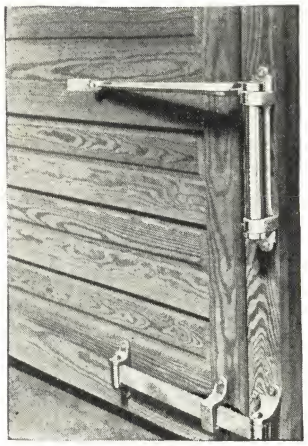


Fig. 6

Saves refrigeration by automatically keeping cold storage doors closed. Suitable for any make of door. A heavy coiled steel spring (entirely enclosed in a metal casing to prevent clogging with dirt, ice, etc.) placed on the casing at the hinge side of the door, operates a strong long metal arm, automatically closing the door. *Closing arm can be instantly released, allowing the door to stay open when desired.* Strong, neat in appearance, more compact and more powerful than preceding models.

Made in several sizes. In specifying state size of door in clear, and whether right or left.

Stevenson Vestibule Door, "Door That Cannot Stand Open"

A combination of an insulated door with two double-acting doors forming an air lock (Figs. 7 to 10), obviating in most instances a vestibule with its loss of space. Flapper doors prevent outflow of cold air and inflow of warm moist air. Extremely desirable in busy doorways. Is replacing many standard doors and track doors, with a marked saving in refrigerating costs and the elimination of mold-spotted goods and ice-coated pipes.

The double-acting armored batten doors, insulated, strike the unlatching bar (as shown in accompanying figures) on the inside of the cold storage door, releasing fastener and throwing door open. Trucks go through without a halt.

Double-acting doors are pivoted on a two-way cam, operating in an oil reservoir at the bottom of the frame. Doors lift a little as they swing open, and close instantly by gravity. The flapper doors can come to rest only in closed position.

Any Jamison or Stevenson standard door, either with or without overhead track rail, fireproof or non-fireproof, can be supplied with these double-acting doors. The outside cold storage door supplied with Jamison or Stevenson Hinges and Stevenson or Wedgetight Fasteners.

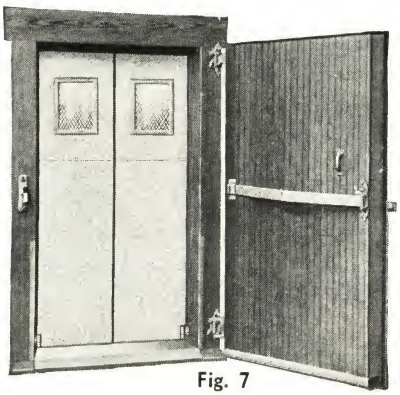


Fig. 7

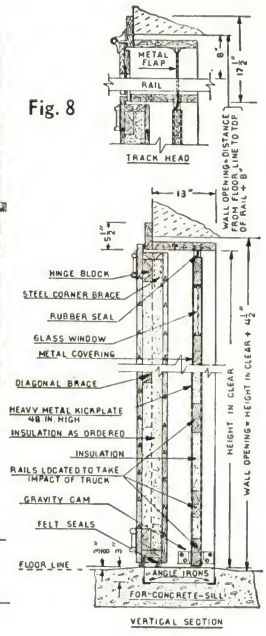


Fig. 8

Fig. 10

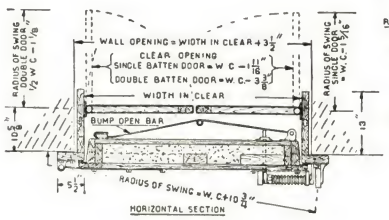


Fig. 9

STANDARD SIZES AND DIMENSIONS

	Stock No.	Dimensions inside of frames Width ft. in.	Height ft. in.		Wall opening for Stevenson type door Width ft. in.	Height ft. in.	Wgt. crated, lbs.
	64	2 6	6 0	Single batten	2 9½	6 4½	540
	66	3 0	6 0	Double batten	3 3½	6 4½	675
	69	3 6	6 6	Double batten	3 9½	6 10½	850
*	71	4 0	6 6	Double batten	4 3½	6 10½	900
*	72	4 6	6 6	Double batten	4 9½	6 10½	950
*	73	5 0	6 6	Double batten	5 3½	6 10½	1000

*Includes extra hinges.
Special sizes furnished where required.
Blue prints furnished on request.
Batten doors on all sizes will "bump" open outer insulated door.
All batten doors on Nos. 64 to 73 provided with peep holes (see Fig. 7).
Each batten door, opened at right angle, reduces clear opening 1⅞ in.

JAMISON AND STEVENSON STANDARD COOLER DOORS

Standard Specifications—We furnish the insulated door hung in the frame, complete with all necessary hardware, galvanized, ready to set in place. For sills see Figs. 18-19.

Front—Raised panel, clear grade yellow pine.

Back—Tongue and groove, fir or spruce. No paint or varnish.

Insulation—Cooler, 4-in. granulated cork encased in paper. Freezer, 4, 6 or 8-in. corkboard laid in hot asphalt. Other insulation as specified.

Seal—On Jamison Door, two. On Stevenson, one (two seals optional). Continuous piece of soft gasket, top, bottom and sides, that remains soft and elastic with years of use.

Fig. 11. Jamison Standard Cooler Door
Right hand, raised panel front

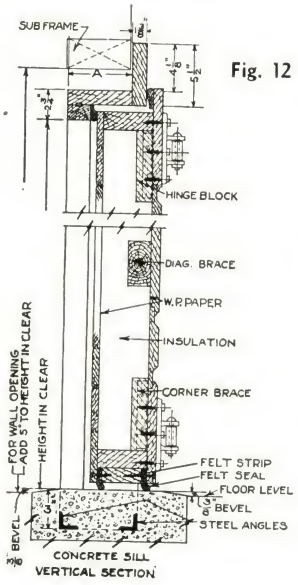


Fig. 12

Wall opening: must be 7 in. wider and 5 in. higher than door in the clear. When overhead rail is used wall opening must be 8 in. higher than top edge of rail.

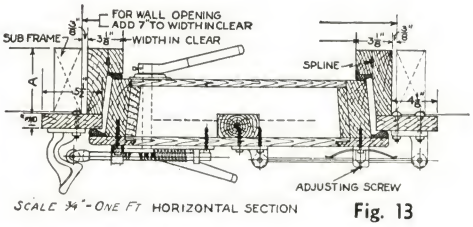


Fig. 13

STANDARD SIZES JAMISON AND STEVENSON COOLER DOORS

Large stocks of standard doors are on hand, ready to ship. Unpainted and unvarnished—can be finished to match other woodwork, but should be given three coats when installing before refrigeration is turned on.

Below are the most popular sizes. Write for complete list of Standard Sizes. Special sizes when required.

Stock No.	Dimensions inside of frames (door in clear)		Size of wall opening					
			Jamison doors			Stevenson doors		
	Width ft. in.	Height ft. in.	Width ft. in.	Height ft. in.	Ship. wgt. crated, lbs.	Width ft. in.	Height ft. in.	Ship. wgt. crated, lbs.
00	2 6	2 0	3 1	2 5	155	2 9½	2 3½	140
0	2 0	3 0	2 7	3 5	205	2 3½	3 3½	175
01	2 0	5 0	2 7	5 5	270	2 3½	5 3½	255
1	2 0	6 0	2 7	6 5	310	2 3½	6 3½	290
2	2 6	6 0	3 1	6 5	335	2 9½	6 3½	320
4	3 0	6 0	3 7	6 5	365	3 3½	6 3½	350
5	3 0	6 6	3 7	6 11	375	3 3½	6 9½	360
7	3 6	6 6	4 1	6 11	455	*3 9½	6 9½	425
11	4 0	6 6	4 7	6 11	470	*4 3½	6 9½	455
13	4 6	6 6	*5 1	6 11	565	*4 9½	6 9½	480
16	5 0	6 6	*5 7	6 11	615	*5 3½	6 9½	575

*Includes extra hinges. In specifying or ordering state "Jamison" or "Stevenson," giving stock number. These same sizes are also standard for Freezer Doors, and other types, fireproof or non-fireproof.

Jamison Sanitary Doors (See Fig. 27)

For use by hospitals, public institutions, restaurants, hotels, etc., where the sanitary feature is desired. Not recommended for freezers.

Embodies standard Jamison or Stevenson Cooler Door construction and insulation, except for its smooth laminated panel front. Special types of hardware, finished as desired to meet individual requirements. For wall openings, see table of Jamison and Stevenson Cooler Doors.

Fittings—*For Jamison Door.* Jamison automatic self-tightening fastener regular equipment, or Wedgetight fastener optional if specified, and Jamison adjustable spring hinges. (See Fig. 1 and description.) Diagonally braced with wood or steel. Unbroken insulation.

For Stevenson Door. New Stevenson automatic roller fastener regular equipment, Wedgetight fastener optional at slight increased cost, self-adjusting flexible spring hinges and guard (Fig. 4 and description). Diagonally braced with wood or steel. Unbroken insulation.

Fig. 14. Stevenson Standard Cooler Door

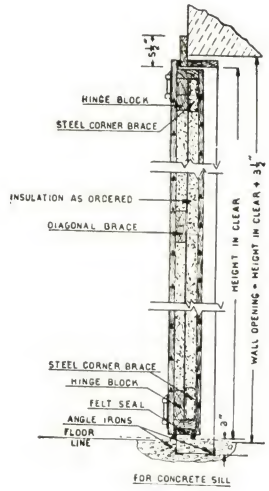


Fig. 15

Wall opening: must be 3½ in. wider and higher than door in the clear. When overhead rail is used wall opening must be 8 in. above upper edge of rail

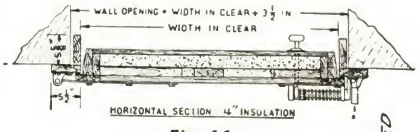


Fig. 16

Sills

Three types of sills, applicable to all Jamison and Stevenson Doors. These sills will meet practically every need.

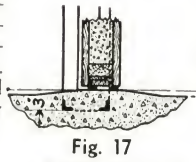


Fig. 17
Arrangement of angles for concrete floor

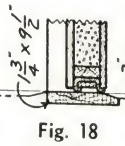


Fig. 18
Beveled Wood Sill

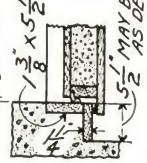


Fig. 19
High Sill

Fig. 20

Track Doors

All Jamison and Stevenson Doors can be furnished with track ports and the necessary opening and closing devices.

Fig. 20 shows the Jamison Automatic Trap Lift Devices. Track port opens and closes with positive motion simultaneously with insulated door through a simple system of levers. No springs or delicate mechanism. Wall opening must be 8 in. higher than top of rail. Otherwise dimensions same.

Always give height from floor level to top of rail (usually 7 ft. 2 in. or 10 ft. 2 in.)

Stevenson Super Freezer Door (Overlap Type)

Designed for use where extreme temperature differences exist, as in ice cream hardening rooms and fish freezers. Especially recommended for quick freeze spaces.

Standard Specifications—We furnish the insulated door without jambs (but jambs furnished if desired) complete with all necessary hardware, galvanized. For sills, see Fig. 23.

Front—Fir or spruce. No paint or varnish.

Back—Sheet metal to protect against sweating (see table).

Insulation—4, 6 or 8 in. of sheet cork in hot asphalt cement.

Seal—Chemically treated, grease saturated wool felt seal 6 in. wide attached to outer side forming ample contact and preventing freezing or sticking.

Fittings—Heavy Stevenson roller fastener or Wedgetight fastener. Flexible steel spring hinges and hinge guard or, if desired, Jamison self-tightening fastener and Jamison adjustable spring hinges.

POPULAR STANDARD SIZES

Stock No.	Size of door in clear		Wall opening			Ship. wgt. 4 in. insulation, lbs.	General
				With jambs			
	Width ft. in.	Height ft. in.	Without jambs	Width ft. in.	Height ft. in.		
80	2 0	3 0	Same as	2 4¼	3 3	350	Unless otherwise instructed, galvanized sheets furnished on front of frame and back of door. For doors swinging into anteroom we will furnish galvanized sheets on front of door.
* 82	2 6	6 0	door	2 10¼	6 3	590	
* 83	3 0	6 0	in	3 4¼	6 3	670	
* 86	4 0	6 6	clear	4 4¼	6 9	750	

*Furnished with additional hinges. Other sizes furnished when desired.

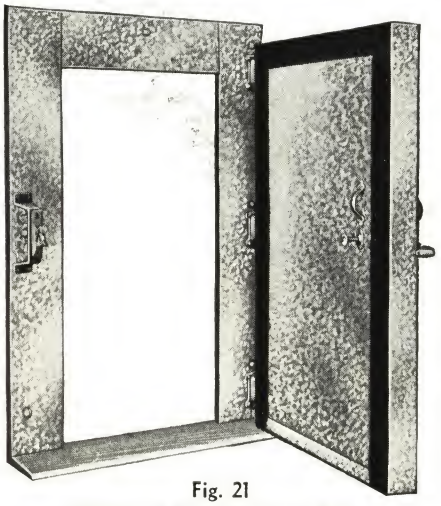


Fig. 21
Stevenson Super Freezer Door

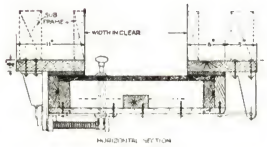


Fig. 22

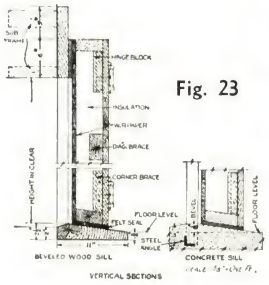


Fig. 23

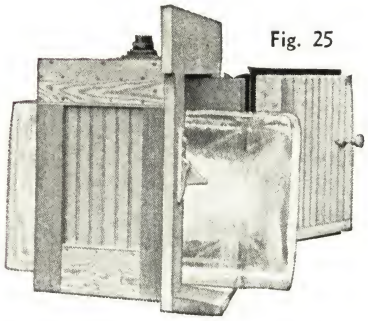


Fig. 25

Stevenson Ice Passing Chutes (Patented)

Consist of small standard insulated door and self-closing, double-swing door operating by gravity on same principle as vestibule door. No springs.

Outside door opened from inside by the advancing cake of ice. Sets entirely in the wall, made so ice slides in or out on edge (as illustrated) or upright on end. Furnished with inclined or level bottom. Ideal for handling milk or ice cream in cans or boxes. Equipped with Stevenson roller fastener, Jamison self-tightening or Wedgetight fastener as desired. Either Jamison or Stevenson hinges.

STANDARD DIMENSIONS

No.	Size in clear or Opening between jambs of frame		Shipping weight, lbs.	
	Width ft. in.	Height ft. in.	With C. S. doors	Without C. S. doors
120	1 8	2 2	230	130
122	1 8	2 2	260	140
124	1 8	4 0	400	200

Note: No. 120 has single batten; Nos. 122 and 124 have double battens. Regularly furnished with cold storage door on exit end as shown or without when specified. Door may be on entrance end when so ordered. Inclined bottom protected with steel wearing plate.

Jamison Refrigerator Fronts—Wood or Metal

Wherever temperature control at openings must be combined with unusually high standards of appearance and sanitation—as in kitchens and laboratories of hospitals, refrigerator fronts in stores and restaurants and institutions, battery fronts for morgues, etc.—Jamison offers insulated, metal-covered fronts and doors of galvanized, Monel, Allegheny or other Austenitic metals, or with porcelain fronts and backs.

All of the many Jamison advantages in operating convenience, efficiency and long service are embodied in this equipment. Hardware is of fitting character,—bronze, nickel or chromium to match. The Jamison Wedgetight fastener is furnished unless otherwise specified, as it combines appearance with operating efficiency. Built specifically to meet the temperature requirements, affording assured insulation protection.

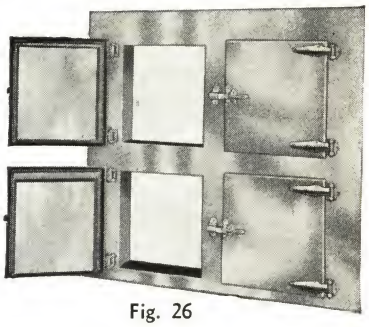


Fig. 26

Our Engineering Department is prepared to make recommendations and render estimates for any particular installation. We invite you to send for a leaflet showing typical installations of Jamison institutional equipment.

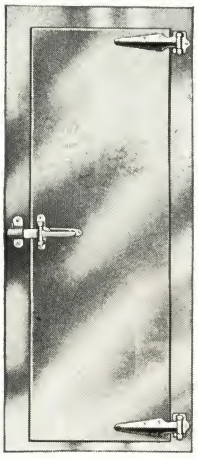


Fig. 27

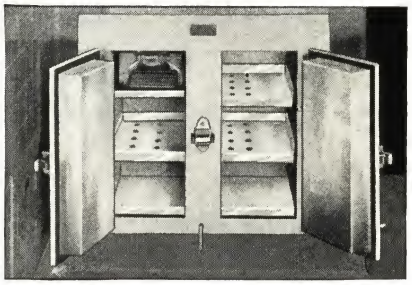


Fig. 28. Specimen Refrigerator
Finished entirely with monel metal, for Presbyterian Hospital, Philadelphia
JOHN T. WINDRIM, Architect

Other Jamison and Stevenson Products

Catalogue describing other products, such as all-steel ice chutes, Dutch doors, cold storage windows, etc., gladly sent on request.

For variations of above or special protection to meet local conditions, we invite you to consult our Engineering Department of 44 years' experience.

VICTOR PRODUCTS CORPORATION

FORMERLY VICTOR COOLER DOOR CO., INC.

"Standard" Refrigeration Products

HAGERSTOWN, MARYLAND

VICTOR BRANCH OFFICES, AGENTS AND DISTRIBUTERS

ATLANTA, GA., Victor Products Corporation, 231 Healey Building
BALTIMORE, MD., M. E. Pyles, 122 So. Eutaw Street
CHICAGO, ILL., Victor Products Corporation, 1005 Conway Building
CLEVELAND, OHIO, Fielding Wales Co., 709 Union Building
DALLAS, TEX., Central Engineering & Supply Co., 2615 Latimer Street
HOUSTON, TEX., Congleton Co., Inc., 2033 Semmes St.
LOS ANGELES, CAL., Warren & Bailey Co., 350 S. Anderson St.
NEW ORLEANS, LA., H. T. Steffee, 930 Tchoupitoulas Street
NEW YORK, N. Y., Victor Products Corporation, 366 Madison Avenue
OMAHA, NEB., Allan Ice Machine Co., 36th and K Streets
PHILADELPHIA, PA., Victor Sales Co. of Philadelphia, 1321 Arch Street
ST. LOUIS, MO., Victor Products Corporation, 369 Paul Brown Building
SALT LAKE CITY, UTAH, Louis A. Roser, 254 W. First Street, So.
SAN FRANCISCO, CAL., W. C. Phillips & Co., 273 Ninth Street
SEATTLE, WASH., Cork Insulation Co., 2410 First Ave., South

FOREIGN REPRESENTATIVES

CAPETOWN, SOUTH AFRICA, International General Electric Co., Ltd., Sun Building, St. George Street
DUBLIN, IRELAND, Irish Agricultural Wholesale Society, Ltd., 151-56 Thomas Street
MANILA, P. I., Philippine Cork Insulation Co., Quinta Building
COPENHAGEN, DENMARK, Henry Olsen Sons, Ltd., Krippelsbrogade 2
ANCOATS, MANCHESTER, ENGLAND, Bratby & Hinchliffe, Ltd., Sanford Street—Canal Street
TOKYO, JAPAN, Shime Trading Company, Ltd.

Products

REFRIGERATION DOORS:
Victor "Standard" Cooler Door.
Victor Auto-Close Vestibule Door.
Victor "Super" Freezer Door.
Victor "Standard" Track Door.
Victor Milk Can or Case Passing Door.
Special Refrigeration Doors to suit your requirements.
VICTOR ICE CHUTES; VICTOR STANDARD HARDWARE.
VICTOR DOOR CLOSERS.
Also Victor All-metal Door, Victor Fireproof Cold Storage Door, Victor "Standard" Windows, Mortuary Doors and Service Fronts, Victor "Standard" Waterproof Gaskets.
For Victor Steel Shelving, see Manufacturers' Index.

Victor Standard Hardware

Lock No. 200 is used on all Victor "Standard" Cooler, "Super" Freezer, Auto-Close Vestibule and all the larger doors.

It is finished either galvanized, polished brass, nickel or chromium.

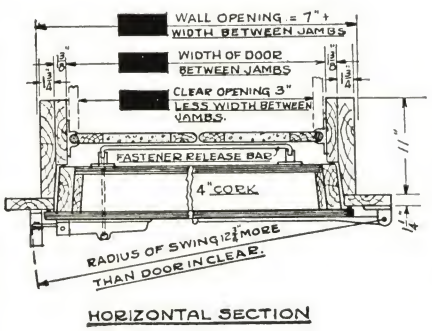
This lock is a one-motion single-action lock; just pull the handle towards you and this releases the lock, at the same time opening the door.

Victor Auto-Close Vestibule Door

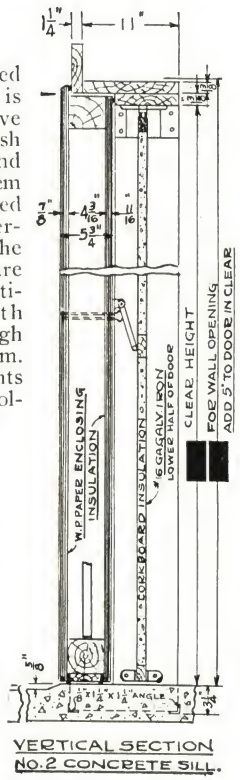
The Victor Standard Auto-Close Vestibule Door eliminates the necessity of building air locks which are expensive and consume valuable storage space. The complete unit consists of a Victor "Standard" Cooler Door mounted in a suitable frame together with a pair of double-swing self-closing Doors. The latter are also insulated and are sheathed with heavy galvanized iron.

The Victor Standard Auto-Close Door *will not* stand open. This feature prevents the loss of refrigeration so frequently incurred by leaving doors open, as is natural when hurried trips are made in and out of the freezer room. It is difficult to estimate the losses during these periods when doors are left open, but it is true that the cost of wasted refrigeration soon reaches a considerable total.

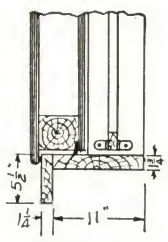
The illustration shows hinged door in open position, with glass covered ports in swing doors. Note the bar on back of hinged door which eliminates any possibility of being locked in the freezer, as it is only necessary to give swinging doors a push or bump with a hand truck which brings them in contact with hinged bar, that in turn operates the fastener. The Auto-Close Doors are practically indestructible. Bumping with trucks passing through will not injure them. Door sizes and weights shown in table on following page.



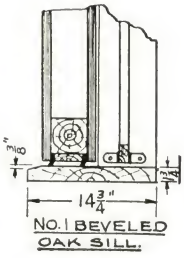
HORIZONTAL SECTION



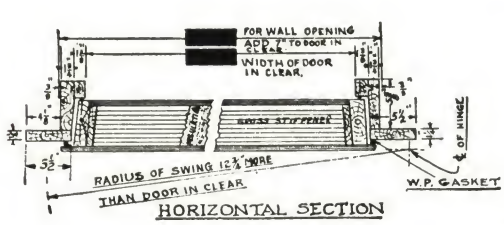
VERTICAL SECTION NO. 2 CONCRETE SILL.



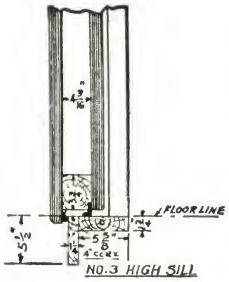
NO. 3 HIGH SILL.



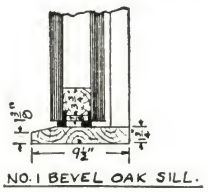
NO. 1 BEVELED OAK SILL.

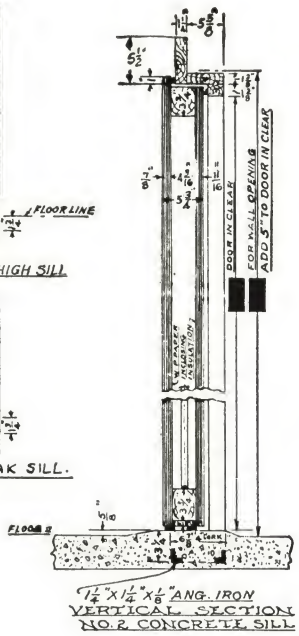


HORIZONTAL SECTION



NO. 3 HIGH SILL


NO. 1 BEVEL OAK SILL.



1¼"x1¼"x⅛" ANG. IRON
VERTICAL SECTION
NO. 2 CONCRETE SILL

Victor "Standard" Cooler Door

The Victor "Standard" Cooler Door is furnished with angle iron, beveled oak or high sill.

Insulation—Granulated cork, corkboard (4 or 6 ins.) laid between 3-ply waterproof paper. Where corkboard is used in freezer doors, it is laid in hot asphalt.

Hardware—Our Standard No. 200 Roller Fastener, as shown, is constructed of malleable castings and forged steel, galvanized by the hot dip process. Single action—easy to operate. Just pull lever forward and this one operation releases latch and operates door. Entrance doors equipped with single acting inside control.

Lumber—Panel door fronts and casings best grade yellow pine; high grade spruce or fir for backing jambs and stiffeners. Made in high grade oak, birch or ash, or plywood when especially ordered.

Brace—Iron, securely bolted in tension, with four large bolts, eliminates any possibility of joints opening. Frost line is avoided by completely covering the brace with insulation.

Shipping—All doors shipped hung in frames, complete with hardware, ready to set in place.

Victor "Standard" Door Construction—Illustrations at left show method of paneling Victor Door Fronts. Cross rails are mortised and tenoned in the stiles and pinned with iron dowels from the back. The iron brace is sufficiently strong to prevent sagging and is surrounded with insulation. Door cannot frost through. The Victor "Standard" method of bracing is patterned after bridge construction and has proven efficient in many years of use.

Victor "Standard" Track Door

Made of the same materials, with the same general specifications as the Victor "Standard" Cooler Door. The working drawing of the "Standard" Door above applies to the "Standard" Track Door as well, except that wall opening should be 7 ins. wider and 15 ins. higher than door in clear. Blue print of "Standard" Track Door and sizes on request.

The Victor "Standard" Track Door is especially suited for use in packing houses where meat or articles passed to and from storage are carried on overhead tracks. Attention is called to automatic opening device for trap door over rail port. This lifting device is unfailing in action, cannot get out of adjustment and guards against refrigeration loss through doors being carelessly left open.

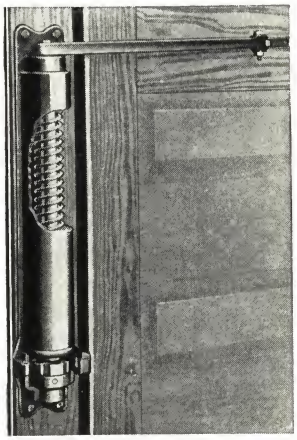
VICTOR DOORS—SIZES AND WEIGHTS

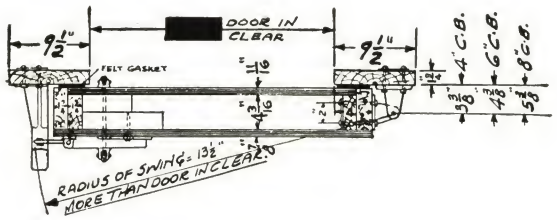
Standard size door in clear	Approximate weight, lbs.
Victor Cooler and Freezer Doors	
2′ 6″x2′ 0″	200
2′ 0″x3′ 0″	220
2′ 0″x5′ 0″	300
2′ 0″x6′ 0″	325
2′ 6″x6′ 0″	375
3′ 0″x6′ 0″	400
3′ 0″x6′ 6″	425
*3′ 6″x6′ 6″	475
*4′ 0″x6′ 6″	525
*4′ 6″x6′ 6″	575
*5′ 0″x6′ 6″	626
Victor "Super" Freezer Doors	
2′ 0″x3′ 0″	275
*2′ 6″x6′ 0″	600
*3′ 0″x6′ 0″	700
*4′ 0″x6′ 6″	800
Victor Vestibule Doors (Auto-Close)	
2′ 6″x6′ 0″ (Single Batten)	580
3′ 0″x6′ 0″ (Double Batten)	625
*3′ 6″x6′ 6″ (Double Batten)	700
*4′ 6″x6′ 6″ (Double Batten)	810
*4′ 6″x6′ 6″ (Double Batten)	950
*5′ 0″x6′ 6″ (Double Batten)	1025

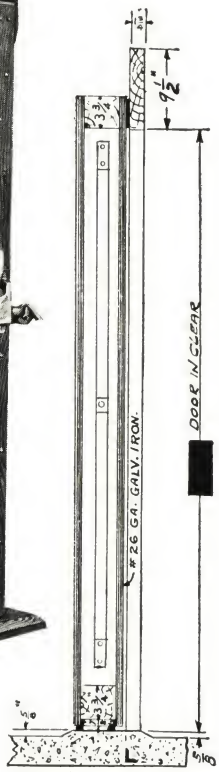
*Includes three hinges.

Victor Door Closer

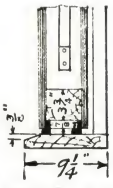
A trial of this superior door closer will quickly prove its worthiness. The cost is small and quickly repaid by the saving effected in preventing loss of refrigeration. Can be installed in a few minutes on any make of door. Designed to give years of service under heavy duty conditions. Made in one size only, right or left hand, and will quickly close the largest door. Furnished with galvanized finish unless other finish is specified. Spring tension adjustable to individual door to which Victor Door Closer is attached. Provision made so door can remain open for a period when desired. The heavy coil spring is completely housed. Casing is cut away in illustration to show spring construction.



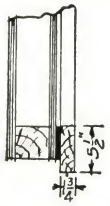




NO.2 CONCRETE SILL
VERTICAL SECTION



NO.1. BEVEL OAK SILL.



NO.3. HIGH SILL

Victor "Super" Freezer Door

This door, illustrated above, was especially designed for hardening room, etc. where it is desired to maintain an extremely low temperature or where on account of conditions ice would have a tendency to form in the doorway. This door cannot freeze in the frame and never need to be cut or forced open. Sizes and weights shown in table on preceding page.

The Victor "Super" Freezer Door can also be supplied with auto-close vestibule door. This gives added refrigeration protection, assuring a closed door at all times.

Blue Prints of Standard "Super" Freezer Door also "Super" Freezer Vestibule Door upon request.

Victor All-steel Ice Chute

This chute is constructed of steel plates and angles of proper proportions, with patented curve door, cork insulated and carefully fitted with waterproof gaskets at points of contact. Door is pivoted on cold rolled steel shaft carefully balanced and requiring no springs to operate. No wood is used in construction and all joints, including door joints, are riveted or welded

Door and other exposed parts are insulated with corkboard. The chute will last indefinitely.

When block of ice enters opening, the top forward edge comes in contact with curved door, which is so balanced that but little force is required to open door. This eliminates broken corners on blocks of ice.

Victor All-steel Ice Chutes are also made with cold storage door on discharge end if desired. All bottoms are made slanting unless otherwise specified, eliminating necessity of a man pushing blocks of ice through. The curved door strikes on waterproof gasket securely fastened to angle iron riveted to side of chute with curve corresponding to curve of door.

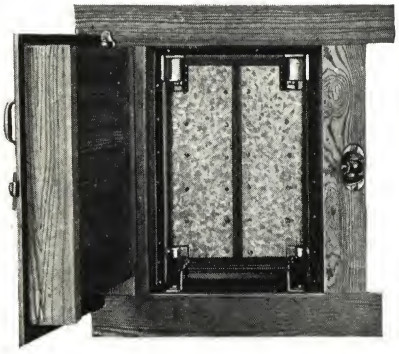
Weighted flapper on point of door completes the seal. This is an *exclusive Victor feature.*

A greater quantity of ice can be handled with this chute than through a door. Also, the chute does not stand open waiting for some one to close it. The block of ice fills the opening so that practically no cold air escapes while passing. Door automatically closes behind ice block in one second, reducing temperature loss to a minimum.

Provide wall opening 16 ins. wide by 37 ins. high for single chute. The Victor Standard Ice Chute can be furnished either single, double, or in batteries.

Victor Milk Can or Case Passing Door

This door was developed to meet the demand for an automatic closure for passing milk cans, crates or cases without upsetting. Formerly, it was necessary to use an ordinary hinged or sliding door that could easily be left open for indefinite periods, involving tremendous loss of refrigeration.



The Victor Can or Case Passing Door is so sensitive that it closes a fraction of a second behind each entry.

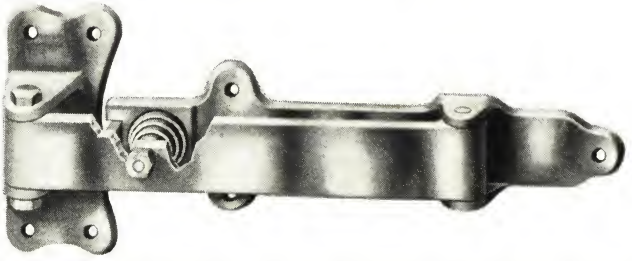
The roller bottom operates in unison with Victor gravity conveyor both to and from the door.

Standard sizes are as follows:

Clear Opening: Can passage, 2′ 0″x2′ 9″; crate passage, 2′ 6″x1′ 9″; combination can and crate passage, 2′ 6″x2′ 9″.

Wall Opening: 7″ wider and 5″ higher than clear opening.

Victor Self-adjusting Hinge



Heavy duty is imposed upon the refrigerator door hinge. It must bear strain and be sufficiently rugged and strong to carry weight of the huge door and prevent sagging. Victor Self-adjusting Hinge assures effortless, smoothly operating door motion and meets the most rigid requirements.

Made in either malleable iron, cast manganese bronze or cast brass. Finished in either nickel, cadmium, chromium or galvanized.

Made only in 17 and 23-in. sizes.

Estimates, etc.

When writing for quotations or ordering, please supply all the information possible, including:

(1) Size of door. (Use stock sizes where practicable.) Sizes are listed on the preceding page. Unless otherwise specified, 4-in. granulated cork will be furnished.

(2) State specifically character of door.

(3) Give approximate temperature, both inside and outside of door.

(4) Kind of insulation preferred.

If you will advise purpose for which door is to be used we will be glad to offer suggestions as to the most practicable insulator.

(5) Give all dimensions necessary, see tracing.

(6) Specify whether right or left-hand door is wanted. Unless otherwise specified, we will ship right-hand door.

(7) Kind of sill. See tracing.

(8) Finish of hardware: galvanized, nickel, chromium or polished brass.

(9) Track doors; please specify height to top of track rails. This is very essential.

THE INTERNATIONAL NICKEL COMPANY, INC.

Monel Metal and Nickel and Allied Products

EXECUTIVE OFFICES
67 Wall Street
NEW YORK, N. Y.

MINES AND SMELTER: Copper Cliff, Ont., Canada
ROLLING MILL AND REFINERY: Huntington, W. Va.
REFINERY: Port Colborne, Ont., Can.
FOUNDRY: Bayonne, N. J.

For Our Other Products, see Manufacturers' Index
For Distributers, see our page on Metals

Products

MONEL METAL—available from stocks conveniently located throughout the country and made in all commercial forms required by manufacturers of refrigerators. (See Manufacturers' Index, our section on Metals, for commercial forms and location of warehouses.) All necessary accessories such as nuts, bolts, screws, rivets, etc., are also available.

INCO MONEL METAL
TRADE-MARK

Monel Metal

Monel Metal is a registered trade-mark applied to a technically-controlled nickel-copper alloy of high nickel content. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

Advantages of Monel Metal for Refrigerators

(1) Absolutely rustproof.
(2) Resists corrosion by food juices and fruit acids.
(3) Strong as steel; tougher than steel.
(4) Easy to clean; therefore sanitary.
(5) Beautiful appearance; has color of platinum.
(6) Low conductivity—retains heat or cold.
(7) Durable—proven by over 20 years of service.
(8) Easily fabricated.

Proven Uses of Monel Metal in Refrigerator Equipment

Monel Metal is used for all exposed surfaces where appearance, cleanliness and long life are required on the following types of refrigerator equipment:

Built-in Refrigerators—Doors, linings, shelving.
Cabinets—Linings, exteriors (front, sides, etc.) trim and shelving.
Cold Food Storage Fixtures—All Monel Metal.
Cold Storage Doors—Linings, facings.

Services

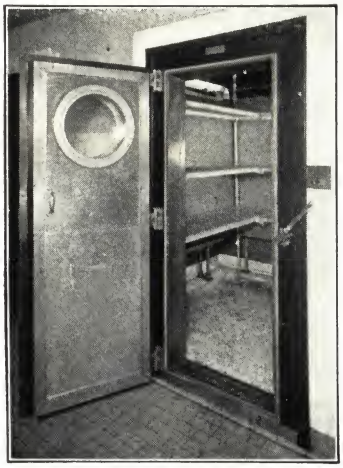
Architects and engineers are invited to make use of the extensive advisory service maintained by this organization. A call to any of our sales offices, listed in our section on Metals, will bring you a specialist trained in the particular application of Monel Metal you are dealing with.

In co-operation with refrigeration engineers, Monel Metal specialists can contribute materially in the application of Monel Metal to refrigerator equipment.

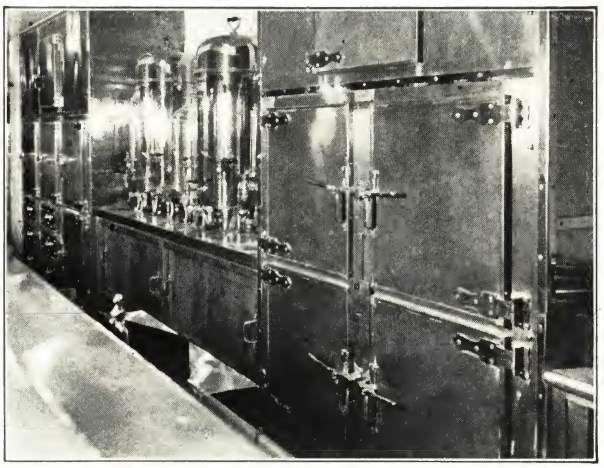
Available Publications

To assist architects and engineers to form a clearer conception of the possibilities for the application of Monel Metal, THE INTERNATIONAL NICKEL COMPANY, INC., has prepared a special reference book on all types of food service equipment.

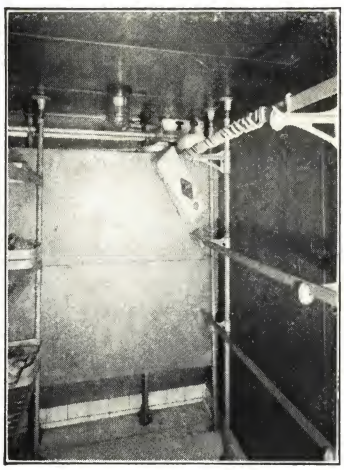
"The Selection of Food Service Equipment"—A reference book prepared for the profession. Contains complete information on the design and construction of food service equipment, recommended gauges for various items of equipment and illustrations of correct methods of writing specifications for all types of equipment. *A special section of this handbook deals exclusively with refrigerator equipment.*



Door and Entrance of Refrigerator in New York Life Savarin Restaurant Are Lined with Monel Metal



Monel Metal Equipment Installed in the Manhattan Room of the Hotel New Yorker, New York, N. Y.
Monel Metal is used on the inside and outside of refrigerators



N. Y. Life Savarin Restaurant Refrigerators Are Lined with Monel Metal, with Seams Lock-jointed and Finished

McCRAY REFRIGERATOR SALES CORPORATION

Manufacturer of Refrigerators for All Purposes

55 Lake Street, KENDALLVILLE, IND.

SALESROOMS IN ALL PRINCIPAL CITIES—SEE TELEPHONE DIRECTORY

Products

REFRIGERATORS and COOLERS.

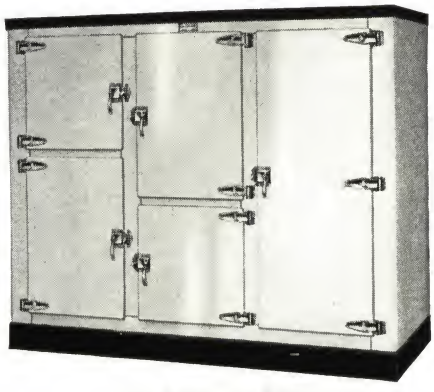
Also Display Cases for all purposes for either ice or machine refrigeration.

Material and Workmanship in McCray Refrigerators and Cooling Rooms

Suitable, seasoned and kiln-dried lumber is the most important material entering into construction of any refrigerator or cooling room. All lumber is carefully selected and air-dried for six months or more before entering the dry kilns, wherein the curing process is completed to a precise degree. By proper steam and heat treatment the moisture content and shrinkage are reduced to a suitable minimum, and the lumber is under constant observation during the process. Successive, carefully conducted laboratory tests tell when the lumber has been sufficiently treated. The heat is then slowly reduced, the lumber is allowed to cool gradually to prevent checking and finally withdrawn ready for manufacturing.

The properly selected and prepared lumber is manufactured into McCray refrigerator and cooling room parts by special woodworking machinery, insuring accuracy of fit and interchangeability of all parts. The gluing, assembling and finishing of the units are accomplished by skilled workmen, under direct supervision of men who have spent a lifetime in the building of high-grade McCray refrigerators.

Stock Model P-424
For machine refrigeration only

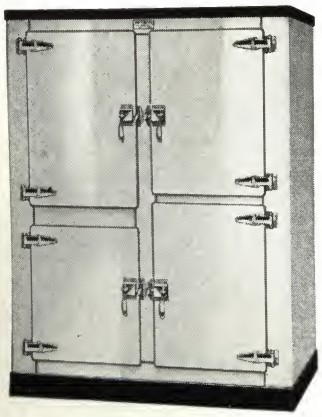


Stock Model P-332
For ice or machine refrigeration

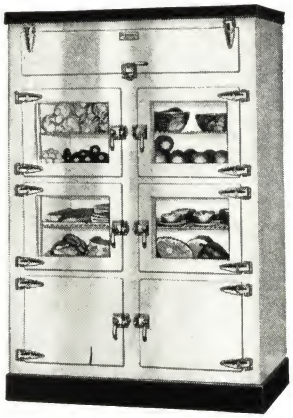
DIMENSIONS AND GENERAL DATA

Model No.	Outside dimensions, in.			Cooling chamber, in.			Ice capacity, lbs.	Cu. ft. capacity	Shelf space, sq. ft.
	W	D	H	W	D	H			
P-424	83	30½	84	74	18½	9	...	70.33	69.36
P-332	84⅜	32¼	74⅜	26	23¾	38⅝	450	56.5	33.5
P-375	52⅝	32¼	72⅜	21	23¾	32⅝	275	32.6	27.39
P-425	57	30½	84	48	18½	9	...	45.62	45.
375	52½	30	72	21	22	32	250	30.58	24.73

Model No.	Wall thickness, in.	Number of doors	Insulation	Exterior	Interior	Shipping weight, lb.
P-424	4	10	Corkboard	Porcelain	Porcelain	2350
P-332	4	5	Corkboard	Porcelain	Porcelain	1900
P-375	4	4	Corkboard	Porcelain	Porcelain	1275
P-425	4	7	Corkboard	Porcelain	Porcelain	1825
375	4	4	Corkboard	Oak	Porcelain	1150



Stock Model P-375
For ice or machine refrigeration



Stock Model P-425
For machine refrigeration only

Stock Model 375
For ice or machine refrigeration

Efficiency from an operating standpoint is gained by the special method of building into the refrigerator structure the best known insulating materials. The permanency of the units depends on this method, which prevents the air infiltration through the insulated parts, thereby eliminating the danger of moisture accumulation between outer and inner linings. Airproofing of insulation in refrigerator and cooling room structures has always been an outstanding feature of McCray factory built units and is a recognized necessity to insure lasting and sanitary construction.

McCray quality is insured by advanced design and rugged construction in minutest detail, coupled with efficient manufacturing methods in the hands of skilled and trained men in every department.

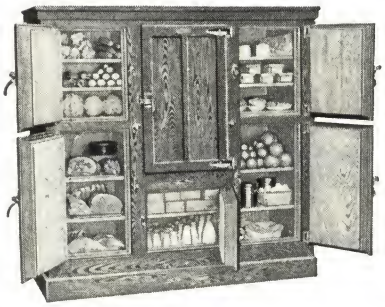
Service

This organization with its large facilities can serve you effectively through its many Branch Offices, located in all principal cities throughout the United States. Special engineering service is offered, and no obligation is incurred by consulting with us regarding your refrigerator problems. Our experience is at your command, and however small or large your installation may be, we are in excellent position to plan and execute your work in an economical and efficient manner.

DIMENSIONS AND GENERAL DATA

Model No.	Outside dimensions, in.			Cooling chamber, in.			Ice capacity, lbs.	Cu. ft. capacity	Shelf space, sq. ft.
	W	D	H	W	D	H			
320	69	30	72	19	22	32	240	41.5	36.35
1135	93½	34¾	84	30	26	39	630	88.56	51.83
171	120	60	96	28½	46½	63½	2100	273.72	.....
3175	144	60	132	26½	48	35	3600	473.03	.....
432	87½	31¼	75	28½	22⅝	34	425	63.5	40.72
120	72½	29¼	72	23½	20⅝	37	340	44.2	37.5

Model No.	Wall thickness, in.	Number of doors	Insulation	Exterior	Interior	Shipping weight, lb.
320	4	6	Corkboard	Oak	Porcelain	1500
1135	4	5	Corkboard	Oak	Odorless wood	2025
171	5	3	Corkboard	Oak	Odorless wood	5000
3175	5	6	Corkboard	Oak	Odorless wood	7500
432	4	5	Corkboard	Oak	Odorless wood	1650
120	4	6	Corkboard	Oak	Odorless wood	1160



Stock Model 120
For ice or machine refrigeration

Stock Model 1135
For ice or machine refrigeration

Built-to-order Model 3175
For ice or machine refrigeration

Stock Model 320
For ice or machine refrigeration

Stock Model 432
For ice or machine refrigeration

Stock Model 171
For ice or machine refrigeration

ESTABLISHED 1849

THE JEWETT REFRIGERATOR CO.

GENERAL OFFICE AND FACTORY
BUFFALO, N. Y.

BRANCH OFFICES

ATLANTA, GA., 292 Spring Street, N. W.
BOSTON, MASS., 79 Milk Street
CHICAGO, ILL., 228 No. La Salle Street
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CLEVELAND, OHIO, 2341 Carnegie Avenue
DETROIT, MICH., 608 Michigan Theater Building
LOS ANGELES, CAL., 722 Story Building
MONTREAL, QUE., 620 Cathcart Street
NEW YORK, N. Y., 10 E. 40th Street
PHILADELPHIA, PA., 2401 Chestnut Street
PITTSBURGH, PA., 233 Oliver Avenue
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PORCELAIN WORKS: LACKAWANNA, N. Y., and CANADIAN WORKS, BRIDGEBURG, ONTARIO

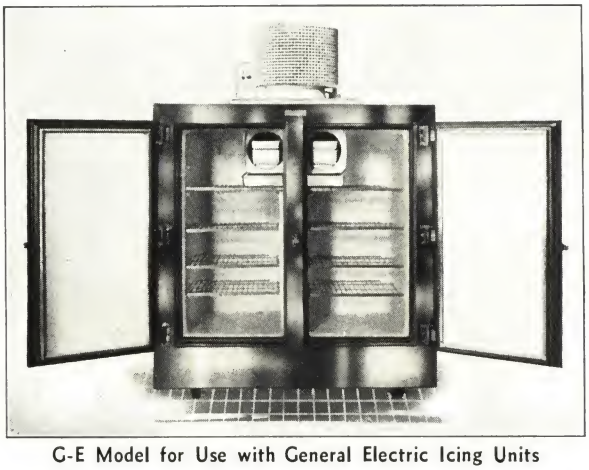
JEWETT REFRIGERATORS WITH SOLID PORCELAIN LINING OF SEAMLESS CONSTRUCTION—FOR RESIDENCES AND HOSPITALS

These have the unusual construction of an interior lining of *solid porcelain* (snow-white earthenware 1¼ in. thick), glazed and fired at 2500° F. The compartments for food as well as for the mechanical apparatus (or ice) are likewise of solid porcelain, without a seam, joint, crack or square corner. The shelves are the only metal part in the refrigerators. With this solid porcelain lining and pure cork insulation, these refrigerators are particularly adapted for use with any type of electric refrigeration you may select. Complete catalogue will be furnished on application.

JEWETT
SOLID PORCELAIN REFRIGERATORS

In addition to the regular Jewett Solid Porcelain Refrigerators, we have available twelve models of Jewett Solid Porcelain Refrigerators designed for use with General Electric icing units, illustrated in brochure which we invite you to write for.

Jewett Solid Porcelain Refrigerator Installed



G-E Model for Use with General Electric Icing Units

BUILT-TO-ORDER REFRIGERATORS FOR HOTELS, HOSPITALS, CLUBS AND INSTITUTIONS—MORTUARY REFRIGERATORS

Special built-to-order refrigerators, constructed from detailed drawings and specifications, have been installed as indicated in the following reference lists.

We offer our services, without obligation, in designing suitable refrigerators for the uses intended.

PROMINENT RECENT INSTALLATIONS OF JEWETT BUILT-TO-ORDER REFRIGERATORS AND THEIR ARCHITECTS

Residences

James P. Donahue, Palm Beach., Fla., *Marion Sims Wyeth*
Edsel Ford, Detroit, Mich., *Albert Kahn, Inc.*
James W. Gerard, New York, N. Y., *Trowbridge & Livingston*
S. M. Halle, Cleveland, Ohio, *Corbusier, Lenski & Foster*
R. T. Crane, Ipswich, Mass., *David Adler and Robt. Work*
Angelica Gerry, Lake Delaware, N. Y., *Cram & Ferguson*
Harold Lloyd, Beverly Hills, Cal., *Webber, Staunton & Spaulding*
Edward F. Hutton, Palm Beach, Fla., *Marion Sims Wyeth*
John D. Rockefeller, Jr., New York., N. Y., *W. W. Bosworth*
George W. Reed, Beverly Hills, Ill., *James Roy Allen*

Hospitals

New York Hospital & Cornell Medical College, New York, N. Y., *Coolidge, Shepley, Bulfinch & Abbott*
University of Chicago Hospitals, *Coolidge & Hodgson*
Pontiac City Hospital, *L. J. Heenan*
Lenox Hill Hospital, New York, N. Y., *York & Sawyer*
Clinic Building, Yale University, New Haven, Conn., *Henry C. Pelton*
Maternity and Children's Hospital, Cleveland, Ohio, *Abram Garfield*
Columbia Presbyterian Medical Center, New York, N. Y., *James Gamble Rogers*
Toronto General Hospital, Toronto, Ont., *Darling & Pearson*
De Paul Hospital, St. Louis, Mo., *O'Meara & Hills*

Clubs, Office Buildings and Institutions

New York Life Insurance Co., New York, N. Y., *Cass Gilbert, Inc.*
Aetna Life Insurance Co., Hartford, Conn., *James Gamble Rogers*
Western Electric Co., Cable Plant, Baltimore, Md.
Sun Life Assurance Co., Montreal, Que., *Darling & Pearson*
Union League Club, New York, N. Y., *Benj. W. Morris*
Canada Life Assurance Co., Toronto, Ont., *Sproatt & Rolph*
Cleveland Club, Cleveland, Ohio, *Meade & Hamilton*
Toronto Union Station, Toronto, Ont., *Ross & MacDonald*

Hotels

Chateau Laurier, Ottawa, Ont., *John S. Archibald and John Schofield*
All 6 Statler Hotels, *Geo. B. Post & Sons*
Constant Spring Hotel, Kingston, Jamaica, *Warren & Wetmore*
Royal York Hotel, Toronto, Ont., *Ross & MacDonald*
New Palmer House, Chicago, Ill., *Holabird & Roche*
Hotel Pennsylvania, New York, N. Y., *Warren & Wetmore*
The Stevens, Chicago, Ill., *Holabird & Roche*
The Biltmore, Los Angeles, Cal., *Schultze & Weaver*
Chateau Frontenac, Quebec, Que., *W. S. Maxwell*
The Olympic, Seattle, Wash., *Geo. B. Post & Sons*
Manor Richelieu, Murray Bay, *John S. Archibald and John Schofield*

COPELAND SALES COMPANY

Dependable Electric Refrigeration

MOUNT CLEMENS, MICH.

Copeland

DEPENDABLE ELECTRIC REFRIGERATION

"For those who want the finest"

PRODUCTS

Dependable ELECTRIC REFRIGERATORS for homes and apartments in a full range of low price, medium and deluxe models.

A complete line of COMMERCIAL EQUIPMENT for meat markets, grocery stores, lunchrooms, clubs and hotels, soda fountains, bakeries and dairies, florists' shops, motor trucks, yachts.

A complete line of WATER COOLERS for offices, schools, apartments and industrial installations.

Special EQUIPMENT for ROOM COOLING.

COPELAND ELECTRIC REFRIGERATORS

Organization

Copeland is one of the older companies of the industry and one of the leaders in engineering and research developments. Many of the accepted features of electric refrigeration today were pioneered by Copeland. A model plant is located at Mount Clemens, Michigan, 20 miles northeast of Detroit.

Design

Copeland equipment is designed for dependable operation over a long period of years, giving proper refrigerating temperatures at low cost. Compressor unit is housed in a locked machine compartment—a safety factor which protects the unit from amateurish tampering or inquisitive baby fingers.

DeLuxe Models

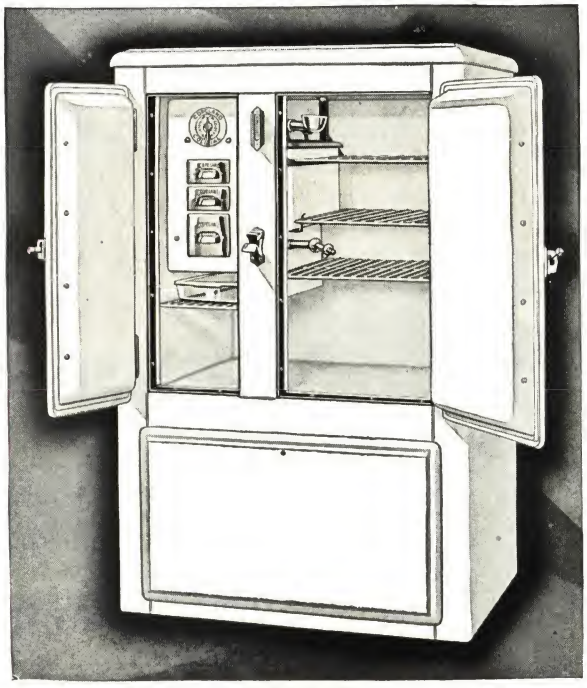
For those who want the finest in electric refrigeration. The "D" and "E" models are all porcelain, inside and out; ice water at the press of a button; Coldial for faster freezing or defrosting; automatically electric lighted interiors; double depth trays for making ice in large cakes or freezing plentiful supplies of desserts; one rubber tray; two-tone chromium hardware; eight color top selections; "E" Models have Coldrawer for frozen foods or freezing extra 10-lb. block of ice, and Coldcrisper for vegetables.

The "P" Models

The "P" Models have all porcelain cabinets. Equipped with Coldial, automatically electric lighted interiors, double depth tray; one rubber tray. Water chiller extra.

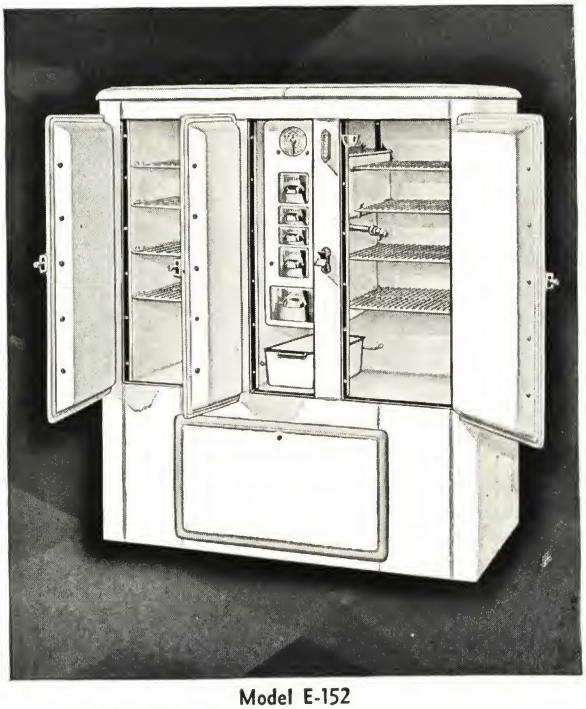
The "A" Models

Exterior finish of white enamel on steel; interior finish, white vitreous porcelain on Armco iron, with rounded coves. Coldial, double depth tray. Automatically electric lighted interiors.



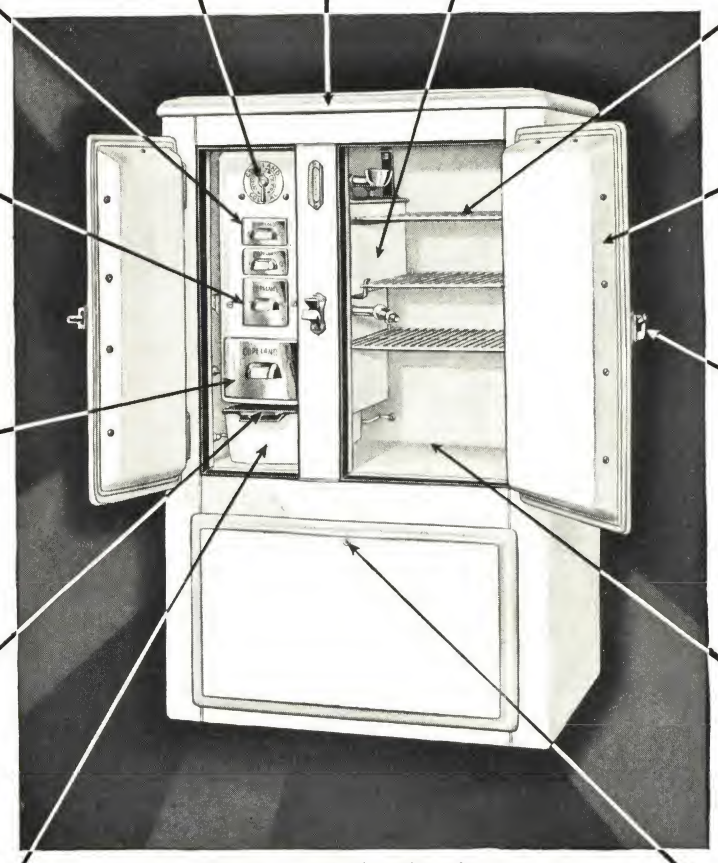
Model D-661

Model E-661 has similar interior, with addition of Coldrawer and Coldcrisper, as shown in E-152



Model E-152

The ideal electric refrigerator for the large family



Ice Cubes
Always in abundance for every purpose

Coldial
Conveniently placed within cabinet; direct connection; for faster freezing or defrosting

Clear Top
Additional shelf space to kitchen or permits "built-in" installation

Water Chiller
A drinking fountain, available for all models

Bar Shelves
All have convenient height—no stooping—dishes slide easily and do not tip

Double Depth Tray
For freezing desserts, mousses, etc., or 54 ice cubes at once

Coldrawer
Low temperature compartment for frozen foods, meat, fish, ice cream storage or extra ice freezing, a 10-lb. block

Cold-Tray
A deep cover to the Coldcrisper for chilling salads, etc.

Coldcrisper
Keeps lettuce, celery and similar vegetables crisp and fresh for days

Doors
Heavy, tight fitting doors with double gaskets

Attractive Hardware
Two-tone chromium plated, substantial and tarnishproof

Rounded Corners and Coves
As easy to clean as a porcelain dish

Locked Machine Compartment
Protects the units from amateurish tampering and from inquisitive baby fingers

Cold-Hold
Cooling unit, like a reservoir, stores up cold; reduces frequency of operating periods, maintains a low temperature for hours if the current has been shut off.

Electrically Lighted
Lighted automatically with the opening of the door, no dark corners.

Excess Power
Quiet, improved design in suspension and counterbalance eliminates vibration and insures quietness. All units powered to carry the excessive refrigeration load of hot weather.

Appearance
Cabinets of all sizes are constructed to withstand years of service, built with design that adds beauty to the finest kitchen. Colored tops; available in eight attractive colors.

Condensing Unit
Unobtrusive, simplified to the last degree, yet entirely accessible; protected by locked compartment.

Rubber Ice Trays
One rubber ice tray is supplied with each cabinet.

Features of the Copeland Dependable Electric Refrigerator

Model A-701
Model P-701 is of same size, but has an all-porcelain cabinet

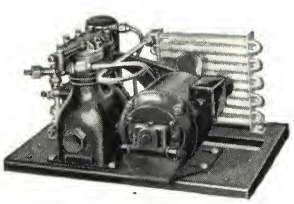
GENERAL SPECIFICATIONS OF COPELAND HOUSEHOLD ELECTRIC REFRIGERATORS

Model	Over-all dimensions, in.* Height less legs**	Width	Depth	Food storage, cu. ft.	Shelf area, sq. ft.	Ice cubes	Ice, lb.
D-661	52 3/8	34 1/8	26 1/16	6.6	11.7	108	6.95
D-901	59 5/8	34 1/8	26 1/16	9	14	162	10.6
E-661	52 3/8	34 1/8	26 1/16	6.6	11.7	108	6.95
E-901	59 5/8	34 1/8	26 1/16	9	14	162	10.6
E-152	59 5/8	52	26 1/16	15	24.3	162	10.6
P-551	50	28 1/4	26	5.5	10.8	108	6.95
P-701	56	28 1/4	26	7	14	108	6.95
A-551	50	28 1/4	26	5.5	10.8	108	6.95
A-701	56	28 1/4	26	7	14	108	6.95
A-411	48	24 3/4	23 3/16	4	8.75	63	4.05
A-521	54	24 3/4	23 3/16	5.23	8.75	63	4.05

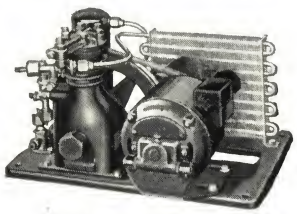
*Including top, gliders, tubing, doors less hardware.
**Legs are 8 in. including gliders, giving a net increase in height of 6 7/8 in.

Special Notice

Because of the possibility of change in the manufacturing specifications of some models since this catalogue went to press, we suggest that you communicate with the local Copeland distributer or dealer, or direct with the home office, for confirmation of the specifications of the various models listed on these pages.



Condensing Unit No. 1
Single-cylinder compressor, operated by 1/6 hp. motor. Equipped with rubber tipped legs and belt guard for remote installation



Condensing Unit No. 2
Twin-cylinder compressor, operated by 1/4 hp. motor. Equipped with rubber tipped legs and belt guard for remote installation

COPELAND COMMERCIAL EQUIPMENT

Vertical Surface Coils

Copeland was one of the pioneers in the development of an efficient system of Commercial Electric Refrigeration. There are 92 sizes of Copeland-Larkin 100% vertical surface coils for all business places where food or other merchandise should be kept without dehydration.

Construction Advantages

(1) Materials with great heat conductivity. (2) Vertical cooling surface (most efficient means of cooling). (3) Compact design. (4) Fewer joints. (5) Light weight. (6) Sturdy construction. (7) Skilled workmanship. (8) A type and size for every refrigerator. (9) Lower cost per unit of cooling surface.

Operating Advantages

(1) Greater refrigeration capacity. (2) Lower operating cost. (3) Eliminates loss from dehydration. (4) Completely automatic (no defrosting). (5) Uniform temperatures. (6) Proper air circulation.

Special Applications

The Copeland Engineering Staff, through Copeland distributers and dealers, is prepared to co-operate with architects and engineers in the preparation of specifications to meet any special requirement for refrigeration.

Dairy Cooling Equipment

Copeland's pioneering in the use of Dry Expansion System has provided one of the most successful low cost Dairy equipments. It is adaptable for every type of dairy need.

Apartment House Refrigeration

Copeland has been unusually successful in apartment house multiple installations. The great flexibility of the Dry Expansion System permits a large number of cabinets at remote locations on one compressor. This one feature has won the approval of architects, owners and builders.

Self-contained Copeland equipment is also available.

Water Coolers

Both the bottle type cooler and the circulating system are provided by Copeland. City pressure self-contained type also available.

Room Coolers

A time-tested unit for homes, offices, restaurants, tearooms, florists' shops, etc.

The Copeland system is automatic and operates at low cost. It lowers temperature, reduces humidity and circulates the air.

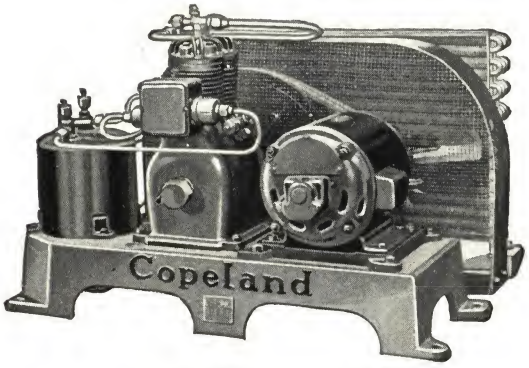
Complete details on request.

Type GM.
Copeland-Larkin Coils
for Commercial Refrigerators

Designed so compactly that they provide 100% vertical cooling surface for every type refrigerator

Type TS.
Display Cases Coils

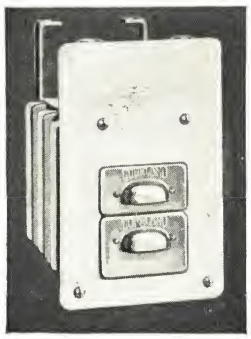
Seven types, each in several sizes, are provided to meet the requirements of the many kinds of display cases



Model XA Condensing Unit

Two-cylinder compressor; air-cooled; 1½ hp. motor; over-all dimensions, 39¼ in. long, 23⅞ in. wide, 24¾ in. high. Capacity, 1200 lbs. ice melting equivalent per 24 hours.

All Copeland compressors last far beyond the usual expectancy and set a standard of economical, quiet, operation



Model 7-A-1 Cold-Hold

For apartment house cabinets; 1 shallow and 1 deep tray, total of 63 ice cubes. 7⅞ in. wide, 12¼ in. deep, 12$\frac{13}{16}$ in. high.

The Cold-hold, as in the case of Copeland household equipment, acts as a reservoir and stores up cold, reducing frequency of operation and current consumption

Model B Water Cooler

Self-contained water coolers are provided in three types.

The Copeland ice water generator is recommended for office buildings, large factories, and restaurants where a large supply of cold water is needed

ELECTROLUX REFRIGERATOR SALES, INC.

Household and Commercial Gas Refrigeration

FACTORY AND GENERAL OFFICES
EVANSVILLE, IND.

ADMINISTRATIVE OFFICES, 51 East 42nd Street, NEW YORK, N. Y.

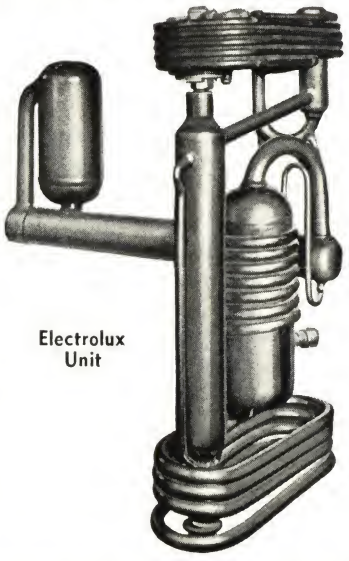
ELECTROLUX REFRIGERATORS HAVE NO MOVING PARTS

Sealed Operating Unit

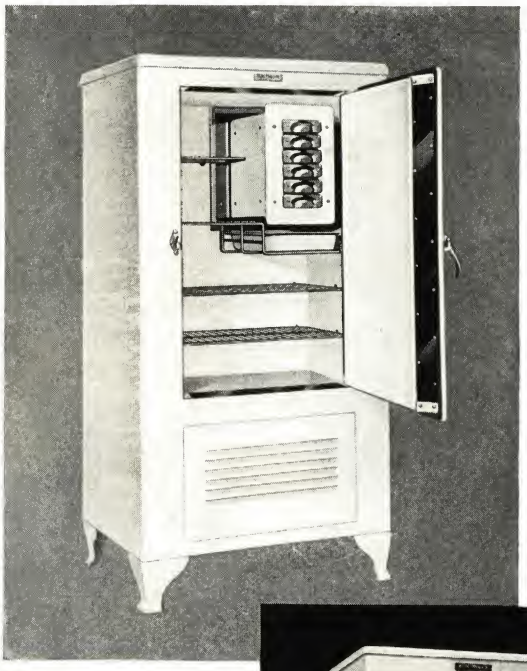
There are no moving parts, compressors, belts or other machinery in an Electrolux. It operates entirely by the absorption principle of refrigeration. The illustration shows the complete Electrolux Unit. The simple, compact unit is of steel construction, oxy-acetylene welded at the factory. The cooling coils are of copper. Only three simple connections are needed to put the Electrolux in operation.

Should the gas flame go out for any reason, an automatic cut-off instantly stops the flow of gas.

ELECTROLUX REFRIGERATOR SALES, INC., will be glad to send you a catalogue and complete data, and also offers a free consulting service on gas refrigeration.



Electrolux Unit



Above:
Electrolux Senator Model EA65

Right:
Electrolux Water Cooler

Cabinet Construction Features

Cabinet frames are of hardwood, screwed — not nailed together. The paneling is high grade steel with lacquered finish. Interiors are genuine porcelain. Special Electrolux insulation is used. All hardware heavily chromium plated brass. Chilling units are cast aluminum alloy. A thermostat controls gas consumption, maintaining proper temperature in food compartment and insuring economical use of fuel.

Refrigeration for the Private Residence or Apartment

Electrolux Refrigerators are made in the following models:

No.	Capacity, cu. ft.	Number of ice cubes	Height, in.	Width, in.	Depth, in.
EA–3	3	36	36 9/32	26 1/16	19 3/4
EA–3A	3	36	55 13/32	21 1/8	22 5/16
EA–4	4	36	52 9/16	24 3/4	24 5/8
EA–5	5	40	31 17/32	37 1/16	25 5/8
EA–5B	5	45	54 31/32	25 3/4	25 1/2
EA–6.5	6.5	54	62 7/8	33 1/4	27 7/16
EA–8	8	60	66 5/16	33 3/4	25 1/4
EA–10A	10	70	67 1/4	36 3/4	25 5/8

In addition to these models there are special units combining either a model EA-3 or EA-5 with a gas range.

For Shops, Hotels, Restaurants and Large Estates

The following models are available:

No.	Capacity	Number of ice cubes	Height, in.	Width, in.	Depth, in.
EA–18	18 cu. ft.	140	68 5/8	63 5/8	25 1/8
EA–20	20 cu. ft. 2 fruit baskets	None	68 5/8	63 5/8	25 1/8
EA–U	2.5 cu. ft. Storage	196	39	33 7/16	28 7/16

For Offices

Model EL-CA Electrolux water cooler is equipped with chromium plated faucets for both ice water and city water. Capacity is approximately 2 gals. per hour with 30° temperature reduction. Dimensions—21 1/8 ins. wide, 26 1/4 ins. deep, 55 ins. high. Color—white. Has regular automatic safety burner.

GENERAL ELECTRIC COMPANY

ELECTRIC REFRIGERATION DEPARTMENT
Hanna Building
1400 Euclid Avenue
CLEVELAND, OHIO

GENERAL ELECTRIC REFRIGERATORS

Product

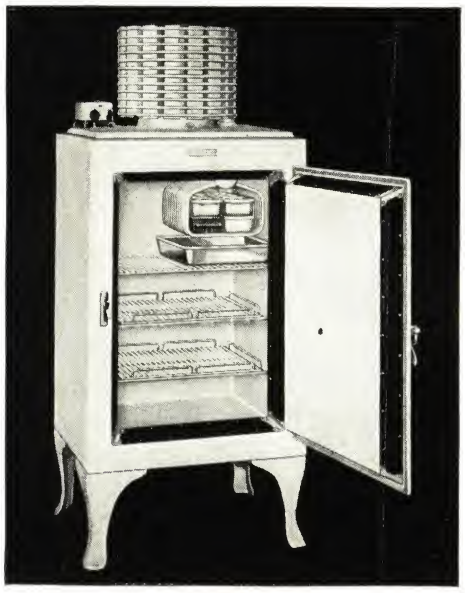
GENERAL ELECTRIC REFRIGERATORS — for homes, apartments, clubs, restaurants, stores, institutions, hospitals and steamships.

Design

Designed to (1) occupy little space, (2) eliminate exposed moving parts, (3) require no attention, not even oiling, (4) eliminate servicing to a minimum, (5) provide constant refrigerating temperatures automatically, and at low cost, (6) reduce the possibility of gas leaks and other causes of failure to a minimum.

Development

The GENERAL ELECTRIC COMPANY needs no introduction to the architect, for G-E products everywhere bear a reputation for excellence.



Model SS-62

In this age of electric refrigeration, a demand for a refrigerator bearing the G-E trade-mark was naturally created.

The demand made upon G-E engineers was as follows:

"Build us an electric refrigerator which will operate for years without attention. Make it spacious, sanitary, economical—eliminate all need for adjustment and oiling. Design it for the home and manufacture it with care."

It is done. The GENERAL ELECTRIC REFRIGERATOR meets the specifications. It is the result of fifteen years of research and experimentation by the GENERAL ELECTRIC COMPANY.

Several thousand electric refrigerators of nineteen different types were built, field-tested and improved before production of the present GENERAL ELECTRIC REFRIGERATOR was authorized. The GENERAL ELECTRIC REFRIGERATOR today embodies the best thought of the leading electrical research organization in the world.

General Advantages

In specifying GENERAL ELECTRIC REFRIGERATORS, the architect has the assurance that he is specifying an electrical product that will give outstanding, continuous satisfaction. He eliminates the need of any unnecessary work, for no plumbing or extra wiring is required.

Nor does the GENERAL ELECTRIC REFRIGERATOR require a special location. The installation merely means uncrating the two boxes, placing the cabinet where it is to go, lowering the icing unit into the top of the cabinet, and plugging the attached cord into a convenience outlet. The switch is then closed and the installation is complete.

The GENERAL ELECTRIC REFRIGERATING icing unit is one of the simplest yet devised. It is built to automatically maintain the constant temperature necessary for proper food preservation—without attention, not even oiling. The compactness of the evaporator gives more room for actual food storage.

If trouble should ever develop, the dealer simply raises the unit out of the cabinet and replaces it with a new one which he keeps on hand for emergencies.

And the GENERAL ELECTRIC REFRIGERATOR is clean. There is no exposed machinery—it is all contained in an hermetically sealed steel casing mounted on the top, up and away from floor dirt. The circulation of air through the coils prevents dust from settling on the top. The corners of the interior of the cabinets are rounded to make cleaning an easy task. All models are mounted on legs to permit cleaning of the floor underneath.

The GENERAL ELECTRIC REFRIGERATOR operates so quietly that it can hardly be heard, and the cold loss has been reduced to a minimum. It is guaranteed against defective workmanship and materials for three years.

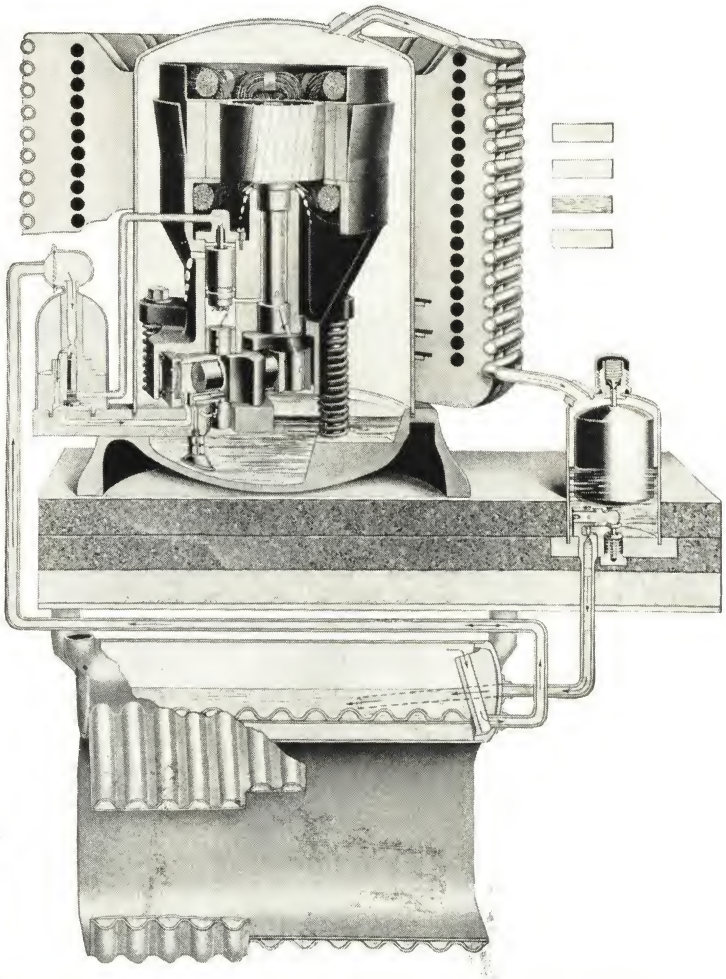
The GENERAL ELECTRIC REFRIGERATOR has been approved by the Underwriters' Laboratories, Inc., and we believe that it surpasses in attractiveness and efficiency anything yet produced. We also believe that it will give the owner less trouble and use less current than any other.

SPECIAL NOTICE

Because of occasional changes in the design (manufacturing specifications) of some models, we suggest that you communicate with the local GENERAL ELECTRIC REFRIGERATOR Distributor or Dealer, or direct with this office for confirmation of the details (manufacturing specifications) of the various models quoted on these pages.

Models on Display at Architects' Exhibits

NEW YORK BOSTON CHICAGO INDIANAPOLIS CLEVELAND LOS ANGELES DETROIT



OPERATION OF THE GENERAL ELECTRIC ICING UNIT

For the purpose of explanation, the General Electric icing unit can be divided into four major parts:

(1) **The Super Freezer**—Sometimes called the evaporator or chilling unit. This is inside the cabinet.

(2) **The Compressor**—Which is inside of the hermetically sealed casing, and which compresses the gas after it has evaporated.

(3) **The Condensing Coils**—After the gas is compressed it is released into the hermetically sealed casing, and from there into the coils that surround the outside of the icing unit. The purpose of this is to condense the gaseous (SO_2) into a liquid.

(4) **The Control**—This regulates the operation of the unit and is so perfected that it provides an even temperature inside the cabinet.

Operation—The following paragraphs explain how heat is removed (or cold produced) in the complete General Electric Refrigerator.

The liquid sulphur dioxide (SO_2) expands or evaporates in the freezing chamber, which is inside the cabinet. This action takes place at approximately 14° above zero. As it expands it becomes a vapor, and absorbs heat from the interior of the cabinet. This vapor passes through a tube to the compressor, which is inside the hermetically sealed casing. The vapor is then compressed and is discharged into the interior of the hermetically sealed casing. The vapor still contains the heat that it absorbed in the refrigerator. It then passes into the condenser. The air circulating around these coils cools the vapor, and the heat absorbed from the interior of the cabinet is given off into the air. When the heat is removed, the vapor condenses to a liquid again in much the same manner as cooling steam condenses into water.

This liquid goes through the float chamber, and from there back into the evaporator, where it evaporates again, absorbs more heat, and the cycle is repeated.

The automatic operation of the unit is governed by a thermostatically actuated control. The pressure in the bellows increases as the evaporator temperature rises, thus causing the unit to start when the upper evaporator temperature limit is reached. A decrease in the pressure results when the evaporator reaches the lower temperature limit and the unit is stopped. This automatic action regulates the operation of the unit to maintain the desired cabinet temperature.

The above system of generating cold is probably the simplest and most trouble-free that has ever been devised for the home.

No Oiling

The no-oiling feature of a General Electric Refrigerator takes on a new significance with tenant operation.

APARTMENT INSTALLATIONS

The newest household electrical servant, the electric refrigerator, has become so desired by tenants that apartment owners all over the country are wondering what is the best type of electric refrigerator to buy. They are interested in purchasing the type of equipment which will give the tenants the most satisfactory service and make the best investment for themselves.

It has always been accepted that the ideal apartment house refrigerator is one which is self-contained. For the simplicity of the individual system for apartment installations—its freedom from operating troubles and maintenance overhead, and the superiority of service—makes it the ideal refrigerator for apartment house use. And individual electric refrigerators have reached the point of development that the owner may now install this type of equipment and secure all its advantages.

Advantages of using GENERAL ELECTRIC REFRIGERATOR individual units.

(1) Ease of installation—no piping required in the walls.

(2) Accessibility—no danger of leaks, corrosion, etc., in inaccessible places.

(3) Portability—because the individual unit requires only an electrical connection it can be moved from place to place in the kitchen.

(4) Individual control of refrigerators in each apartment:

(a) Refrigerators in apartments not rented may be shut off when not in use.

(b) Easily accessible freezing regulator—each tenant can have the exact temperature regulation in their refrigerator that they desire.

(5) Continuity of service—if an individual unit fails, only one tenant is affected and replacement can be made very quickly.

(6) Ice cubes and frozen desserts can be made quickly in the individual installation. It is possible to do this even in the warmest weather.

(7) GENERAL ELECTRIC REFRIGERATOR individual units are air cooled, so there is no water expense.

(8) More equitable arrangement of charges with the tenant.

The individual system allows the tenant to pay for the electricity consumed by his individual unit. This is the most satisfactory method.

(9) The cabinet of the GENERAL ELECTRIC REFRIGERATOR is built like a safe—it cannot warp. It is strong, built to last.

For the small additional first cost of installing General Electric refrigeration, the owner has a building that is greatly enhanced in resale value, more attractive to discriminating tenants, and more readily rentable. He has free service for three years, with only nominal service charges thereafter, no electricity bills (each tenant pays his own) negligible repair costs and depreciation, and no supervision is required.

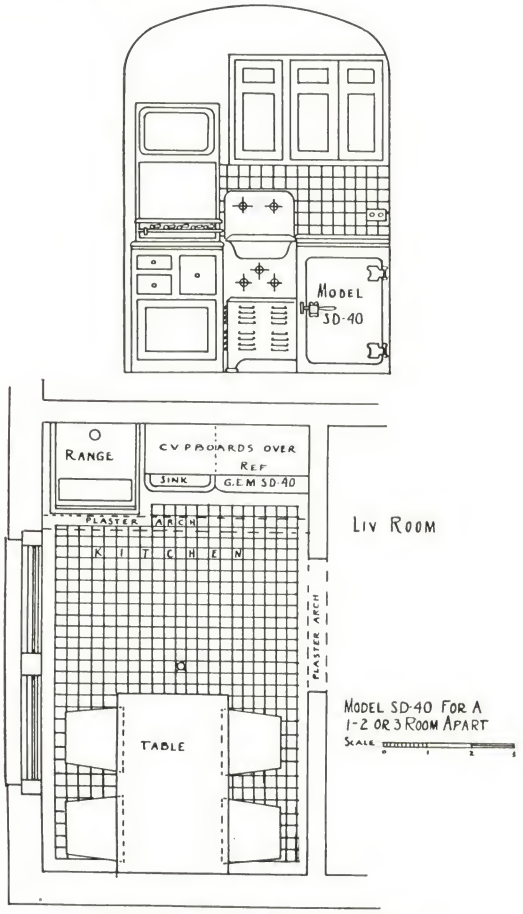


Diagram of Built-in Apartment Kitchen

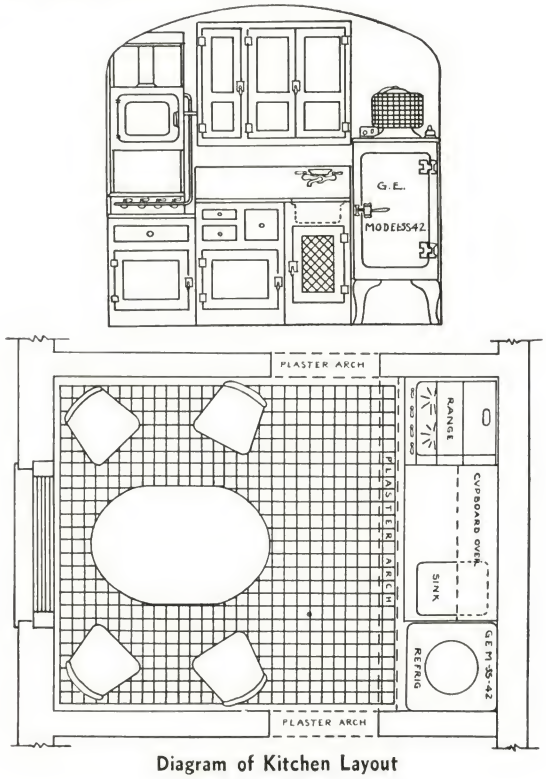


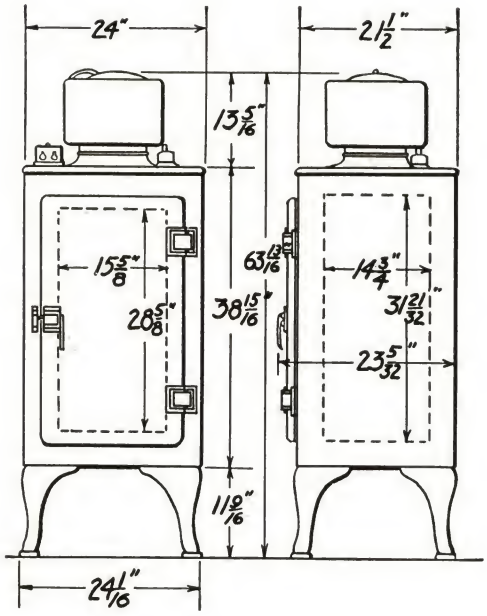
Diagram of Kitchen Layout

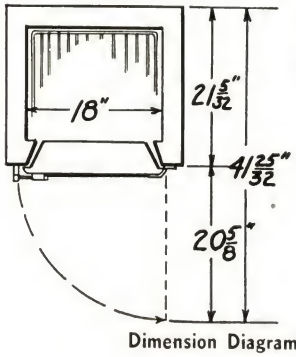
General Electric Refrigerators Offer These Vital Advantages

.... an hermetically sealed, dustproof mechanism.
.... an easily accessible freezing regulator.
.... a mechanism that requires no oiling.
.... all troublesome machinery eliminated.
.... a new standard of quiet operation.
.... mounted on legs with broom-room underneath.
.... no installation problem whatever.
.... a sanitary, porcelain chilling chamber.
.... the entire mechanism mounted on top.
.... maximum food storage space in the cabinet.
.... an appreciably lower cost of operation.
.... a radically improved type of cabinet.
.... an unqualified three-year guarantee.

Specification Suggestions

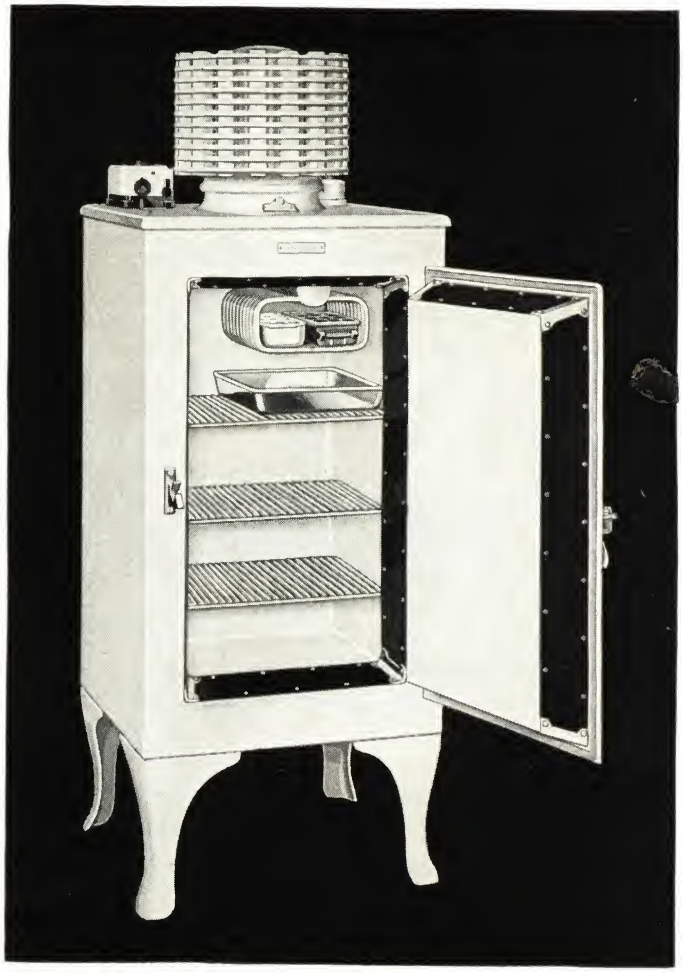
Electric Refrigerator—Furnish and install in (give location) a Model [SD-40] [SS-42] [SS-62] [SS-82] [SS-100] [SS-140] [SS180] [PS-6] [PS-95] [PS-13] [PS-17] GENERAL ELECTRIC REFRIGERATOR made by the Electric Refrigeration Department of the GENERAL ELECTRIC COMPANY, Cleveland, Ohio.





MODEL SS-42

Dimension Diagram Model SS-42



Model SS-42

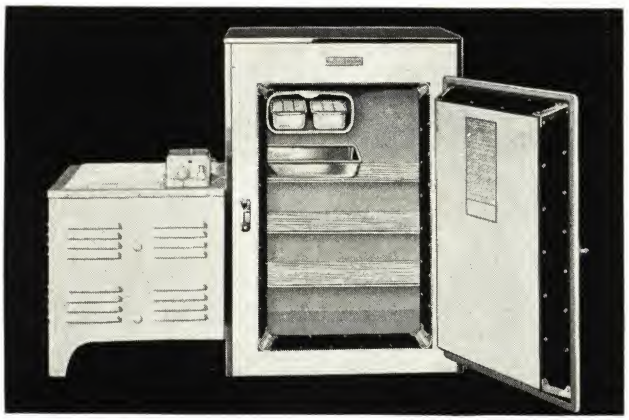
Architects' Handbook

To assist architects in the selection of proper refrigeration facilities, an "Architects' Handbook on Electric Refrigeration" has been published by the Electric Refrigeration Department of the GENERAL ELECTRIC COMPANY. This interesting booklet contains complete information on electric refrigeration and copies are available, free of charge, on request.

Description of Model SS-42

Food Storage Capacity—4.4 cu. ft.
Food Shelf Area—8.1 sq. ft. Straight wire shelves.
Ice Making—44 cubes in two trays. Arranged for fast freezing.
Refrigerating Unit—(DR-1) 1/10 hp. single-phase induction type. All moving parts enclosed in hermetically sealed casing.
Cabinet—"All Steel" type construction in which no wood frame is used either in the cabinet or doors. Black "Textolite" strips are used on the door and door jamb. A removable rubber gasket seals the door. Shelves are straight bar type welded together and heavily tinned. Hardware is chromium finish.
Interior Finish—White vitreous porcelain.
Exterior Finish—White "Sanak."
Weight—
Unit—136 lb.
Cabinet—126 lb.
Shipping Weight—
Unit with accessories—192 lb.
Cabinet—200 lb.

ILLUSTRATIONS AND DESCRIPTIONS OF G-E REFRIGERATOR MODELS



Model SD-40

Description of Model SD-40

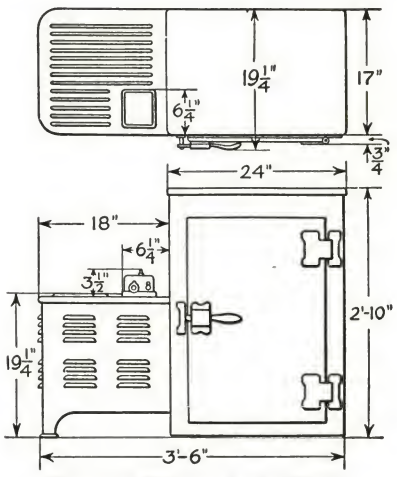
Net Food Storage—3½ cu. ft.
Shelf Area—7.3 sq. ft.
Ice Making—44 cubes in two trays.
Interior Dimensions—
Height—28½ in. Width—19 in. Depth—12½ in.

Refrigerating Unit (DA-1) — Permanently attached to and forming an integral part of the cabinet.
A $\frac{1}{10}$-hp., single phase induction type motor is used.
All moving parts enclosed in a hermetically sealed casing.

Cabinet—
Exterior — White lacquer on steel with polished aluminum top.
Interior — White porcelain.

Note: Model SD-40 can be furnished with unit on either right or left side of cabinet.

Weight—275 lb.
Shipping Weight—307 lb.

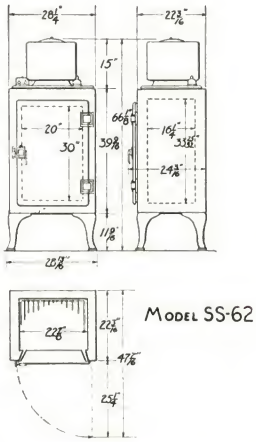


Dimension Diagram Model SD-40

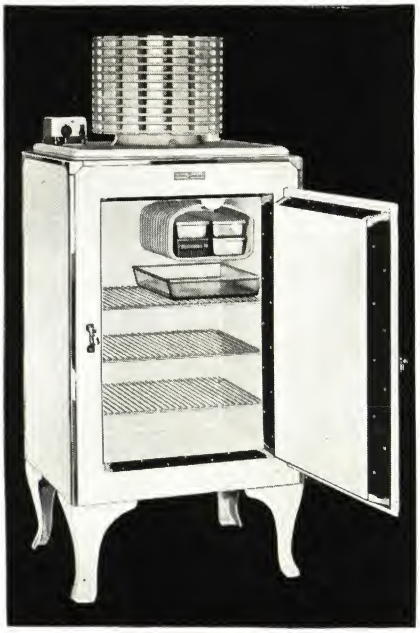
Model SS-62

Description of Model SS-62

Food Storage Capacity—6.7 cu. ft.
Food Shelf Area—11.6 sq. ft.
Ice Making—Four trays, 9 lb. of ice, 84 cubes. Three metal trays, two with covers, holding 2¼ lb. each, 20 cubes, each. One specially designed General Electric Du-Flex rubber tray holding 2¼ lb., 24 cubes.
Refrigerating Unit (D-2)—⅛ hp. squirel cage motor, split phase induction type. All moving parts enclosed in hermetically sealed casing—1740 r.p.m.
Cabinet—"All Steel" type construction in which no wood frame is used either in the cabinet or doors. Black "Textolite" strips are used on doors and door jambs. There is one shelf of the bar type with steel wires running from front to rear, and two sliding shelves. Hardware is chromium finish.
Interior Finish—White vitreous porcelain.
Exterior Finish—White "Sanak."
Insulation—Approved General Electric specifications.
Weight—
Unit—169 lb.
Cabinet—237 lb.
Shipping Weight—
Unit with accessories—226 lb.
Cabinet—315 lb.



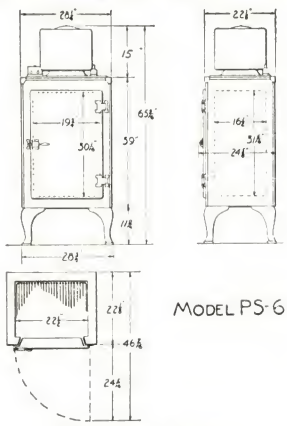
Dimension Diagram



Model PS-6

Description of Model PS-6

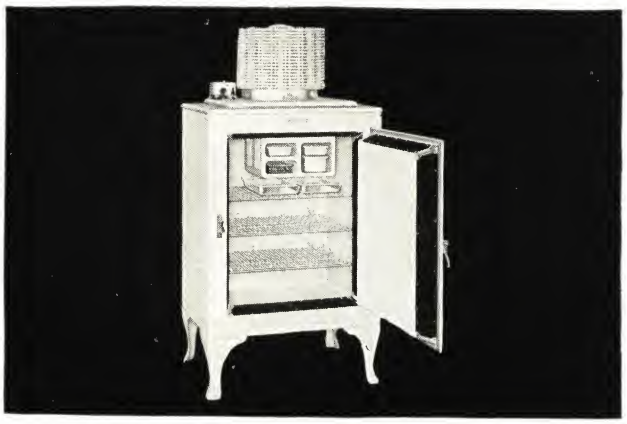
Food Storage Capacity—6.3 cu. ft.
Food Shelf Area—11.3 sq. ft. Straight wire shelves.
Ice Making—Four trays, 9 lb. of ice, 84 cubes. Three metal trays, two with covers, holding 2¼ lb. each, 20 cubes, each. One specially designed General Electric Du-Flex rubber tray holding 2¼ lb., 24 cubes.
Refrigerating Unit (D-2)—⅛ hp. squirrel cage motor, split phase induction type. All moving parts enclosed in hermetically sealed casing—1740 r.p.m.
Cabinet—Heavy durable construction with one piece porcelained steel inner liner and porcelain exterior. Black "Textolite" strips are used on the door and door jamb facings. Shelves are straight wire bar type, welded together and heavily tinned. Metal trim is corrosion resistant and highly polished. Cabinet is mounted on $11\frac{9}{16}$-in. detachable legs.
Interior Finish—White vitreous porcelain.
Exterior Finish—White vitreous porcelain.
Insulation—Approved General Electric specifications.
Weight—
Unit—169 lb.
Cabinet—200 lb.
Shipping Weight—
Unit with accessories —226 lb.
Cabinet—268 lb.



Dimension Diagram

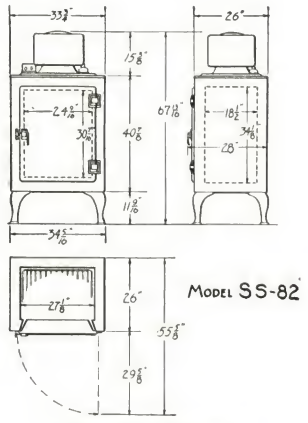
Description of Model SS-82

Food Storage Capacity—9 cu. ft.
Food Shelf Area—16 sq. ft.
Ice Making—Four trays, 12 lb. ice, 104 cubes each. Two shallow metal trays with covers hold 2½ lb. each, 20 large cubes each. One deep metal tray with cover holds 4½ lb., 40 cubes. One specially designed General Electric Du-Flex rubber tray holding 2½ lb., 24 cubes.



Model SS-82

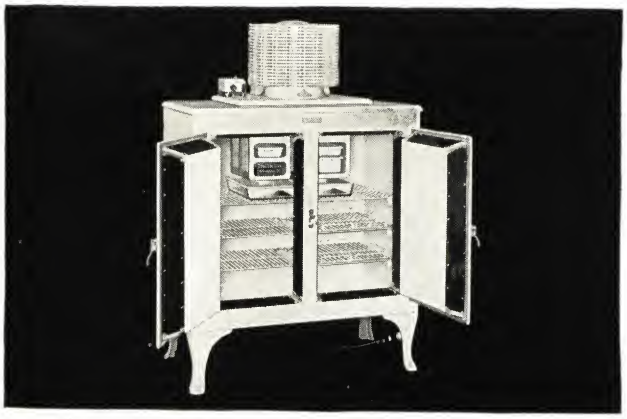
Refrigerating Unit (D-30)—⅙ hp. squirrel cage motor, split phase induction type. All moving parts enclosed in hermetically sealed casing—1740 r.p.m.
Cabinet—"All Steel" type construction in which no wood frame is used either in the cabinet or doors. Black "Textolite" strips are used on door and door jamb. A removable rubber gasket seals the door. There is one straight bar type heavily tinned shelf and two sliding shelves. Hardware is chromium finish.
Interior Finish—White vitreous porcelain.
Exterior Finish—White "Sanak."
Insulation—Approved General Electric specifications.
Weight—
Unit—243 lb.
Cabinet—345 lb.
Shipping Weight—
Unit with accessories—319 lb.
Cabinet—435 lb.



Dimension Diagram

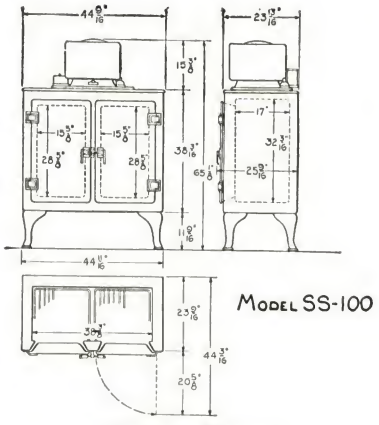
Description of Model SS-100

Food Storage Capacity—10.9 cu. ft.
Food Shelf Area—20 sq. ft.
Ice Making—Four trays, 12 lb. of ice, 104 cubes. Two shallow metal trays with covers, hold 2½ lb. each, 20 large cubes each. One deep metal tray with cover holds 4½ lb., 40 cubes. One specially designed General Electric Du-Flex rubber tray holding 2½ lb., 24 cubes.



Model SS-100

Refrigerating Unit (D-35)—⅓ hp. squirrel cage motor, split phase induction type. All moving parts enclosed in hermetically sealed casing—1740 r.p.m.
Cabinet—"All Steel" type construction in which no wood frame is used either in the cabinet or door. Black "Textolite" strips are used on doors and door jambs. There are four shelves of the bar type, with steel wires running from front to rear, and two sliding shelves. Hardware is chromium finish.
Interior Finish—White vitreous porcelain.
Exterior Finish—White "Sanak."
Insulation—Approved General Electric specifications.
Weight—
Unit 250 lb.
Cabinet—380 lb.
Shipping Weight—
Unit with accessories, 326 lb.
Cabinet—500 lb.



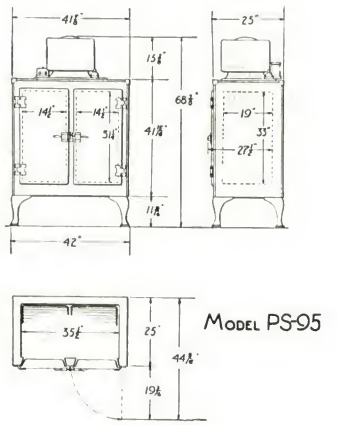
Dimension Diagram

Description of Model PS-95

Food Storage Capacity—11.3 cu. ft.
Food Shelf Area—20.4 sq. ft. Straight wire shelves.
Ice Making—Four trays, 12 lb. of ice, 104 cubes. Two shallow trays with covers, hold 2½ lb. each, 20 large cubes each. One deep metal tray with cover holds 4½ lb., 40 cubes. One specially designed General Electric Du-Flex rubber tray holding 2½ lb., 24 cubes.

Model PS-95

Refrigerating Unit (D-35)—⅓ hp. squirrel cage motor, split phase induction type. All moving parts enclosed in a hermetically sealed casing—1740 r.p.m.
Cabinet—Heavy durable construction with one-piece porcelained steel inner liner and porcelain exterior. Black "Textolite" strips are used on the door and door jamb facings. Shelves are straight wire bar type, welded together and heavily tinned. Metal trim is corrosion resistant and highly polished. Cabinet is mounted on 11⅞-in. detachable legs.
Interior Finish—White vitreous porcelain.
Exterior Finish—White vitreous porcelain.
Insulation—Approved General Electric specifications.
Weight—
Unit—250 lb.
Cabinet—361 lb.
Shipping Weight—
Unit with accessories—326 lb.
Cabinet—508 lb.



Dimension Diagram

Description of Model PS-13

Food Storage Capacity—13.6 cu. ft.
Food Shelf Area—22 sq. ft. Straight wire shelves.
Ice Making—Four trays, 12 lb. of ice, 104 cubes. Two shallow trays hold 2½ lb. each, 20 large cubes. One deep metal tray with cover holds 4½ lb., 40 cubes. One specially designed General Electric Du-Flex rubber tray holding 2½ lb., 24 cubes.

Model PS-13

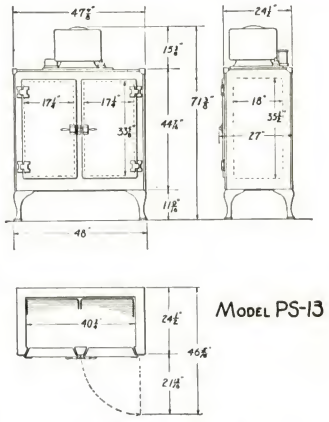
Refrigerating Unit (D-35)—⅛ hp. squirrel cage motor, split phase induction type. All moving parts enclosed in hermetically sealed casing—1740 r.p.m.

Cabinet—Heavy durable construction with one-piece porcelained steel inner liner and porcelain exterior. Black "Textolite" strips used on door and door jamb facings. Shelves straight wire bar type, welded together and heavily tinned. Metal trim corrosion resistant and highly polished. Cabinet is mounted on 11 9/16-in. detachable legs.
Interior Finish—White vitreous porcelain.
Exterior Finish—White vitreous porcelain.

Insulation — Approved General Electric specifications.

Weight—
Unit—250 lb.
Cabinet—436 lb.

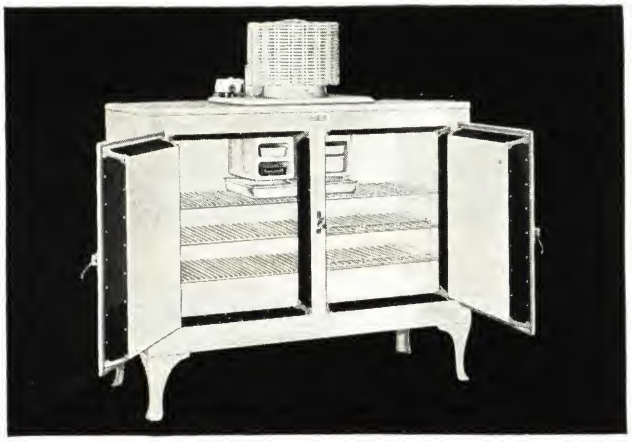
Shipping Weight—
Unit with accessories—320 lb.
Cabinet—599 lb.



Dimension Diagram

Description of Model SS-140

Food Storage Capacity—14.8 cu. ft.
Food Shelf Area—25.2 sq. ft.



Model SS-140

Ice Making—Four trays, 12 lb. of ice, 104 cubes. Two shallow metal trays with covers, hold 2½ lb. each, 20 large cubes each. One deep metal tray with covers holds 4½ lb., 40 cubes. One specially designed General Electric Du-Flex rubber tray holding 2½ lb., 24 cubes.

Refrigerating Unit (D-35)—⅛ hp. squirrel cage motor, split phase induction type. All moving parts enclosed in hermetically sealed casing—1740 r.p.m.

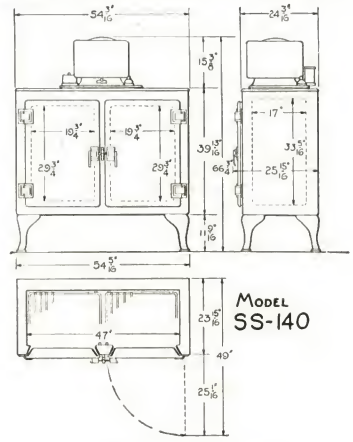
Cabinet—"All Steel" type construction in which no wood frame is used either in the cabinet or doors. Black "Textolite" strips are used on doors and door jambs. There are four shelves of the bar type with steel wires running from front to rear, and two sliding shelves. Hardware is chromium finish.
Interior Finish — White vitreous porcelain.
Exterior Finish—White "Sanak."

Insulation—Approved General Electric specifications.

Weight—
Unit—250 lb.
Cabinet—420 lb.

Shipping Weight—
Unit with accessories—326 lb.

Cabinet—602 lb.



Dimension Diagram

Description of Model PS4-17

Food Storage Capacity—18 cu. ft.
Food Shelf Area—26.5 sq. ft.

Model PS4-17

Ice Making—Four trays, 12 lb. of ice, 104 cubes. Two shallow trays hold 2½ lb. each, 20 large cubes. One deep metal tray with cover holds 4½ lb., 40 cubes. One specially designed General Electric Du-Flex rubber tray holding 2½ lb., 24 cubes.

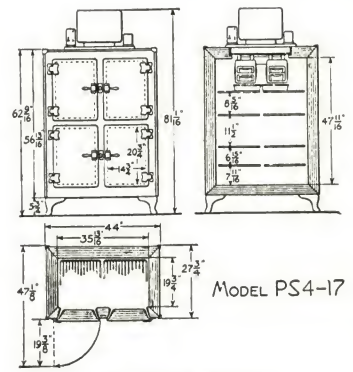
Refrigerating Unit (D-40)—⅓ hp. single phase condenser motor. All moving parts enclosed in a hermetcially sealed case—1740 r.p.m.

Cabinet—Heavy durable construction with one-piece porcelained steel inner liner and porcelain exterior. Black "Textolite" strips are used on the door and door jamb facings. Shelves are straight wire bar type, welded together and heavily tinned. Metal trim is corrosion resistant and highly polished. Cabinet is mounted on 5¾-in. detachable legs.
Interior Finish — White vitreous porcelain.
Exterior Finish — White vitreous porcelain.

Insulation—Approved General Electric specifications.

Weight—
Unit—322 lb.
Cabinet—640 lb.

Shipping Weight—
Unit with accessories—440 lb.
Cabinet—800 lb.



Dimension Diagram

Description of Model PS-17

Food Storage Capacity—17.2 cu. ft.

Food Shelf Area—26.7 sq. ft.

Ice Making—Four trays, 12 lb. of ice, 104 cubes. Two shallow metal trays with covers hold 2½ lb. each, 20 large cubes each. One deep metal tray with cover holds 4½ lb., 40 cubes. One specially designed General Electric Du-Flex rubber tray holding 2½ lb., 24 cubes.

Refrigerating Unit (D-35 and D-40)—⅙ and ⅓ hp. squirrel cage motor, split phase induction type. All moving parts enclosed in a hermetically sealed casing—1740 r.p.m.

Cabinet—Heavy durable construction with one-piece porcelained steel inner liner and porcelain exterior. Black "Textolite" strips are used on the door and door jamb facings. Shelves are straight wire bar type welded together and heavily tinned. Metal trim is corrosion resistant and highly polished. Cabinet is mounted on 11 $\frac{9}{16}$-in. detachable legs.

Interior Finish—White vitreous porcelain.

Exterior Finish—White vitreous porcelain.

Insulation—Approved General Electric specifications.

Weight—

Unit D-35—250 lb.

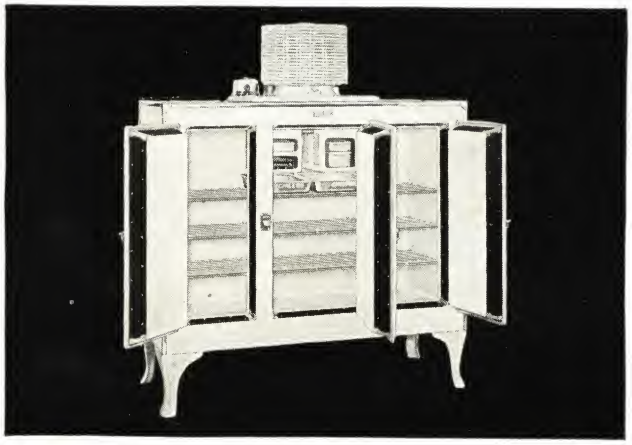
Unit D-40—332 lb.

Cabinet—595 lb.

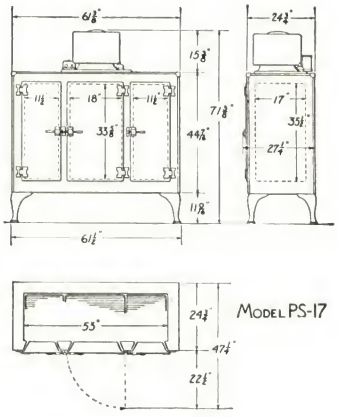
Shipping Weight—

Unit with accessories—D-35, 326 lb.; D-40, 440 lb.

Cabinet—773 lb.



Model PS-17



Dimension Diagram

Description of Model SS-180

Food Storage Capacity—18.3 cu. ft.

Food Shelf Area—30.3 cu. ft.

Ice Making—Four trays, 12 lb. of ice, 104 cubes. Two shallow metal trays with covers hold 2½ lb. each, 20 large cubes each. One deep metal tray with cover holds 4½ lb., 40 cubes. One specially designed General Electric Du-Flex rubber tray holding 2½ lb., 24 cubes.

Refrigerating Unit (D-35 or D-40)—⅙ and ⅓ hp. squirrel cage motor, split phase induction type. All moving parts enclosed in hermetically sealed casing—1740 r.p.m.

Cabinet—"All Steel" type construction in which no wood frame is used either in the cabinet or doors. Black "Textolite" strips are used on doors and door jambs. There are four shelves of the bar type, with steel wires running from front to rear, and two sliding shelves. Hardware is chromium finish.

Interior Finish—White vitreous porcelain.

Exterior Finish—White "Sanak."

Insulation—Approved General Electric specifications.

Weight—

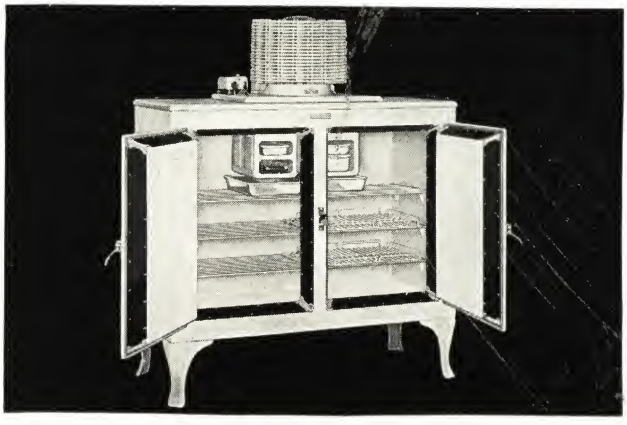
Unit (D-35)—250 lb.; (D-40)—332 lbs.

Cabinet—700 lb.

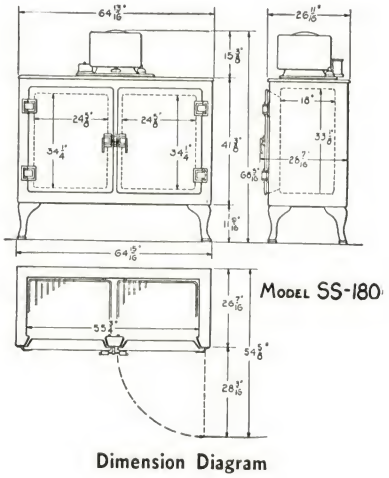
Shipping Weight—

Unit with accessories—D-35, 326 lb.; D-40, 440 lb.

Cabinet—900 lb.



Model SS-180



Dimension Diagram

GENERAL ELECTRIC
COMMERCIAL REFRIGERATOR

The "GENERAL ELECTRIC" REFRIGERATOR either for commercial or domestic use is a package article. Both the refrigerating unit and cabinet are completely assembled ready for installation and operation.

Thus the purchaser gains the following advantages:

(1) Refrigerating unit is completely assembled in a modern plant under strict supervision.

(2) The responsibility for successful operation is centered in one company.

(3) A minimum of floor space per cubic foot of food storage capacity is occupied by both refrigerating unit and cabinet.

(4) The refrigerating unit is hermetically sealed.

(5) Economy in operation is the result of high efficiency.

(6) No costly labor is necessary in the field to insure continued operation.

(7) Expensive maintenance is eliminated since there are no exposed moving parts to wear out.

(8) No oiling or service is required.

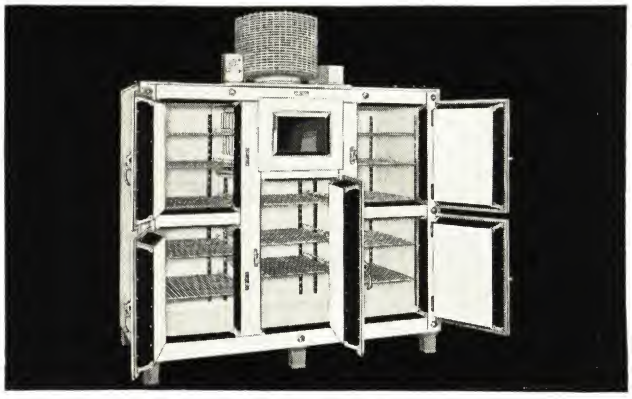
(9) Quiet operation.

(10) The correct refrigerating unit and cabinet is sure to be installed for the performance of a given task.

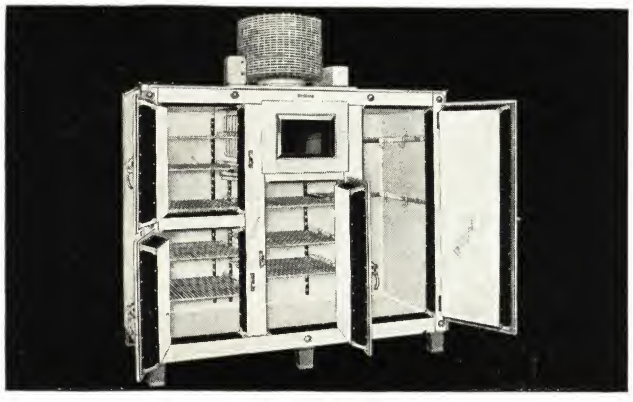
(11) Guaranteed for three years by GENERAL ELECTRIC COMPANY.

All modern merchandising tends toward the package line of goods. The reason for this tendency is quite obvious when we consider that simplicity is the keynote of everything that is really great.

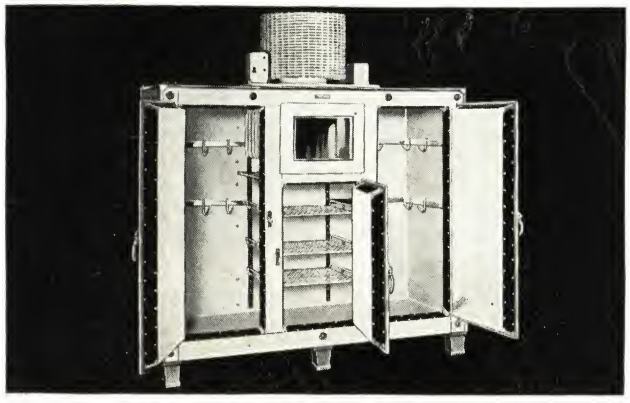
What could be more obvious and, what could be more appropriate in this day of time, labor and money savers than to have the GENERAL ELETRIC COMPANY produce an electric refrigerator employing the package article principle for commercial use?



Model CD-600



Model CD-601



Model CD-602

Description of Model CD-600

Food Storage Capacity—58 cu. ft.
Shelf Area—73 sq. ft. Heavily tinned straight wire shelves adjustable to 2-in. spacing.

Finish—Interior and front of cabinet including door panels—white porcelain on steel. Top and sides of cabinet—white lacquer on steel. Back and bottom of cabinet—galvanized iron. Porcelain enameled cast iron legs. Exterior trim—non-corrosive metal chrome plated and polished. "Textolite" door and door jamb strips. Special moulded rubber door gaskets.

Hardware—Is hard brass, chrome plated. All doors have spring lock latches.

Insulation—Is 4 in. thick wrapped and sealed according to General Electric specifications.

Drain—Removable vitreous enamel drip pan is located beneath chilling unit, and connected by nickel plated brass pipe to trays and drain.

Installation—Cabinet can be taken apart for installation if necessary. Minimum room height required to install unit in assembled cabinet—9 ft. 5 in. Minimum room height required to install unit in cabinet, front removed, and allowing 10 in. clearance above installed unit—8 ft. 6 in.

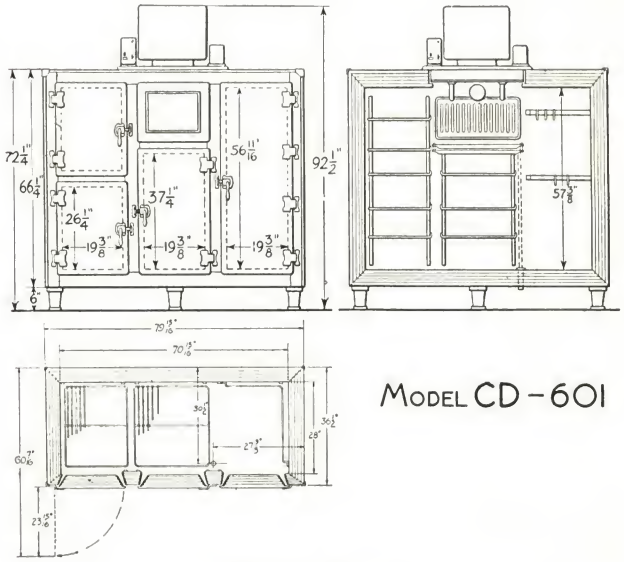
Refrigerating Unit—Model D-50. Self-defrosting. No ice making. See second page following.

Description of Model CD-601

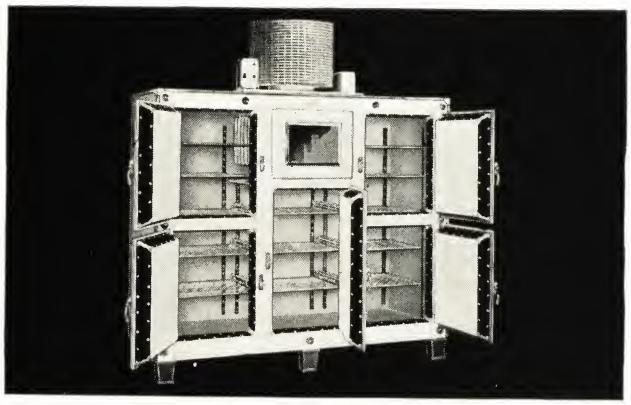
Food Storage Capacity—58 cu. ft.
Shelf Area—50 sq. ft.
Heavily tinned straight wire shelves adjustable to 2-in. spacing. Meat hooks in right end compartment.
Finish, Hardware, Insulation, Drain, Installation and Refrigerating Unit are the same as for Model CD-600.

Description of Model CD-602

Food Storage Capacity—58 cu. ft.
Shelf Area—27 sq. ft.
Heavily tinned straight wire shelves adjustable to 2-in. spacing in two center compartments. Meat hooks in right and left end compartments.
Finish, Hardware, Insulation, Drain, Installation and Refrigerating Unit are the same for Model CD-600.



Dimension Diagram



Model CS-450

Description of Model CS-450

Storage Capacity—45 cu. ft. Shelf area, 55 sq. ft. Heavily tinned straight wire shelves adjustable to 2-inch spacing.

Finish—Interior and front of cabinet including door panels—white porcelain on steel. Top and sides of cabinet—white lacquer on steel. Back and bottom of cabinet—galvanized iron. Porcelain enameled cast iron legs. Exterior trim—non-corrosive metal, chrome plated and polished. "Textolite" door and door jamb strips. Special moulded rubber door gasket.

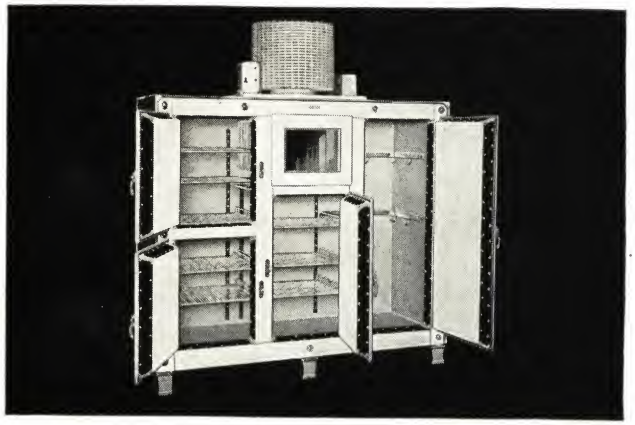
Hardware—Hardware is hard brass, chrome plated. All doors have spring lock latches.

Insulation—Insulation is 3½ in. thick, wrapped and sealed according to General Electric specifications.

Drain—Removable vitreous enamel drip pan is located beneath chilling unit and connected by nickel plated brass pipe to trays and drain.

Installation—Cabinet can be taken apart for installation when necessary. Minimum room height required to install unit in assembled cabinet—9 ft. 5 in. Minimum room height required to install unit in cabinet, front removed and allowing 10-in. clearance above installed unit—8 ft. 6 in.

Refrigerating Unit (D-50)—Self defrosting, no ice making. See following page.



Model CS-451

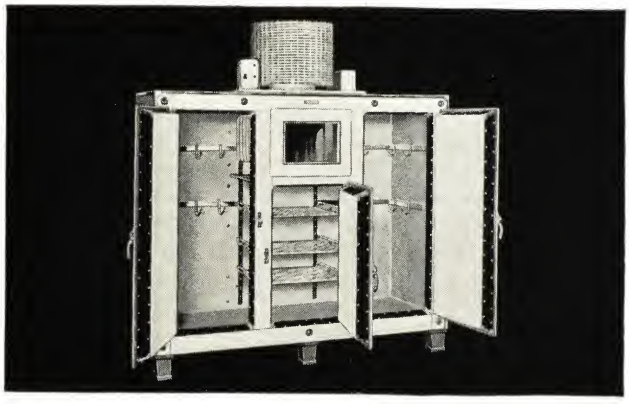
Description of Model CS-451

Storage Capacity—Shelf compartment, 28½ cu. ft. Shelf area, 35 sq. ft. Meat compartment, 16½ cu. ft. Meat compartment, 6 sq. ft.

Total, 45 cu. ft. net.

Heavily tinned straight wire shelves adjustable to 2-inch spacing. Meat hooks in right end compartment.

Finish, Hardware, Insulation, Drain, Installation and Refrigerating Unit—The same as for Model CS-450.



Model CS-452

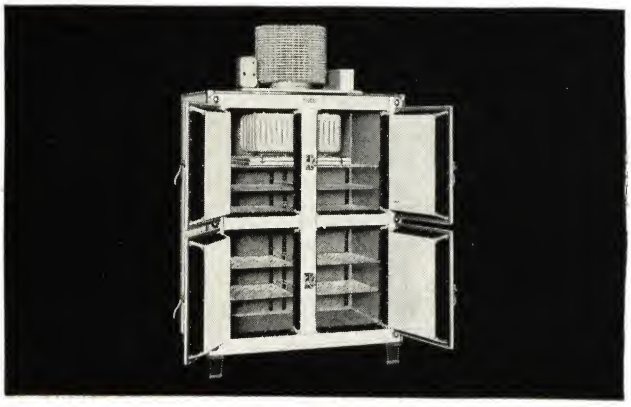
Description of Model CS-452

Storage Capacity—Shelf compartment, 12 cu. ft. Shelf area, 20 sq. ft. Meat compartment, 33 cu. ft. Meat compartment, 12 sq. ft.

Total, 45 cu. ft.

Heavily tinned straight wire shelves adjustable to 2-inch spacing. Meat hooks in right end and left end compartment.

Finish, Hardware, Insulation, Drain, Installation and Refrigerating Unit—The same as for Model CS-450.



Model CS-270

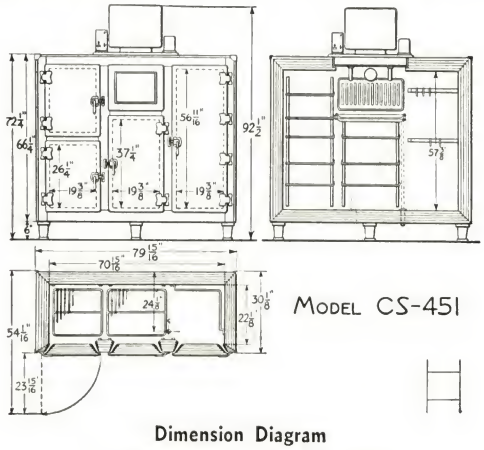
Description of Model CS-270

Storage Capacity—27 cu. ft. Shelf area, 35 sq. ft. Heavily tinned straight wire shelves, adjustable to 2-inch spacing.

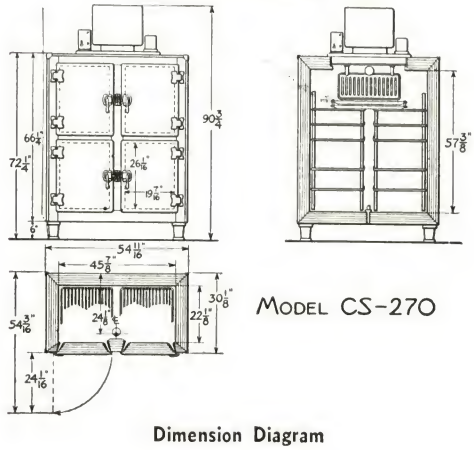
Finish, Hardware, Insulation and Drain—Same as for Model CS-450.

Installation—Cabinet can be taken apart for installation when necessary. Minimum room height required to install unit in assembled cabinet with D-41, 8 ft. 11 in.; with D-50, 9 ft. 5 in. Minimum room height required to install unit in cabinet, front removed, and allowing 10-in. clearance above installed unit—8 ft. 6 in.

Refrigerating Unit (D-41 or D-50)—Self defrosting, no ice making. See following page.

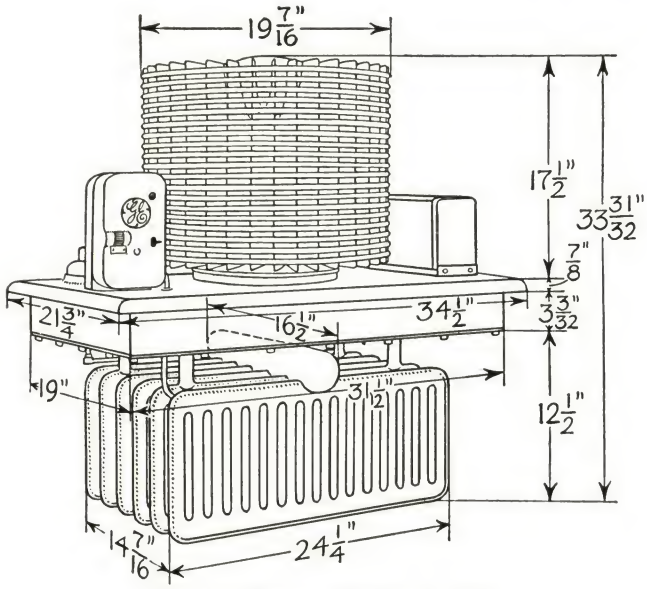


Dimension Diagram



Dimension Diagram

General Electric Refrigerating Unit Model D-41



Dimension Drawing Unit Model D-41

Compressor

The compressor is of the twin oscillating cylinder type, direct connected to the motor. The stuffing box is eliminated by having the motor mounted inside of the hermetically sealed housing.

Evaporator

White porcelain on steel, operates on defrosting cycle.

Lubrication

All moving parts are liberally supplied with oil by means of simple forced feed system. Each unit has a permanent supply of 3½ qts. of special mineral oil. No re-oiling is ever necessary.

Mounting

The compressor unit is mounted on three vertical springs inside the housing to insure quietness of operation and freedom from vibration.

Motor

A single phase, ⅓ hp., 110 volt condenser motor is used. The condenser type motor represents the latest development in high efficiency, high power factor, fractional horse-power motor design. The power input to the motor under normal operating conditions is approximately 350 watts. The power factor is 82%.

Capacity

1340 B.t.u. per hour; 80° F. room; 20° F. chilling unit.

Control

The automatic control maintains a uniform temperature in the cabinet. It has an overload relay which protects the motor against abnormal conditions. It also has a manual switch for starting and stopping the unit.

General Electric Refrigerating Unit Model D-50

Compressor

The compressor is of the twin oscillating cylinder type, directly connected to the motor. The stuffing box is eliminated by having the motor mounted inside of the hermetically sealed housing.

Evaporator

White porcelain on steel. Operates on a defrosting cycle.

Lubrication

All moving parts are liberally supplied with oil by means of a simple forced feed system. Each unit has a permanent supply of 5 qts. of special mineral oil. No re-oiling is necessary, since the hermetically sealed design eliminates the factors which ordinarily cause the deterioration of oil.

Mounting

The compressor unit is mounted on three vertical springs inside of the housing to insure quietness of operation and freedom from vibration.

Motor

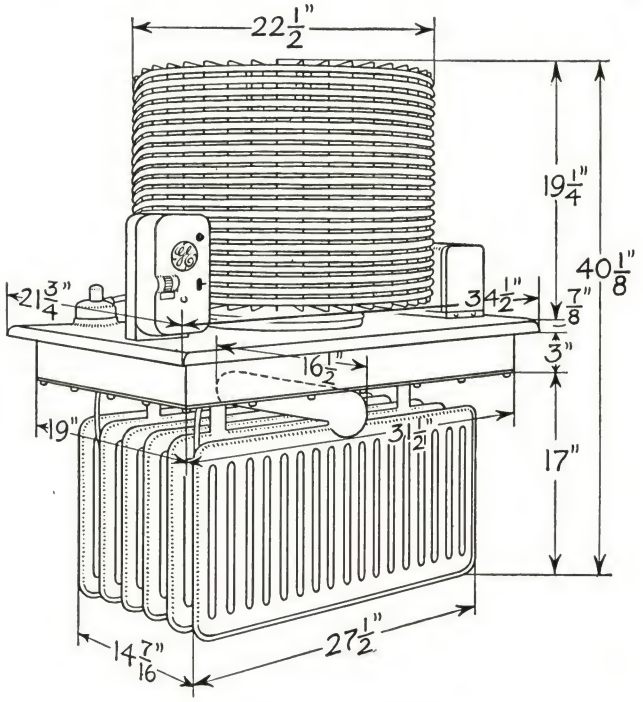
A single phase, ½ hp., 220 volt condenser motor is used. The condenser motor represents the latest development in high efficiency, high power factor, fractional horse-power motor design.

The motor does not cause radio interference, since it has no brushes or sliding contacts.

The power input to the motor, under normal conditions of operation, is approximately 475 watts. The power factor is above 85%.

Capacity

2100 B.t.u. per hour; 80° F. room; 20° F. chilling unit.



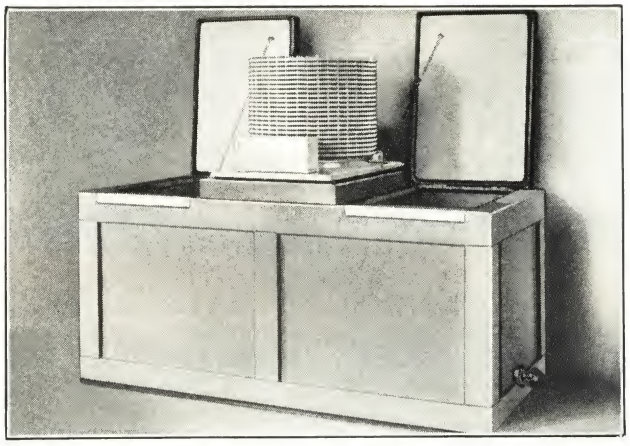
Dimension Drawing Unit Model D-50

Control

The automatic control maintains a uniform temperature in the cabinet. It has an overload relay which protects the motor against abnormal conditions. It also has a manual switch for starting and stopping the unit.

Immersion Type Milk Cooler

Cabinet—All wooden framework and trim is built of well-seasoned cypress protected with a waterproofing varnish.



Four 10-gal. Can Size

The exterior metal panels are made of galvanized, rust-resisting ingot iron finished with waterproof battleship gray paint.

Exterior Dimensions—
Body—73½ in. wide; 35¾ in. deep; 33½ in. high.
Unit Over Cabinet—20¼ in.
Total Height Unit and Cabinet—56¾ in.

Interior Dimensions—65½ in. x 28½ in. x 28¾ in.

Inner Tank—Heavy galvanized rust-resisting ingot iron.

Floor Racks—Floor racks are provided to protect the bottom against damage.

Door Opening—18⅞ in. x 28½ in.

Insulation—Approved General Electric specifications.

Unit Used—(D-48)—A single-phase ½-hp. 220-volt condenser motor is used. The condenser motor represents the latest development in high efficiency, high power factor, fractional horse-power motor design. It has a special copper coil type evaporator designed especially for operation when immersed in water bath.

The unit is available for operation on the following sources of power:
220-volt alternating current, 50 or 60 cycle.
110-volt alternating current, 50 or 60 cycle with transformer.

Drain—¾-in. galvanized pipe located at right end of cabinet.

Ice Freezer

Ice Freezing Capacity

Twelve trays of ice may be frozen at one time, each holding 2½ lb. or a total of 30 lb. of ice. As each freezing is completed, the ice cubes may be removed from the trays and stored in the space below the evaporator, thus permitting the trays to be refilled and frozen again. Between 50 and 60 lb. of ice in cube form may be stored which, in addition to the 30 lb. in the ice trays, insures a reserve supply for immediate use or to carry over periods of heavy demand. Ordinarily a complete freezing is accomplished in from 6 to 7 hours.

Normal operation of the refrigerating unit will maintain the cabinet temperature at about freezing or slightly below, minimizing or preventing meltage of the stored ice cubes.

The ice storage basket is placed in a porcelain steel pan and is so arranged as to keep the ice cubes about 1 in. off from the floor of the pan. Thus, if any meltage does take place, the ice cubes will be above the level of the water.

Refrigerating Unit

The refrigerating unit is of the General Electric hermetically sealed design Model D-46.

The compressor is direct connected to a ⅓-hp., 110-volt condenser motor. The condenser type motor represents the latest development in high efficiency, high power factor, fractional horse-power motor design. The power input to the motor under normal operating conditions is approximately 370 watts. The power factor is 82 per cent.

The operation of the unit is automatic and requires no attention—not even oiling.

All Steel Model SS-62 Cabinet with D-46 Refrigerating Unit

Biological Refrigerator

Construction

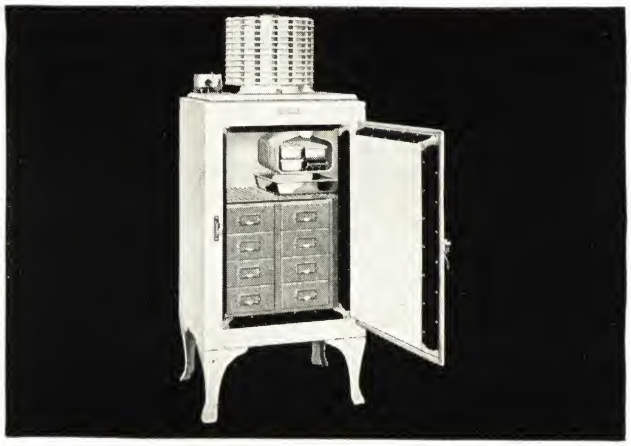
This refrigerator is designed to meet the needs of pharmacies, hospitals, laboratories, where biologicals, serums, and various chemicals and test samples must be kept at temperatures below 50° F.

This biological refrigerator consists of a standard General Electric all-steel SS-62 cabinet with a standard DR-2 unit. The rack and drawers are designed so that they can be installed through the door of the cabinet.

Adjustable side angles are provided to hold the drawers rigidly in place.

Two sets of racks and drawers can be used in a SS-140 cabinet to take care of requirements greater than can be handled with the SS-62 model. This equipment when ordered for use in model SS-140 should be so specified, as a center tie iron is necessary to hold the two drawer frames together.

The control on the unit is set to maintain temperatures in the cabinet below 50° F., just as in the standard domestic cabinets. If certain installations require that the temperature in the cabinet shall not vary more than 2° F., under any condition, a special thermostat is necessary. Individual cases of this type should be taken up with the Commercial Engineering Department.



All Steel Model SS-62 Refrigerator, Equipped with Biological Drawers

GENERAL ELECTRIC

WATER COOLER

Specifications for General Electric Pressure Water Cooler

Model DP-1

Note: The DP-1 cooler is not designed for use with remote bubblers or for glass filling requirements.

General

The Model DP-1 cooler is completely self-contained, the compressor, cooling compartment, and drinking fountain being mounted in one all-steel cabinet. The refrigeration system is hermetically sealed just as the other standard General Electric domestic and commercial refrigerating units. Each unit is completely assembled, charged and tested in a 100° F. room before shipment from the factory. The DP-1 cooler is exceptionally quiet in operation.

The compressor is of the single oscillating cylinder type direct connected to a $\frac{1}{10}$ hp. single phase motor. All moving parts are liberally supplied with oil from a permanent supply by means of a simple forced feed system.

The condenser and compressor are air cooled, although the waste water from the bubbler assists in cooling the condenser in the last turn of the pre-cooler.

The vitreous china top of which the bubbler bowl is an integral part, the acid resisting porcelain cooling compartment, and the cabinet on legs are unusual features of sanitation.

In the DP-1 cooler waste water is used to pre-cool the inlet water and thereby greatly reduces the energy consumption per gallon of water delivered.

The pre-cooler consists of two tinned copper coils, one within the other. The waste water flows through the inner coil and the inlet water in the outer.

Cooling Compartment

The cooling compartment consists of an acid resisting porcelain enameled evaporator, with a quick cooling device of corrosion-resistant metal. Efficient cooling is secured by having the drinking water in direct contact with the refrigerant compartment.

Bubbler

The bubbler is of the angle stream type.

Temperature Control

A temperature control is provided with a dial adjustment so that the drinking water temperature may be regulated by the user between 40° and 60°.

Pressure Regulator

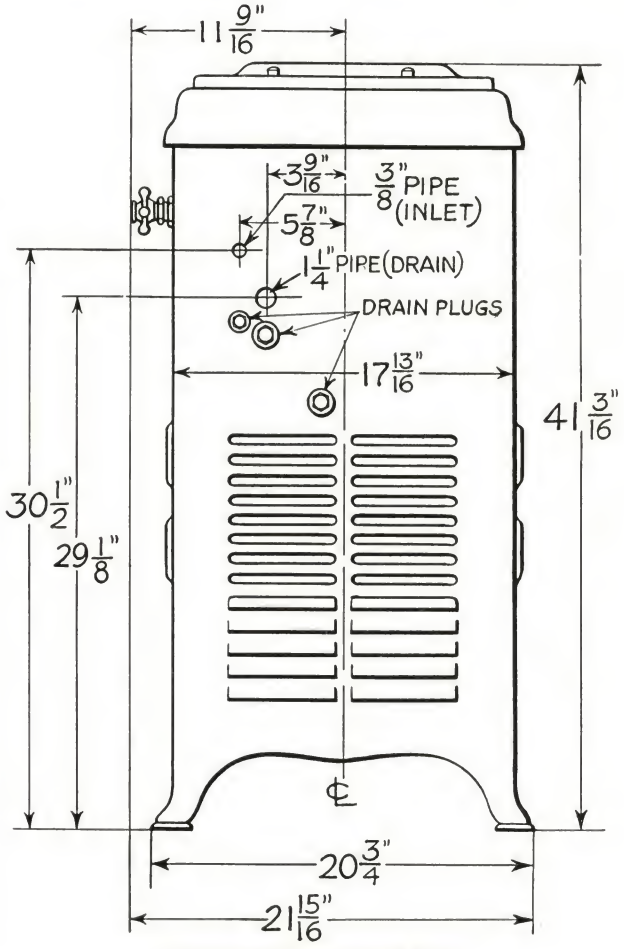
Each cooler is supplied with an automatic pressure regulator which must be connected in the water supply line.

No external trap is necessary since the waste line is trapped inside of the unit. A plug is provided in the rear to drain this trap.

Weight

Crated, 335 lb.; uncrated, 265 lb.

Model DP-1



Dimension Diagram Model DP-1

Specifications for General Electric Pressure Water Cooler
Model DP-3

General

The model DP-3 cooler is completely self-contained, the compressor, cooling compartment, and drinking fountain being mounted in one all-steel cabinet. The refrigeration system is hermetically sealed just as the other standard General Electric domestic and commercial refrigerating units. Each unit is completely assembled, charged and tested before shipment from the factory. The DP-3 cooler is exceptionally quiet in operation.

The compressor is of the single oscillating cylinder type, direct connected to a ⅛ hp. condenser motor.

The moving parts of the unit are liberally oiled from a permanent supply by means of a simple forced feed system.

The vitreous china top, of which the bubbler bowl is an integral part, the stainless steel cooling compartment, and the cabinet on legs are unusual features of sanitation.

In the DP-3 cooler waste water is used to pre-cool the inlet water and thereby greatly reduces the actual refrigeration required of the unit per gallon of water delivered. This feature of the General Electric pressure coolers contributes greatly to their high operating efficiency.

Cooling Compartment

The cooling compartment consists of a stainless steel chamber. Efficient cooling is accomplished by having the drinking water in direct contact with the refrigerant coils. In addition, quick cooling is produced by directing the inlet water so that it comes in contact with both the outside and inside surfaces of the refrigerant compartment, thus providing a large surface for cooling.

Bubbler

The bubbler is of the angle stream type.

Temperature Control

A temperature control is provided with a dial adjustment so that the drinking water temperature may be regulated, by the user, between 40° and 60°.

Water Cooler Condenser

The condenser of the refrigerating unit is water cooled. It is the double tube, counter flow type and is supported in a jacket filled with a non-freezing, non-corrosive fluid.

The flow of condenser cooling water is regulated by a valve which is operated thermostatically and in accordance with the temperature of the condenser.

Pressure Regulator

The DP-3 cooler is supplied with an automatic pressure regulator which is connected in the cold water supply line to the bubbler and which is mounted inside the cooler casing.

Capacity

There are several different methods or ways of using the DP-3 cooler and its capacity will vary between 5 and 12 gallons per hour depending to a certain extent upon the type of installation.

Glass Filling Attachment

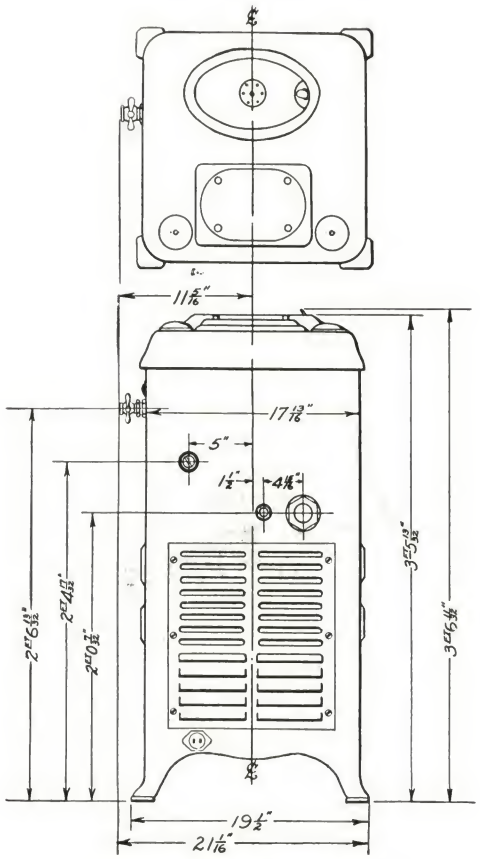
The standard DP-3 cooler can be equipped with a glass-filling attachment for restaurant use. To use the glass-filling fixture it is merely necessary to unscrew the standard nozzle and replace it with the special fixture.

Weight

Net, 325 lb. Shipping, 425 lb.

Caraffe Filler

Glass Filler

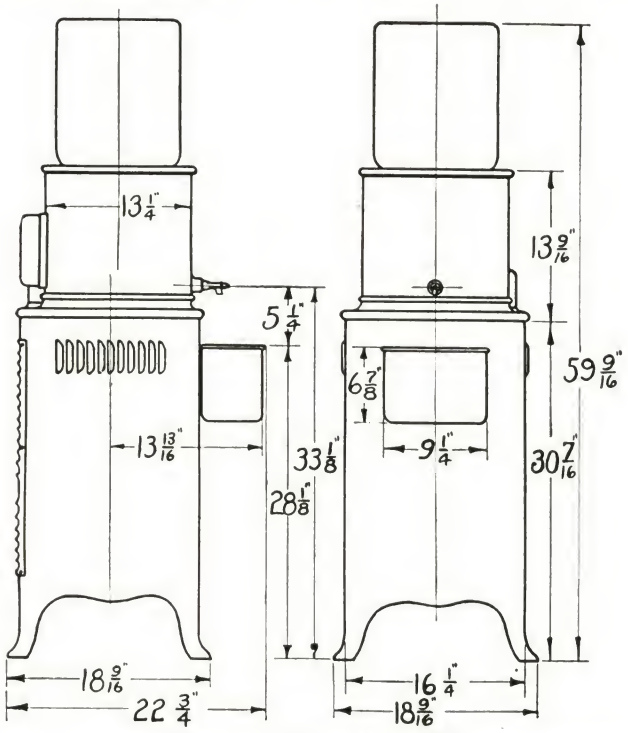


Dimension Diagram Model DP-3

5-GALLON BOTTLE WATER COOLER
Model DB-1
Specifications

Evaporator
A white porcelain evaporator with a capacity of 2 qt. forms the water cooling compartment. It has no seams or crevices, is absolutely sanitary.

Compressor
The compressor unit is of the single oscillating cylinder type, direct connected to the motor and is enclosed in a hermetically sealed casing.



Dimension Diagram Model DB-1

Model DB-1

Lubrication
All moving parts are liberally lubricated by a simple, forced feed oiling system from a permanent oil supply, eliminating the necessity of ever re-oiling.

Condenser
The condenser is air cooled.

Motor
A small 1/10 hp., 60 cycle, 110 volt, induction type motor is used. Since no commutator or brushes are used on this motor, it does not cause radio interference.

Control
The cooler is equipped with a temperature regulating control which automatically maintains the drinking water at the desired temperature.

Waste Basin
The waste basin has a capacity of 3 qts. It is readily removable for emptying.

Capacity
Two gallons per hour, cooled from 80° F. to 50° F. in an 80° F. room.

Weight
Net, 185 lb.; shipping, 225 lb.

Side View of Model DB-1

FRIGIDAIRE CORPORATION

SUBSIDIARY OF GENERAL MOTORS CORPORATION

Manufacturers of Refrigerators and Refrigerating Equipment

DAYTON, OHIO

Backed by a Definite Guarantee

FRIGIDAIRE CORPORATION offers to the architect a complete line of time-tested equipment backed by wide experience and outstanding success in the refrigeration field—equipment for installation in homes, apartments, stores and institutions of every type.

Architects have the assurance, moreover, that every Frigidaire product is backed by a definite guarantee on the part of Frigidaire and General Motors Corporations. The new white Porcelain-on-steel Frigidaires are sold with a 3-year complete guarantee.

And what is more important, assurance is given that in future years, Frigidaire will continue to give reliable refrigeration—long after the guarantee has expired.

Architects Can Choose from This Comprehensive List

Standard refrigerators for homes and apartments: (1) for unit installations; (2) for multiple installations.

Water coolers: (1) individual type for bottled water; (2) individual pressure type; (3) individual, multiple and circulating water cooling systems for office buildings, factories, etc.

Ice cream cabinets: (1) small portable models; (2) large standard models.

Combination ice cream and bottled beverage cabinets.

Room coolers.

Dehumidifiers.

Individual cooling coils and compressors for practically any need.

General Advantages of Frigidaire Equipment

(1) Frigidaire offers the architect the choice between unit and multiple installations. This gives him the utmost freedom in specifying exactly the right type and amount of refrigeration to serve his client's interest.

(2) Frigidaire offers a selection of refrigerator models to suit not only the size and cost of the building but also the taste and pocketbook of the client.

(3) Frigidaire makes it possible for the architect to include water coolers and other refrigeration equipment as part of a comprehensive plan. In many cases, such equipment as a water cooler may be refrigerated by the same mechanical unit as the refrigerator.

(4) Frigidaire offers the architect the economies and convenience of the "Group System" of refrigeration whereby several groups of two or more refrigerators may be operated independently of one another.

Write for Standard Frigidaire Data Book

Inasmuch as it is not practical to include on the following pages all information on Frigidaire that an architect should have, we shall be glad to furnish on request our standard Frigidaire Data Book for Architects and Builders. This booklet gives complete and detailed information concerning all Frigidaire products.

Architects are also invited to keep in touch with the local Frigidaire office, so that they may at all times be familiar with improvements and developments in Frigidaire equipment.

FRIGIDAIRE HOUSEHOLD REFRIGERATORS

Many Outstanding Features Make Frigidaire Refrigerators Convenient and Economical.

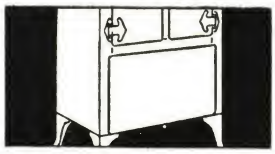
Smooth Flowing Lines, Symmetrical Proportions and Attractive Finish Make the Frigidaire Cabinet One of Striking Beauty—a Cabinet That Will Harmonize Perfectly with Any Kitchen Color Plan

(1) Sparkling surfaces of Porcelain-on-steel make cleaning easy. Just once over the cabinet with a damp cloth and the finish looks again like new.

(2) The trim, tailored lines of the graceful, easy-to-look-at top are in perfect harmony with the entire white Porcelain-on-steel cabinet.

(3) Frigidaire's front-to-back steel-rail shelves make it easy to put food in and take it out without risk of slopping or spilling. Even the bottom shelf can be reached without stooping.

(4) The high speed freezing unit maintains temperatures that are always below freezing and keeps the food compartment safely below 50 degrees.



(5) Surplus power keeps food fresh regardless of weather. And the power unit is completely concealed in the bottom of the cabinet.

(6) The "Cold Control" sends freezing compartment temperatures down toward zero whenever desired—makes remarkably short work of freezing ice or desserts.

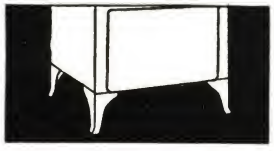
(7) The patented Frigidaire Quickube Ice Tray releases ice cubes instantly—one at a time or a whole trayful—with just a slight pressure on the bottom of the tray.

(8) The Frigidaire Hydrator keeps vegetables fresh and crisp. It even makes wilted vegetables fresh again. And it is finished in a special porcelain which even fruit juices will not stain.

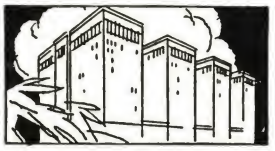
(9) The simple Frigidaire mechanism operates with incredible quietness. It starts quietly—runs quietly—stops quietly. And it stays quiet.

(10) Just a few cents a day covers the cost of operating Frigidaire. In fact, the difference it makes in electric light bills is scarcely noticeable.

(11) Even fruit juices will not stain the acid-resisting porcelain interior. The inside of Frigidaire can be kept as spotlessly clean as a china dish.



(12) The cabinet can be had with legs or with casters, whichever is preferred. All cabinets will be furnished with legs unless otherwise specified.



(13) Frigidaire is a General Motors value offering the many benefits of General Motors vast purchasing power, quantity productions and rigid inspections.

(14) The new, all-white, self-contained Porcelain-on-steel Frigidaires are sold with a 3-year complete guarantee—a guarantee that covers both cabinet and mechanism.

Complete details, including specifications and other important facts regarding the entire line of Frigidaire Household Refrigerators are given in the Frigidaire Data Book for Architects and Builders. Let us send you a copy or ask the local Frigidaire office.

Frigidaire Is Ideally Suited to Fit into Architects' Designs

The illustrations below show how easy and convenient it is for architects to fit Frigidaire cabinets into various kitchen plans.

Because of their symmetrical design, with top and other exterior surfaces flat and smooth, Frigidaire cabinets can be adapted to practically any kitchen size or arrangement. They may be placed underneath shelves, beside cupboards, and in many other niches.

The legs of Frigidaire cabinets can be removed to put the refrigerator in a lower position if desired, thus saving headroom. Hardwood casters are furnished to replace legs upon request.

Moreover, because Frigidaire cabinets are adaptable for both unit and multiple installations, they afford the architect an even greater degree of freedom in his refrigeration plans.

If desired, hardwood casters may be substituted for legs on Frigidaire cabinets, thus saving headroom as shown above.

This illustration shows how compactly the Frigidaire cabinet may be fitted in beneath shelves and beside cupboards.

A most practical arrangement of the kitchen can be secured with Frigidaire. Note the attractive installation shown.

The Frigidaire Individual System Provides a Complete Self-contained Refrigerator for Each Kitchen

With the individual system, every tenant is entirely independent of any other apartment in the building as far as refrigeration is concerned. In each apartment a self-contained Frigidaire is installed with a compressor in the base of the cabinet. Connection is made to any convenient electrical outlet.

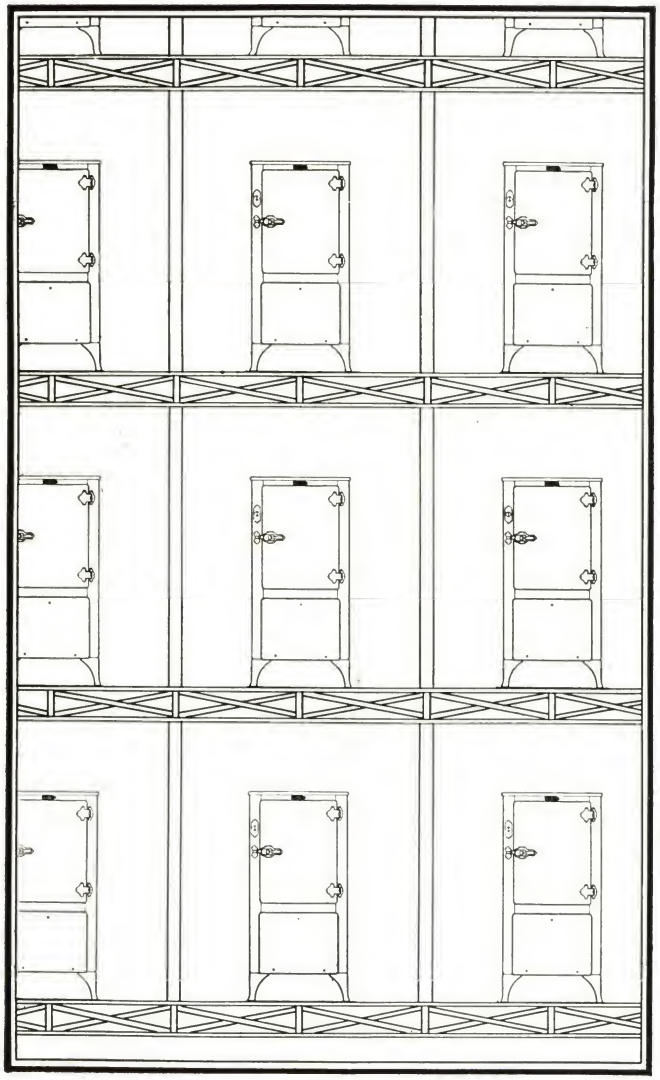
Structural dimensions of the most unusual proportions in no way limit the installation of a Frigidaire individual unit system.

With the individual system, each Frigidaire cabinet is equipped with an accessible "Cold Control" on the exterior, which may be used to regulate freezing speed as required. The "Cold Control" also permits tenants to control their own defrosting, thereby eliminating the responsibility of the monthly defrosting period by the janitor.

Each tenant by shifting the "Cold Control" to the "off" position, defrosts his own Frigidaire when necessary or shuts it off entirely when away. In other words, each apartment kitchen may be considered as the kitchen of an individual home.

The famous Frigidaire "cold control," conveniently at hand on the outside of the cabinet, is provided on all Frigidaire self-contained models for unit installation. This Frigidaire contribution to greater convenience permits tenants not only to speed the freezing of ice and desserts but also to control their own defrosting.

Famous Frigidaire "Cold Control"



Frigidaire Individual System

Features of the Frigidaire Individual Unit Installation

The following are a few of the features of the individual unit system:

(1) Tenants pay own operating costs. Each apartment has its separate meter. Bills for electric current used by Frigidaire are mailed directly to the tenant and owner realizes clear profit on extra rent secured due to presence of Frigidaire in apartment.

(2) "Frigidaire Cold Control" regulates freezing of ice cubes and desserts at will of tenant.

(3) Tenants control own defrosting by shifting the "Cold Control" to the "off" position.

(4) Low expenditure for installation.

(5) Installation of Frigidaire units may be made when and as desired.

(6) No limitations due to dimensions of building.

(7) Can be installed in a minimum of space. Because of their symmetrical design, with top and other exterior surfaces flat and smooth, the cabinets may be fitted in beneath shelves, besides cupboards and in many other niches.

(8) Frigidaire units do not necessitate special construction specifications.

(9) May be rented separately or sold to tenants.

(10) No radio interference.

(11) All equipment made and guaranteed by General Motors.

The Frigidaire Multiple System, Which Provides for All the Machinery in One Location, Affords Many Definite Advantages

In apartment houses where low initial investment is of paramount importance, the multiple system of refrigeration is chosen by many owners and builders. As shown by the diagram on this page, the multiple system provides for all the machinery in one location with the refrigerant piped to the refrigerator of the individual apartments. A central operating point for the machinery is easily supervised by the janitor and any adjustments can be made without annoyance to tenants. Moreover, any suite can be shut off if desired.

In addition to the standard line of cabinets, Frigidaire also manufactures several special models for multiple installation only. (We shall be glad to furnish detailed specifications and sketches on these Frigidaire apartment house models.)

Multiple installations are being used in thousands of apartment houses throughout the country and, wherever installed according to Frigidaire specifications, have proved themselves completely satisfactory from the standpoint of both owner and tenants.

Note: Frigidaire compressors and cabinets for multiple installation are now available with F-12, a remarkable new refrigerant developed through the collaboration of the same noted General Motors research chemists who discovered ethyl gasoline.

Features of the Frigidaire Multiple System

The following are a few of the features of the multiple system:

(1) Low initial investment and greater investment returns to apartment owner make this type of installation attractive.

(2) Economical cost of operation.

(3) A central operating point for all compressors, located in the basement of the apartment, is easily supervised by the janitor and any adjustments can be made without disturbing tenants.

(4) All defrosting of Frigidaires is done periodically by the janitor.

(5) The new refrigerant F-12 is especially suited for multiple installations.

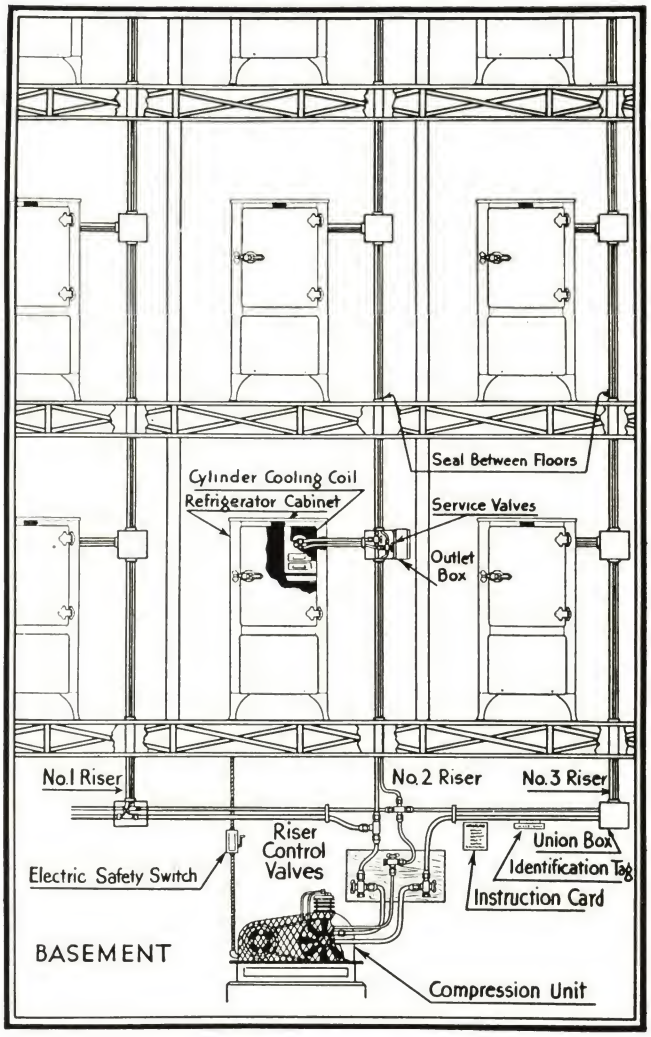
(6) Vacant suites in the apartment can be shut off at will. Valves located in standard junction boxes near each apartment enable the janitor to shut off refrigeration in any apartment.

(7) Each apartment suite is independent of the other with the multiple system.

(8) Frigidaire multiple installations meet approval of National Board of Fire Underwriters.

(9) There is no radio interference.

(10) All Frigidaire equipment is backed by a definite guarantee.



Frigidaire Multiple System

FRIGIDAIRE COMMERCIAL EQUIPMENT

Adaptable and Flexible

Whenever his work includes plans or specifications for any kind of commercial refrigeration, the architect will find that Frigidaire equipment is so adaptable and flexible that it will meet practically any refrigeration need. And it will do this in a way that will create good will and satisfaction on the part of the clients.

Commercial Frigidaire Line Is Complete

The completeness of the Frigidaire line for commercial refrigeration is well illustrated by the following list of equipment which is only partial:

Cooling coils to fit any shape compartment and any fixture.
Compressors up to 1½ h.p., both air and water cooled.
Complete cabinet refrigerators.
Water coolers of both bottle and pressure type.
Water cooling systems.
Ice cream cabinets.
Combination ice cream and bottle beverage cabinets.
Room coolers.
Dehumidifiers.

Advantages of the Frigidaire Group System for Commercial Refrigeration

Before the development of Frigidaire, the common practice was to use one large refrigerating plant to meet all the requirements of a commercial installation. This system was, however, inflexible and sometimes not completely satisfactory.

The development of a complete line of Frigidaire Cooling Coils, Compressors and other equipment has made it possible for large refrigeration installations to be broken down into small units, each operating at its best efficiency and each taking care of one certain type of refrigeration requirement economically and dependably.

With this system, entirely automatic operation can be secured. The expensive and cumbersome piping necessary with the central plant type of installation, together with the need for maintenance and renewal of piping is banished. The services of a refrigeration engineer can be dispensed with and more satisfactory temperatures will be obtained together with low operating expense.

Features of Frigidaire Commercial Refrigeration Installations

(1) Equipment of Ample Capacity at Low Prices—Frigidaire equipment is supplied at unusually low prices as a result of efficient quantity production, financial resources and engineering skill. But performance is never sacrificed in an effort to secure low prices. Every Frigidaire installation is engineered to do the job required, in a reliable, economical way.

(2) Low Cost of Operation—The operating cost of Frigidaire equipment has been proved very low in proportion to the temperatures required and the amount of space refrigerated. This is due to Frigidaire's sound design, careful manufacture and its principle of operating a relatively few hours out of every twenty-four.

(3) Trouble-free Automatic Operation—Negligible Upkeep—Frigidaire equipment has a reputation for trouble-free automatic operation over long periods. This applies not only to the first two or three years it is installed, but for many years—long after the guarantee has expired.

(4) Equipment That Is Flexible—Because it is often desired to change or alter commercial refrigeration fixtures after years of operation, the flexibility of Frigidaire is important. Frigidaire may be adapted to present fixtures or to any approved type the architect has in mind. Later, if so desired, the Frigidaire installation may be easily expanded or changed at minimum cost, often without interruption to refrigeration.

(5) Equipment That Is Accessible—Although Frigidaire provides the maximum in trouble-free refrigeration, Frigidaire engineers have so designed the equipment that it can be quickly adjusted or repaired on the premises at any time. In future years, if service should ever be necessary, this feature means much to clients and users, in low upkeep and uninterrupted refrigeration.

(6) Equipment That Will Last a Lifetime—Frigidaire equipment will perform reliably for a lifetime. The life of Frigidaire has never been determined because an early type of Frigidaire unit is still running and has been running continuously the equivalent of more than 35 years' operation in the hands of users. Such amazing results are secured because only the highest quality of materials are used in the manufacture of Frigidaire products; because all working parts are accurately ground to mirror-like surfaces to eliminate wear and increase life; because the design is right.

Ice Cream Cabinets

Wherever plans call for the storage of ice cream, the architect will find a wide variety of Frigidaire models enabling him to specify exactly the correct size and type for the need involved.

There are 12 models in all—3 of them portable and the other 9 of the standard type. The smallest is a 2-hole, 10-gal. unit and the largest a 12-hole, 60-gal. model. Each cabinet has a compressor that produces greater refrigeration power than ever before, at still lower cost. A new type cooling coil provides greater contact surface between coil and brine in the cabinet, producing faster refrigeration and more of it. The stainless bright metal top has been strengthened against dents by reinforcing its underneath surface with a layer of sturdy sheet steel. Each cabinet now has thicker top insulation.

Furthermore the insulated lids are now enclosed in hard rubber, with top and bottom of bright, rustless metal, and with a vulcanized flexible sealing ring that keeps heat out and cold in. And each cabinet is provided with the famous "Frigidaire Cold Control" which gives temperature control without affecting the automatic feature in any way.

Detailed specifications on Ice Cream Cabinets are shown in the Frigidaire Data Book for Architects and Builders. This book will be gladly furnished on request.

Standard Model Ice Cream Cabinet

Portable Model Ice Cream Cabinet

Combination Ice Cream and Bottled Beverage Cabinets

Wherever plans call for the storage of both ice cream and bottled beverages, architects have found Frigidaire Combination Cabinets ideal, since they meet requirements of those businesses that do not justify two pieces of equipment.

These models are provided in two sizes—one with one round and one square sleeve for ice cream and the other with two round and two square sleeves for ice cream. Both models include all the features of design and performance that have contributed to the success of Frigidaire Ice Cream Cabinets.

We will gladly send you specifications on the Combination models.

Combination Model Ice Cream Cabinet

Frigidaire Water Coolers

To help architects meet the growing demand for automatic water-cooling facilities, Frigidaire provides a complete line of time-tested equipment, varied enough and flexible enough to satisfy practically any need.

Frigidaire Water Coolers are distinctive in appearance, sturdy in construction and outstanding in performance. And there are models for bottled water and for city water connection.

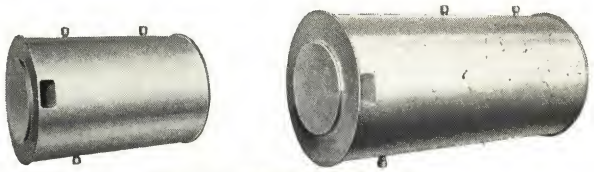
In addition, there are two water cooling tanks for use in connection with separate bubblers, fountains or faucets. Architects will find tank-type coolers ideal where it is not desired to have complete, self-contained water cooling units at each outlet.

Several Frigidaire Water Cooler models have a separate refrigerated compartment of acid-resisting porcelain for the storage of sandwiches, fruit, candy, yeast cakes, flowers, cigars and bottled goods. And as an added feature, the compartment door is equipped with a high grade automobile type door lock.

Furthermore, the coolers are built to withstand many years of usage. They are made of the highest grade copper, steel and brass. And each new self-contained cabinet model is equipped with a refrigerating unit that carries a 3-year guarantee. The faucets, bubblers and other fixtures are chrome-plated to prevent tarnishing and to permit easy cleaning. In fact, every part touched by water is of rust-proof material.

Complete descriptions, capacities and specifications on all Frigidaire Water Coolers are available for your use in the Frigidaire Data Book for Architects and Builders.

Self-Contained Frigidaire Water Coolers



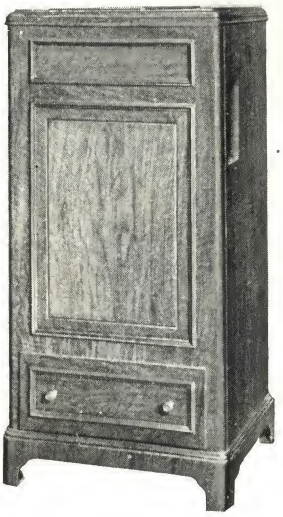
Frigidaire Water-Cooling Tanks

Frigidaire Room Coolers

The refreshing effect of the Frigidaire Room Cooler will prove invaluable wherever oppressive summer heat makes rooms hot, humid and uncomfortable. Architects find it ideal for bedrooms, living rooms, private offices, conference rooms, laboratories, restaurants, beauty parlors and a host of other locations.

The Frigidaire Room Cooler lowers the temperature, reduces humidity and circulates air without causing undesirable drafts or breezes.

It requires no attention, except to be turned on and off when desired. The Frigidaire mechanism is automatic. It runs only at intervals—just long enough and often enough to keep the room at the proper temperature.



While Frigidaire Room Coolers are designed for cooling ordinary sized rooms or offices, there are models available which will operate with entire satisfaction in rooms measuring as much as 450 sq. ft. Where larger spaces are to be cooled, more than one room cooler can be installed.

Frigidaire Room Coolers are available in two different types: Vertiflow Models and Cube Models; two models of each type, one provided with a pre-cooler and one without.

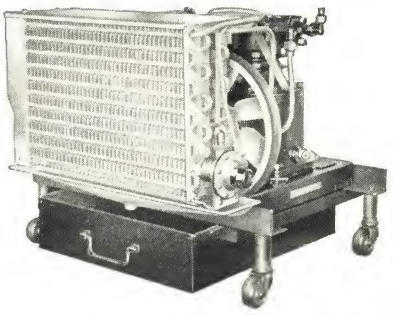
Vertiflow Models are a beautiful floor cabinet finished in grained walnut lacquer on steel.

Cube Models are finished in attractive ungrained mahogany Duco on steel. They may be placed on the wall, hung from the ceiling, built into furniture or placed behind grilles in the walls.

Further details concerning the room coolers will be gladly furnished on request.

The Dehumidifier

To condition humid air in organ lofts, bank vaults, libraries, clothes closets and other rooms where dampness threatens to warp and ruin fine things, Frigidaire offers the Dehumidifier—a remarkable new development.



Through the extremely simple design of the Dehumidifier, it has been possible to eliminate heaters, ventilators and other such fixtures usually employed to condition humid air.

In fact, the Dehumidifier is simplicity itself. It draws the moisture-laden air in over a cold coil and forces it out over a warm coil. This process removes the moisture by condensation and returns the reconditioned air to the room.

Additional information concerning this new development will be gladly furnished on request.

Frigidaire Cooling Coils

Frigidaire Cooling Coils are available in many different shapes and sizes and there are models to fit any type of cooling compartment and to meet any refrigeration need. Both Flooded and Expansion Types are available.

Some of the cooling coils have fins—some have flanges for installation in brine or water baths—some are equipped with ice trays—and others are supplied with cylinder and tubes only.

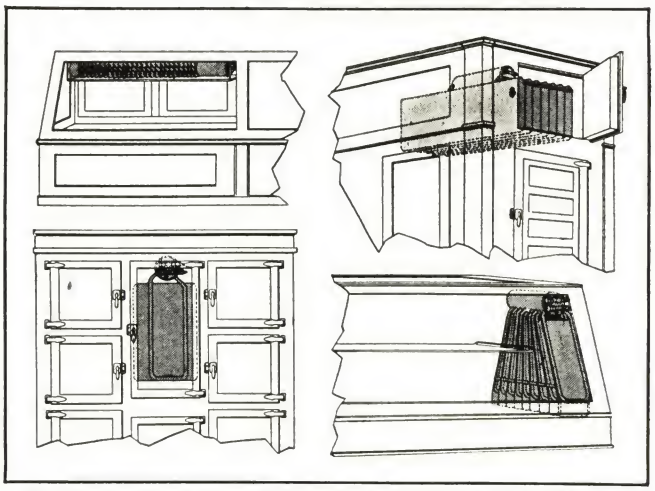
All Frigidaire Cooling Coils are made of copper and brass, plated with pure block tin, materials which guarantee the highest type of efficiency and long life. All fittings are made of brass and are drop-forged to eliminate the possibility of flaws in the material.

The large cooling surface of Frigidaire finned cooling coils, the high heat conductivity of the material of which they are made, and their clean surfaces maintained by automatic defrosting, make Frigidaire finned coils highly efficient.

In addition to the wide variety of flooded type cooling coils, Frigidaire offers a number of expansion type coils. These coils, like the flooded type, have been designed to give maximum refrigerating capacity at the lowest possible initial cost. And they are of the same quality construction throughout.

Here is a Representative Group of Frigidaire Cooling Coils

Examples of the Adaptability of Frigidaire Cooling Coils



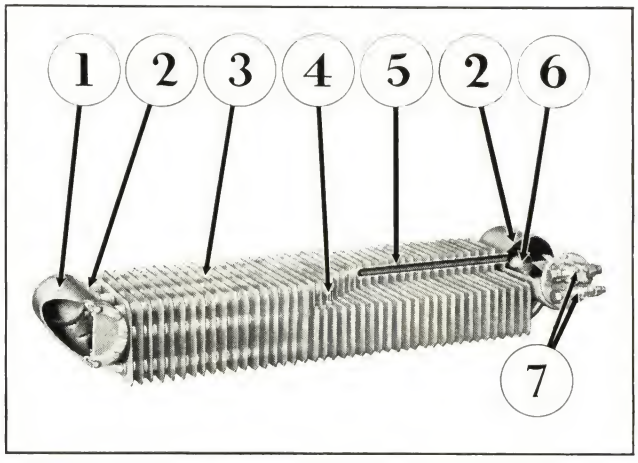
The diagram above shows the complete adaptability of Frigidaire cooling coils to different shapes and sizes of refrigerator bunkers. These are typical examples of Frigidaire's ability to meet widely varying refrigeration requirements.

A detailed list of Frigidaire cooling coils with applications and dimensions is provided in the Frigidaire Data Book for Architects and Builders, copies of which are available for the asking.

Mechanical Design and Construction Features of Frigidaire Flooded Type Cooling Coils

(1) Cylinder of thick, seamless brass is strong and leakproof.

(2) Silver solder is used to unite all tubes to cylinder.



This process gives the complete unit strength and durability, besides guarding against leaks.

(3) Special finned construction, developed by Frigidaire, makes possible "automatic defrosting," keeping coil surfaces clean and providing improved humidity conditions.

(4) Cross-tube construction of super-duty coils aids in proper evaporation of refrigerant and movement of oil.

(5) All fins are soldered to the tubing, for rapid, efficient transfer of heat from fins to refrigerating medium.

(6) Simple and reliable "float-valve" construction for regulating supply of refrigerating medium.

(7) Valves of drop-forged brass in both "liquid" and "suction" lines allow coil to be shut off completely from the rest of the system whenever desired.

Frigidaire Compressors

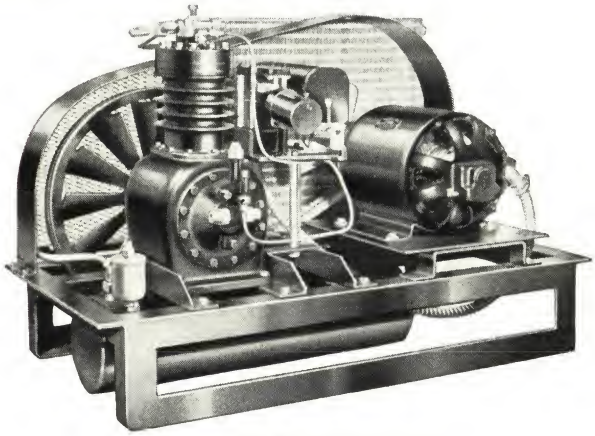
Frigidaire Compressors are furnished in a variety of models in both air and water cooled types. Air cooled models are adaptable to practically any location that is adequately ventilated, while water cooled units are most efficient on heavy duty wherever a supply of cool running water is convenient.

Two of the most important features of Frigidaire Compressors are their surplus power and their low speed. Frigidaire and General Motors engineers believe that best results may be obtained when a compressor of relatively high capacity is designed to run only a comparatively few hours a day. Short running time is easy on the equipment and gives it long life. A large margin is also left to be used in case of unusual demands or unusually hot weather.

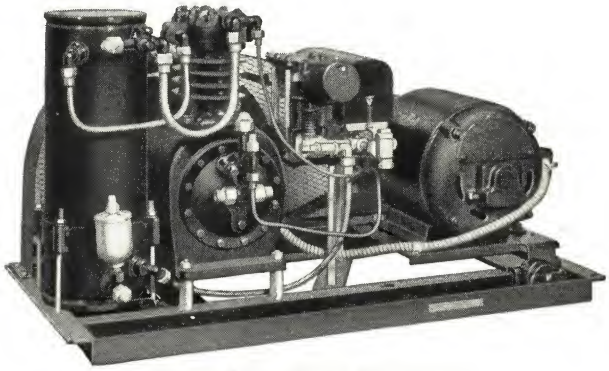
Frigidaire Compressors are designed to operate at low speeds to lengthen the useful life of the unit. When larger capacity is required, a larger compressor of larger bore and stroke is provided, thus assuring that each compressor is of ample size to supply all the refrigeration required.

All compressor units are of the sturdy, two-cylinder, slow speed, reciprocating type. All are equipped with belts of the strong, silent V-type, perfected in General Motors Research Laboratories. The condensers on all air cooled units are cooled by scientifically constructed, quiet and powerful fans. The water cooled units have entirely automatic water-flow regulators that are unusually economical in their use of water. All commercial compressors are equipped with a special safety switch which stops the compressor in case excess pressure develops in the system.

A detailed list of Frigidaire Compressors with dimensions is provided in the Frigidaire Data Book for Architects and Builders, copies of which are available for the asking.



Typical Air Cooled Compressor

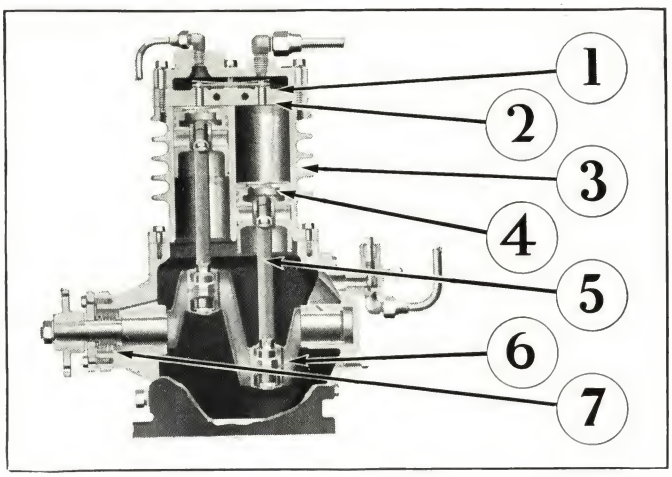


Typical Water Cooled Compressor

Mechanical Design and Construction Features of Frigidaire Compressors

(1) Positive-acting discharge valves, of split reed, "flapper" type, made of special spring steel.

(2) To assure perfect fit, the cylinder head valves are polished by hand with fine pumice.



(3) Cylinder walls are accurately ground to assure mirror-like surfaces.

(4) Intake valves in the piston are of selected spring steel. Piston and piston rings are ground to assure close fit.

(5) Connecting rod of drop-forged steel with babbitt crankshaft bearing similar to finest automobile engine construction.

(6) Crankshaft is drop-forged from tested steel, heat treated to give surfaces of a proper hardness.

(7) The Frigidaire Patented Durex bushing seals the oil and refrigerating medium within the compressor.

Write for Special Booklet

Architects are again invited to make free use of Frigidaire Engineering and Technical Facilities in all matters pertaining to refrigeration. With its large organization and its years of successful experience as a background, FRIGIDAIRE CORPORATION feels that a close friendly contact between the architect and local Frigidaire headquarters can be of mutual benefit. Every architect should have in his files a copy of the Frigidaire Data Book for Architects and Builders, AF-562, which replaces AF-417. This book contains a multitude of information concerning Frigidaire equipment and its application. Write direct or ask the local Frigidaire office.

KELVINATOR SALES CORPORATION

Kelvinator Electric Refrigerators

DETROIT, MICH.

CANADA: Kelvinator Canada, Ltd., LONDON, ONTARIO
ENGLAND: Kelvinator, Ltd., 258 Gray's Inn Road, LONDON, W. C. 1

Consult Telephone Directory for Local Addresses of Branch Offices

Product

AUTOMATIC REFRIGERATION for homes, apartments, stores, florists, restaurants, clubs, institutions, hospitals, dairy and ice cream equipment.

A complete line of WATER COOLERS for offices and industrial installations.

Also equipment for special applications, such as room cooling, marine installations, refrigerated trucks, etc.

Organization

The pioneer manufacturer of automatic refrigeration for domestic use, with an engineering and manufacturing personnel brought up within the industry, and devoting their entire time to the creation and production of automatic refrigeration units and cabinets.

Facilities

Probably the largest plants in the world devoted entirely to the manufacture of refrigeration units and cabinets. The Kelvinator plant located at Detroit, Michigan, has a daily capacity of 2000 units.

Co-operation

An international organization of distributers and dealers, suppiemented by a staff of factory representatives fully qualified by training and experience to co-operate with architects and engineers in the preparation of specifications to meet every requirement, and accustomed to working with engineers and architects in the field.

A direct advisory service with the factory at Detroit through distributers in all principal centers or through their associate dealers.

DeLuxe Line

The finest conveniences in automatic refrigeration. Five cabinets comprise this line which embodies all the pioneering features that have made Kelvinator one of the outstanding names in the industry. These cabinets range in size from 6 to 22 cu. ft.

Domestic Equipment

There is a Domestic Kelvinator for every type of home. They range in food compartment size from 4 to 22 cu. ft. The exterior dimensions are such that almost every home has at least one convenient space large enough for a Kelvinator cabinet.

For luxurious homes, where only the best of equipment is installed, Kelvinator recommends its DeLuxe line. White porcelain with a gray trimmed exterior, electrically lighted one-piece porcelain interior. Frost chest for frozen food and ice cube storage, and, of course, the celebrated Kold Keeper with its superautomatic, fast freezing Iso-thermic tray. All these conveniences come with the DeLuxe line in cabinets from 6 to 22 cu. ft.

In addition to the DeLuxe line, Kelvinator manufactures a complete range of cabinet sizes for small homes, flats and apartments both for self-contained and multiple installations.

Kelvinator Domestic Condensing Unit

Kelvinator condensing units have been developed to a point of perfection over a period of eighteen years. Models are available for equipping any refrigerating cabinet, and also of sufficient capacities to satisfactorily operate multiple systems with the maximum number of cabinets per condensing unit

A Typical Kelvinator Direct Expansion Cross Fin Cooling Unit Horizontal Type for Refrigerating Large Coolers and Other Storage Fixtures

Commercial Cooling Units

Kelvinator manufactures a complete line of cooling units for all types of commercial installations.

The cross fin cooling unit for storage and display refrigerating fixtures, recognized as the most efficient type of commercial cooling unit, is offered by Kelvinator in both the direct expansion system and flooded system.

Kelvinator Cross Fin Cooling Unit, Vertical Type, Used in Small Refrigerators and Display Cases

In the direct expansion system where a thermostatic expansion valve is used to admit the refrigerant to the cooling unit, both the horizontal and vertical types are manufactured. With this range of units in various sizes, it is possible to select the correct cooling unit for any type of cooling compartment.

The same range of choice is available in the flooded system, where a float valve included in the evaporator which is an integral part of the cooling unit is used for the admission of the refrigerant.

Flooded system cooling units are also available for cooling refrigerated fixtures, soda fountains, milk cooling equipment and other commercial requirements.

With the combination of a full line of both direct expansion and flooded system cooling units, Kelvinator can be used in all types of commercial applications.

A Typical Kelvinator Ice Making Unit
To be installed in cabinets where large quantities of ice cubes are required

Commercial Condensing Units

Over twenty-five different compressors make up the line of Kelvinator condensing units. These range from $\frac{1}{10}$ to 3 hp. For heavy duty installations, Kelvinator offers both refrigerant-cooled and water-cooled cylinder heads on their compressors, thus assuring maximum refrigerating capacities and satisfactory performance.

A Typical Commercial Condensing Unit

Ice Cream Cabinets

Complete electric refrigeration equipment for the ice cream industry is manufactured by Kelvinator. From the portable cabinet for small "stops" to the large twelve-hole double row remote, there is a cabinet available for all types of ice cream merchandising. Ice cream equipment for hardening and storage purposes is also available.

Water Cooling Equipment

Kelvinator manufactures equipment designed to operate efficiently for all types of water cooling. The general classifications are as follows:

(1) Individual self-contained coolers:
  (a) Side faucet pressure coolers
  (b) Top or side bubbler pressure coolers
  (c) Bottle filled gravity coolers
  (d) Restaurant coolers with storage reserve and glass-filling faucet
(2) Remote coolers:
  (a) Office (Individual)
  (b) Factory (Dead end)
  (c) Restaurant (Multiple)
(3) Dead end system.
(4) Multiple system.
(5) Circulating system.

Architects' Manual

The Automatic Refrigeration Manual for Architects and Engineers, form No. 2013, A.I.A. File No. 32 C-3, contains photographs, line drawings and complete specifications of every Kelvinator cabinet in addition to specifications and data on water cooling and commercial equipment.

The Kelvinator Handbook of Electric Water Cooling for Architects and Engineers, form No. 2023, A.I.A. File No. 32 C-3, describes and illustrates the complete line of Kelvinator self-contained water coolers, also the evaporators and condensing units for use with approved water cooling equipment for multiple and circulating systems. It contains a complete description of all types of cooling equipment and service to which they are best adapted, together with application data that will enable the architect and engineer to compute requirements and specify equipment for any system.

These books will be sent gratis if a request is addressed to the Kelvinator distributer in your city or to Kelvinator Sales Corporation, Detroit, Michigan.

Commercial Engineering Assistance

As a means of simplifying the commercial application, Kelvinator has developed a very complete list of engineering tables for calculating commercial work. Distributers and their representatives throughout the country have been thoroughly trained on commercial equipment, and may be called upon by the architect and engineer at any time for assistance along these lines.

Consult the Kelvinator Refrigeration Engineer in your territory.

SERVEL SALES, INC.

Electric Refrigeration

FACTORY AND GENERAL OFFICES
EVANSVILLE, IND.

DISTRIBUTORS AND DEALERS IN ALL PRINCIPAL CITIES

SERVEL HERMETIC ELECTRIC REFRIGERATORS

Simplified Refrigeration

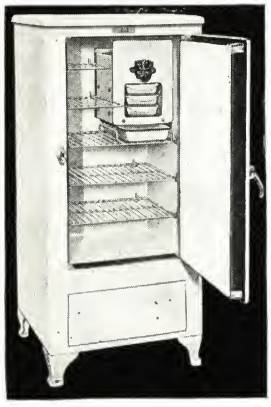
So advanced, so simplified is the new Servel Hermetic line that the architect may specify these modernized electric refrigerators for every domestic and apartment use.

Installation problems are completely eliminated. Because no special wiring or connections are required, the Servel Hermetic may be installed by plugging the electric cord into a convenient light socket.

The operating unit is a marvel of simplicity, with a minimum of working parts, all of them sealed at the factory in a lifetime of oil. Adjustments in the kitchen and repeated lubrication are no longer necessary.

A complete guarantee, during its period, protects the owner and user against expensive repairs in the kitchen or apartment. If, for any reason, except abuse, replacement of the operating unit is necessary, the whole unit is simply lifted out of the back of the cabinet and a new unit quickly installed in its place.

Architects will be supplied upon request with a special Architects' Manual, containing complete data and specifications. Write to the factory or the nearest distributor or dealer.



Servel Hermetic Model SE-5

SERVEL HERMETIC DIMENSIONS

Model	Height, in.	Width, in.	Depth, in.	Shipping weight, lbs.	Storage capacity, cu. ft.	Shelf area, sq. ft.	Ice cubes	Lbs., ice
SE-3	53 1/2	21 1/4	22 3/4	335	3.2	6.63	42	4
SE-4	52 5/8	24 3/4	25 1/2	398	3.99	8.52	63	6
SE-5	55 1/8	25 7/8	26	428	4.87	10.92	63	6
SE-7	62 7/8	33 1/4	26 1/2	595	6.72	14.87	72	9*
SE-9	62 7/8	41 1/2	26 1/2	632	9.18	19.56	72	9*

*In addition to the regular cube trays in Models SE-7 and SE-9, the cold storage compartment will freeze a large 12-lb. cake of ice.

Details of Cabinet Construction

Liner—white vitreous porcelain fused on rust-resisting steel. Insulation—in accordance with Servel-approved specifications. Exterior—Bonderited metal (patented process). Finish—softly gleaming white pyroxylin. Hardware—heavy brass, chromium plated in satin finish.

Servel Hermetic Model SE-9

OUTSTANDING FACTS ABOUT THE SERVEL HERMETIC

Hermetically Sealed Unit

The operating unit is hermetically sealed in a bath of oil—permanently protected from dust, rust and moisture. This unit is located in the base of the cabinet—leaving a flat, usable top for the housewife's convenience.

Fewer Moving Parts

So simplified is the design of the Servel Hermetic that it requires fewer moving parts. Fans, belts, expansion valves, float valves, fuses, seals, and other parts most likely to cause trouble, have been entirely eliminated. Force-feed lubrication lessens the chance for friction and wear.

Convenience of Design

The compact cabinets provide greater shelf area and storage capacity with less floor space. Convenient height legs permit easy cleaning, yet the cabinet top is within easy reach of every housewife. Flat "ribbon-type" shelves prevent tipping of dishes. A handy temperature control permits faster freezing of ice cubes and desserts.

Quiet and Economical

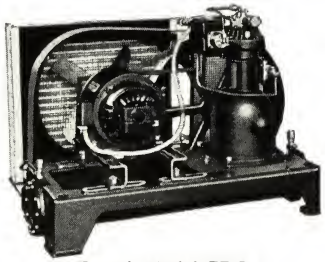
The Servel Hermetic operates quietly—with less vibration—with only a faint whisper of sound. Because it consumes less electricity, its operation costs the fewest possible cents per day. Low prices and generous terms are available.

SERVEL COMMERCIAL ELECTRIC REFRIGERATION

The completely modernized line of Servel refrigerating machines includes 16 sturdier, heavier models for every commercial requirement from 130 to 1510 lbs. ice equivalent per day.

For water-cooling, multiple apartment installations, restaurants, groceries, meat markets, florist shops, dairies, hospitals, schools—wherever dependable, economical automatic refrigeration is required—the architect may safely specify Servel Commercial Refrigeration.

These new Servel models are equipped with improved interchangeable condensers, so that a water-cooled model may be readily converted into an air-cooled model, or vice versa. Multiple v-belt drives insure uninterrupted service and quiet operation. All models are furnished with automatic, positive-action controls. Low speed compressors provide greater efficiency for the current consumed.



Servel Model 75-B

With all their advancements, these 16 new Servel models cost no more than ordinary refrigeration. Write to the factory for complete specifications, or consult the nearest distributor.

J. F. WEINHEIMER

National Distributor of The Combinator Sink

304-308 Genesee Street

BUFFALO, N. Y.

THE COMBINATOR SINK

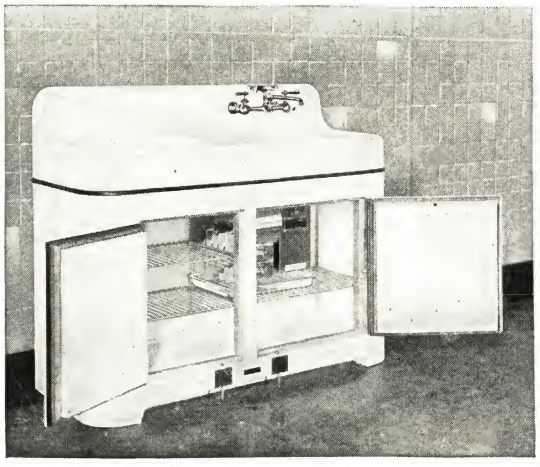
The Combinator combines the standard kitchen sink and the electric refrigerator in a single convenient unit. No longer need these two accessories, common to every modern home, occupy the majority of space in the kitchen and rear hall. No longer need the housewife spend endless time and countless steps traversing the distance from the sink to the refrigerator. With the Combinator when she stands at her sink, she stands at her refrigerator. Labor involved in the preparation of meals is reduced by 50%. Time involved is cut in half. The beauty and the convenience of her kitchen is considerably enhanced.

The Combinator is available in sizes to fit Standard Sanitary Sinks.

The Combinator cabinet is extremely spacious and well built. Obtainable in colors to match Standard Sanitary Sinks. Moreover, it is designed so as to house any of the prominently advertised units on the market, such as Frigidaire, Kelvinator, Mayflower, etc.; the architect or owner deciding in preference of the unit most favored.

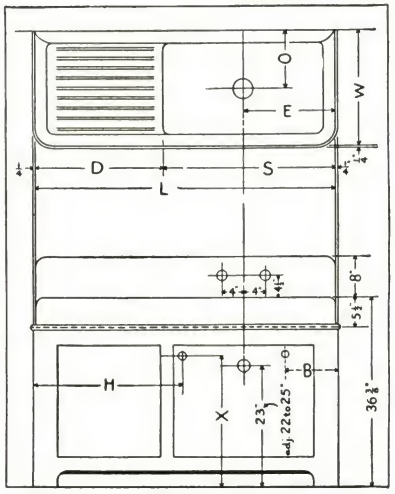
Combinator doors are opened by the flick of a foot against an inconspicuous pedal. Right or left drainboard sinks are available as are storage capacities to meet the need of every family.

Complete installation instructions and diagrams supplied to any architect requesting them.

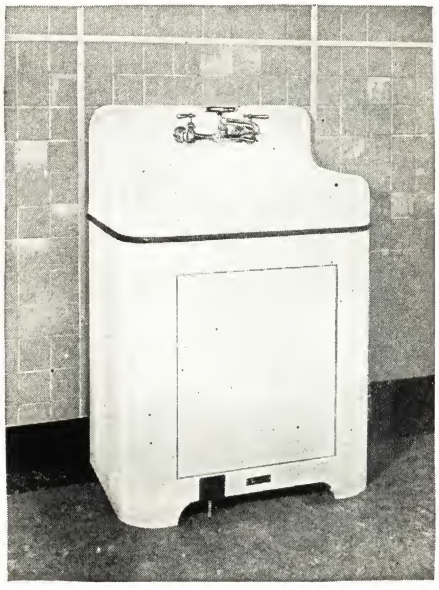


Model 57 Combinator

Model 47 Combinator



Note the advantage of toe space beneath refrigerator, rounded corners and the plain front without any projections to catch on clothing. All unsightly hardware has been eliminated.



Model 30 Combinator

Model	Drain Board	Standard sanitary Sink No.	Storage capacity, cu. ft.	Shelf area, sq. ft.	Dimensions, in.									
					Over all	W	L	S	D	E	O	H	X	B
M. 46	R.H.	P.6706	6½	9	20 x 42	20	42	22	20	12	10	18½	24	
M. 47	L.H.	P.6707	6½	9	20 x 42	20	42	22	20	12	10	18½	24	
M. 56	R.H.	P.6706	8½	12	20 x 52	20	52	28	24	15	10	24	24	
M. 57	L.H.	P.6707	8½	12	20 x 52	20	52	28	24	15	10	24	24	
Mo.30		P.6700	4½	6½	20 x 30	20	30	30		15	10			11

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue
For References to Other Products, see Index to Manufacturers

WESTINGHOUSE "COMPLETELY BALANCED" REFRIGERATOR

Twelve years of scientific research and preparation in the great Westinghouse Laboratories preceded the introduction of this "completely balanced" quiet, economical refrigerator. No one feature has been developed for mere sales effect, at expense of another. Food preservation, fast freezing operating mechanism, storage capacity, are all perfectly balanced with each other. It is as foolproof and troubleproof as it could possibly be made. There are no belts, gears, or stuffing boxes to get out of order. In 1930 Westinghouse refrigerators had an unbeaten record of trouble-free performance. This is a guarantee of satisfaction to the owner and for the architect who specifies it.

Exclusive Features

The Westinghouse possesses many advantageous features, among them are:

(1) A Hermetically Sealed Quiet Operating Unit—The motor and compressor are enclosed within a dirt and dust proof sheet of steel, parts of which are precision built to an accuracy of 2/10,000 of an inch. A permanent supply of oil and SO_2 refrigerant is placed within the unit.

(2) Fan Cooled Condenser—This results in more efficient operation of the freezing mechanism. This is a Westinghouse development.

(3) Fully Automatic—(Built-in watchman) This not only stops but starts up the unit automatically when unusual conditions interrupt operation.

(4) Buffet Top—The flat top is in reality an outside shelf.

Temperature Selector—A seven-point selector, located where it is visible and readily accessible at all times.

Broom High Legs—Legs are 9½ to 11½ ins. high. It is easy to clean beneath a Westinghouse Refrigerator. Glider feet make it possible to move it with little effort.

Maximum Usable Space—Exceptional large storage space. Ample room for tall bottles and containers.

Automatic Electric Froster—Assures food preserving temperatures. Freezes ice cubes and frozen dainties quickly when necessary.

Safety Zone Food Compartment—Assures temperature always below 50° F. Actually betters food.

Extra Thick Insulation—2½ to 4-in. Celotex, made to Westinghouse specifications.

Other Features

In addition to the above, the Westinghouse has sanitary porcelain on steel interiors with rounded easy-to-clean corners, rubber freezing tray (one or many ice cubes can be instantly removed) and chromium plated hardware.

It is forced draft cooled. Operates efficiently even in "dog days," under pantry shelves, in wall recesses, and other places where there is little natural air circulation.

Models and Sizes

The Westinghouse line includes the Standard type in four sizes, three of which are shown below, and the DeLuxe electric lighted type in five sizes.

DeLuxe Types—These come in a choice of all-porcelain finish or lacquer exterior and porcelain interior. All have automatic electric lighting inside, hermetically sealed, quiet mechanism, forced draft cooling, extra large shelf area, and the built-in watchman (referring to the Spencer disc protection).

Model WL45 for Apartments and Small Homes

The ideal size for modern small apartments. Forced draft cooling. Operates efficiently where there is little natural circulation of air.

***Specifications—**

Finishes: exterior, lacquer; interior, porcelain.
Over-all dimensions: width, 24 ins.; depth, 20½ ins.; height, 55⅞ ins.
Shelf area, 7.8 sq. ft.
Usable interior volume, 4.27 cu. ft.
Ice making capacity, 54 large cubes, 5¼ lbs.
3 single depth non-tarnishing metal trays.
1 rubber freezing grid

Model WL73 for Homes and Apartments

An ideal size for the larger apartments and homes of average size families. Easily fits into recesses, built-in kitchen ensembles, etc.

***Specifications—**

Finishes: exterior, lacquer; interior, porcelain.
Over-all dimensions: width, 31⅞ ins.; depth, 22 ins.; height, 59⅞ ins.
Shelf area, 11.40 sq. ft.
Usable interior volume, 7.28 cu. ft.
Ice making capacity, 96 large cubes, 11 lbs.
2 single depth and 1 double depth non-tarnishing metal trays.
1 rubber freezing grid

Model WL90 for Large Homes and Apartments

This is the largest Standard model. Yet, because of forced draft cooling and its practical design, it will fit into and operate efficiently in ensembles, recesses and other restricted places.

***Specifications—**

Finishes: exterior, lacquer; interior, porcelain.
Over-all dimensions: width, 38⅞ ins.; depth, 22½ ins.; height, 59⅞ ins.
Shelf area, 14.1 sq. ft.
Usable interior volume, 8.98 cu. ft.
Ice making capacity, 96 large cubes, 11 lbs.
2 single depth and 1 double depth non-tarnishing metal trays.
1 rubber freezing grid

**Specifications subject to change without notice.*

WILLIAMS OIL-O-MATIC HEATING CORPORATION

Williams Ice-O-Matic Electric Refrigeration

FACTORY
BLOOMINGTON, ILL.

FACTORY BRANCH OFFICES
NEW YORK, Graybar Building
CHICAGO, 185 North Michigan Avenue

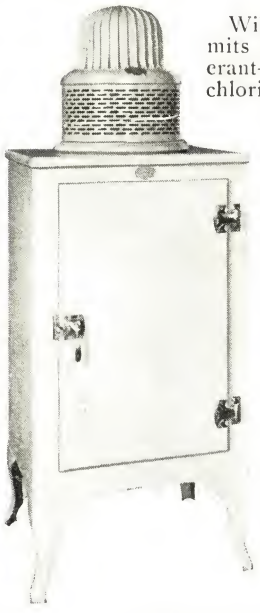
Products

Williams Ice-O-Matic and Ice-O-Matic Capitol refrigeration for domestic uses with 4 to 19 cu. ft. of storage space; commercial installations up to 1200 lbs. melting ice equivalent. Available as self-contained or multiple-unit installations in apartment houses. Water coolers, milk coolers, etc., have been adapted for Ice-O-Matic operation. (The Good Housekeeping Institute and Underwriters' Laboratories have approved Ice-O-Matic.)

For Williams Automatic Oil Burners, see Manufacturers' Index.

WILLIAMS ICE-O-MATIC REFRIGERATION

Williams Ice-O-Matic domestic cabinets are lined and covered with rust-resisting steel mounted on a wood frame. There is no metal-to-metal contact to reduce insulating capacity. The insulating material is extra thick corkboard or other approved material, proofed against moisture or sagging. Door openings are sealed with double gaskets and the doors are closed tight automatically with self-locking latches. Several models have electrically lighted interiors.



Refrigerating Units

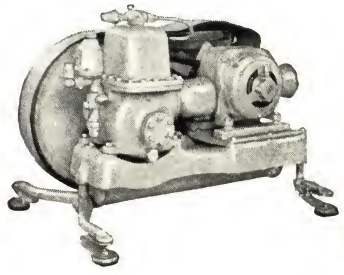
Williams Engineers perfected a patented device which permits successful use of the coldest known domestic refrigerant—methyl chloride. At atmospheric pressure methyl chloride boils at —10.65° F. This colder refrigerant permits compressor to operate with greater efficiency—thus lengthens useful life—and lowers operating cost.

The high cost of methyl chloride prohibited wide use but since the war it has been produced in this country on a practical, commercial scale. All gases, except pure air, are toxic to different degrees. Government tests prove that methyl chloride is among the least toxic of common refrigerants.

Methyl chloride is stable and chemically inert in the presence of metals, moisture, air and lubricating oils.

During a test—which is still being conducted—an Ice-O-Matic unit was operated continuously, without stopping, for more than 48 months. No oil or refrigerant was added during this severe run which is equal to more than 8 years of normal service.

Williams Ice-O-Matic compressors are built in four sizes, to efficiently handle the smallest domestic cabinets, or commercial installations. Evaporators (coolings units) are available in a multiplicity of sizes and shapes to fit practically any installation.



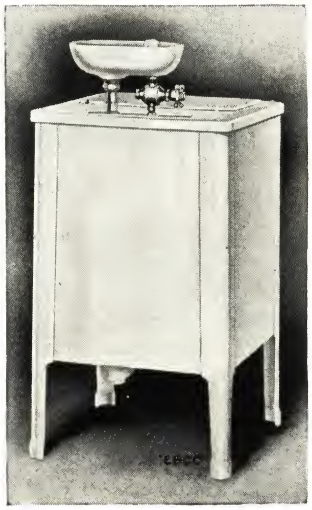
Note: Location of the Ice-O-Matic Capitol sealed unit is optional. It may be placed either on top of the cabinet, self-contained in a cabinet having a lower compartment, or located remotely in the basement.

Company

Ice-O-Matic is built and backed by the WILLIAMS OIL-O-MATIC HEATING CORPORATION whose home utilities are now serving more than 125,000 owners. Ice-O-Matic is sold and serviced by Williams dealers throughout the United States and in 44 foreign countries.

Cabinets

Williams Ice-O-Matic is offered in a complete line of cabinets for all domestic needs. Various sizes and styles are in stock for immediate shipment. Several makes of commercial cabinets have earned the recommendation of Ice-O-Matic engineers for business uses. Write for details on your job.



Water Coolers

Williams Ice-O-Matic is available in two new types of water coolers, in models suitable for schools, office buildings, hospitals, factories, lunchrooms, locker rooms, etc.

Ice-O-Matic JP Cooler will give adequate refrigeration for 2 to 3 gallons of water per hour. It has both the sanitary bubbler and a push-button type glass-filler. Ice-O-Matic Cooler C-304 has a capacity of 6 to 10 gallons of water per hour. It is little more than 3 ft. high and 1½ ft. wide. The cabinet is all vitreous enamel. Bubbler has automatic stream control valve. It pitches an angle stream of water for sanitary safety and convenience.

Information

Detailed information on refrigerating problems is offered you by factory engineers.

Please address your inquiries to Bloomington, Chicago, or New York office for prompt attention.

Catalogues

"Installation and Service Manual" (revised edition).

"Williams Ice-O-Matic Refrigeration."

GENERAL REFRIGERATION SALES COMPANY

Manufacturers of Lipman Full Automatic Electric Refrigerating Machines

101 Shirland Avenue
BELOIT, WISCONSIN, U. S. A.

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ALBANY, N. Y., New York Power & Light Corp.
AMSTERDAM, N. Y., Chuctanunda Gas Light Co., Inc.
ATLANTA, GA., Mutual Foundry & Machine Co.
BALTIMORE, MD., Maryland Refrigeration Co.
CAMDEN, N. J., Edmund S. Allen, % Walt Whitman Hotel
CINCINNATI, OHIO, General Refrigeration Co. of Cincinnati
CORTLAND, N. Y., Cortland County Traction Co.
DAVENPORT, IOWA, Interstate Refrigerating Co.
DENVER, COLO., Public Service Co. of Colorado
DES MOINES, IOWA, C. L. Percival Co.
EL PASO, TEX., Achterberg Warehouse Co.
ESCANABA, MICH., Major Utilities Co.
GRAND RAPIDS, MICH., General Freezer Corp.
GREAT FALLS, MONT., P. P. Boukind, 4 W. 6th Street
HOUSTON, TEX., Way Engineering Co.
INDIANAPOLIS, IND., Kiefer-Stewart Co.
KNOXVILLE, TENN., Chapman Drug Co.
LANCASTER, PA., H. M. Vondersmith, 38 So. Queen Street
LOUISVILLE, KY., F. A. Clegg & Co.
MADISON, WIS., Lipman Sales Co.
MEMPHIS, TENN., Southern Engineering Co.
MILWAUKEE, WIS., Emkay Engineering Co.
MINNEAPOLIS, MINN., Lipman Refrigeration Co.
NEW HAVEN, CONN., Harry N. Glynne Co.
OGDENSBURG, N. Y., St. Lawrence County Utilities Corp.
OKLAHOMA CITY, OKLA., Oklahoma Refrigerating Co.
PEORIA, ILL., Nailon Corp.
PHOENIX, ARIZ., John Kennedy, 337 No. Second Street
PHILADELPHIA, PA., Philadelphia Electric Co.
PITTSBURGH, PA., Refrigeration & Equipment Co.
PORTLAND, ORE., Gray, McLean & Percy
POTTSDAM, N. Y., St. Lawrence County Utilities Corp.
READING, PA., Utilities Purchasing & Supply Co.
RENSSELAER, N. Y., Eastern N. Y. Utilities Corp.
ROCKFORD, ILL., Illinois-Lipman Co.
ROME, N. Y., Northeastern Power Corp.
SACRAMENTO, CALIF., M. S. King, 2305 "O" Street
SALT LAKE CITY, UTAH., Automatic Refrigeration Co.
SAN ANTONIO, TEX., Martin Wright Electric Co.
SAN DIEGO, CALIF., West Coast Gas Engine Co.
SAN FRANCISCO, CALIF., Teltz & Company, Inc.
SEATTLE, WASH., Gray, McLean & Percy
SPOKANE, WASH., James Smythe Plumbing Co.
SYRACUSE, N. Y., Syracuse Lighting Co.
TAMPA, FLA., W. C. Hardy
UTICA, N. Y., Utica Gas & Electric Co.
WALLINGTON, N. J., Mayer Refrigerating Co.
WASHINGTON, D. C., Washington Refrigeration Co.
WATERTOWN, N. Y., Northern New York Utilities Co.
WICHITA, KAN., Midwest Refrigeration & Fixture Co., Inc.
WILKES-BARRE, PA., Popky Refrigeration Co.
WILMINGTON, DEL., Delaware Power and Light Company

EXPORT DISTRIBUTORS

BARCELONA, SPAIN, R. Oyarzun & Cia., Rambla Cataluna 81
BILBAO, SPAIN, R. Oyarzun & Cia., Hernao 6
BUENOS AIRES, ARGENTINA, Alfa Laval, Sociedad Anonima Importadora, Chacabuco 599
CALGARY, ALBERTA, Alberta Refrigeration Co., 611 First Street, E.
GLASGOW, SCOTLAND, MacNaughton & Watson, Gallowgate, near Cattle Market
S'GRAVENHAGE, HOLLAND, M. J. Spruyt & Zonen, Prinsogracht 23
HAMILTON, ONTARIO, Freeman Store Fixture & Supply Co.
HAVANA, CUBA, Refrigeracion Lipman S. A., O'Reilly No. 22, P. O. Box 2161
HONOLULU, T. H., Hurd Pohlman Co., Ltd., Knights of Pythias Bldg., off Bishop at Union and Adams Lane
HORSENS, DENMARK, Mr. Gorm Petersen, 43 South Street
JOHANNESBURG, SOUTH AFRICA, P. J. Lucey & Co., Ltd., Commissioner and Kruis Streets
LONDON, ENGLAND, L. Lumley & Co., Minories E-1
MADRID, SPAIN, R. Oyarzun & Cia., Ave. Pi & Margall 22
MANILA, P. I., Erlanger and Galinger, Roxas Building
MELBOURNE, AUSTRALIA, Henry Berry & Co., Pty. Ltd., 568 Collins Street
MEXICO CITY, D. F. Machinery Corporation, S. A., 3A Palma, 33 Apartado, P. O. Box 76 B
MONTEVIDEO, URUGUAY, Messrs. Alfa Laval, S. A. I., Casilla de Correo 134
MONTREAL, QUEBEC, F. W. Pennock & Co., 632 Craig Street, West
OTTAWA, ONTARIO, Geo. Cameron, 80 Queen Street
RIO DE JANEIRO, BRAZIL, Mayrink Veiga & Co., 13 Rue Mayrink Veiga—21
SANTIAGO, CHILE, Carr Haynes & Cia., Ltd., Augustinas No. 1041, Casilla 2769
SEVILLE, SPAIN, R. Oyarzun & Cia., Ansor De Dios 2
SHANGHAI, CHINA, Anderson, Meyer & Co., Ltd., 4 Yuen Ming Yuen Road
STRATFORD, ONTARIO, McLagen Furniture Co., Ltd.
TOKYO, JAPAN, Iwaya Refrigeration Co., Ltd., Itchome, Ginza
TORINO, ITALY, Sviluppo Applicazioni Tecnico Ind., Via Maria Vittoria 4, Via Lagrange 1
VANCOUVER, B. C., General Refrigeration Co., 1019 Richard Street
WALKERVILLE, ONTARIO, Walkerville Hydro-Electric Co.
WINNIPEG, MANITOBA, Arctic Ice & Fuel Co., 156 Bell Avenue

Product

FULL AUTOMATIC (AMMONIA) COMPRESSION REFRIGERATING MACHINES, including Compressors, Condensers, Valves, Fittings, Coils, Cabinets, Water Coolers, etc.

Application

Lipman machines deliver dependable, economical refrigeration for every type of commercial or industrial installation. They function with equal efficiency on direct expansion or brine circulating systems. Typical installations include creameries, apartments, hospitals, schools, hotels, ice cream factories, and drinking water cooling systems for public buildings, institutions, and industrial plants.

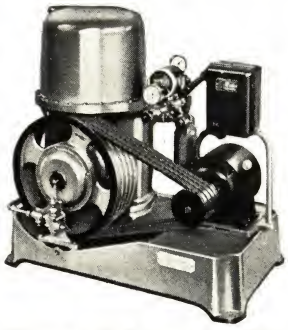
Sizes

Self-contained, full automatic machines are built in capacities ranging from ¼ to 5 tons daily refrigeration. Vertical compressors, with individual capacities of 7½, 10, 15, and 20 tons, are equipped with either automatic or manual controls.

Service

Each Lipman branch and distributing organization has a competent refrigeration engineer as its directing head. These men are specialists in the design and layout of refrigerating systems to fit any commercial or industrial requirement. Design and layout for replacement installations is another service which is given by Lipman engineers free of charge.

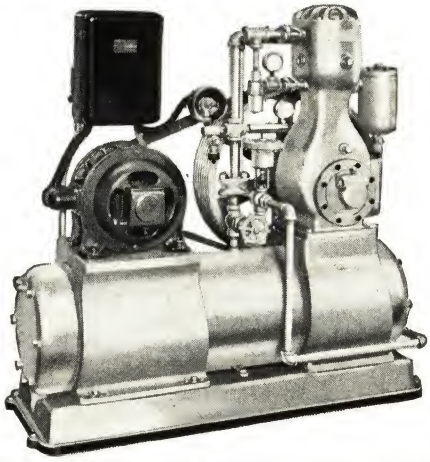
Complete personal information and additional information in the form of booklets and catalogues is always readily available for the mere asking. Submit your refrigeration problems to Lipman for quick and satisfactory solutions.



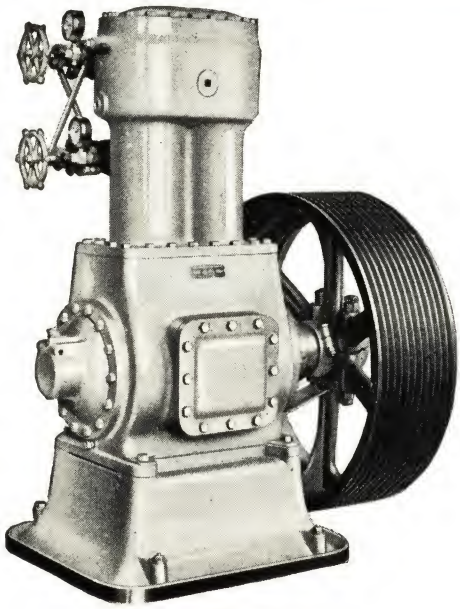
Lipman Refrigerating Machine, ½ to 1½ Hp.

Self-contained Models

The Lipman Model at the left is built in five sizes, ranging from ½ to 1½ hp., while the model below is built in six sizes, from 2 to 10 hp. All eleven models are fully automatic and fully self-contained.



Lipman Refrigerating Machine, 2 to 10 Hp.



Lipman Compressor

Other Lipman Models

The Lipman Compressor above is built in the 15, 20, 30, and 40 hp. sizes.

Compressor, motor, and condenser are mounted separately, but may be assembled very compactly and operated fully automatic.

Manual control is optional.

SPECIFICATIONS—LIPMAN FULL AUTOMATIC SELF-CONTAINED REFRIGERATING MACHINES

Model	51	61	81	101	151	210	310	410	710v	1110
Shipping weight with motor (approx.) lb.	435	580	620	880	940	1215	1345	2070	2410	3300
Over-all length in.	25	29½	29½	37	37	43½	51½	56	57¾	70
Over-all width in.	19	19¼	19¼	22½	22½	20½	20½	26¼	26¼	30
Over-all height in.	22¾	24¾	26½	33¾	36¼	46¼	46¼	53	55¼	66
Compressor speed r.p.m.	490	490	490	395	495	395	495	270	405	235
Number of cylinders	1	1	1	1	1	2	2	2	2	2
Bore and stroke in.	1¾x1½	2x1½	2¼x1½	2¼x2¼	2¼x2¼	2¼x2¼	2¼x2¼	3¼x3½	3¼x3½	4½x5
Flywheel diameter in.	13¼	13¼	13¼	17	17	19½	19½	28	28	36
Flywheel face in.	2	2	2½	3	3	3½	3½	5¾	5¾	7½
Motor size hp.	½	½	¾	1	1½	2	3	5	7½	10
Motor syn. speed r.p.m.	1800	1800	1800	1800	1800	1800	1800	1800	1800	1200
Motor pulley diam in.	3 13/16	3 13/16	3 13/16	4 1/32	4 29/32	4⅝	5¾	4 11/16	6¾	7 11/16
Number of "V" belts	2	2	3	3	4	4	4	5	6	8
Oil capacity of crankcase	3 pt.	3½ pt.	3½ pt.	6½ pt.	6½ pt.	9 pt.	9 pt.	11½ qt.	11½ qt.	27 qt.
Ammonia charge capacity lb.	6½	10	12	15	20	25	35	50	75	135
Suction line (pipe thread size) in.	½	½	½	½	½	¾	¾	1¼	1¼	1¼
Liquid line (pipe thread size) in.	½	½	½	½	½	½	½	½	½	½
Water supply (pipe thread size) in.	¼	¼	¼	½	½	1	1	1	1	1
Water drain (pipe thread size) in.	¼	½	½	½	½	½	½	¾	¾	1
Approx. current consumption per hour kw.	0.4	0.6	0.7	0.8	1.0	1.7	2.0	3.0	4.0	6.0
Approx. amt. 65° cond. water per hr. cu. ft.	3	4	5	6	8	12	18	26	40	65

Models 210, 310, 410, 710V are tapped for split suction.

SPECIFICATIONS—MODELS 1510, 2010, 3010 AND 4010

Model	1510	2010	3010	4010
Shipping weight—compressor only lb.	2350	2350	3235	3235
Dimensions, compressor only:				
Length in.	37½	37½	46	46
Width in.	40	40	40	40
Height in.	55½	55½	65	65
Number cylinders	2	2	2	2
Bore and stroke in.	5½x5½	5½x5½	7½x7½	7½x7½
Speed r.p.m.	200	265	160	210
Bearings	Babbitt	Babbitt	Babbitt	Babbitt
Flywheel:				
Size in.	40x8½	40x8½	40x12⅝	40x12⅝
Weight lb.	585	585	720	720
Crankshaft—drop forged steel, diam in.	4	4	4¾	4¾
Motor hp.	15	20	30	40
Motor speed r.p.m.	720	900	720	900
Drive, V-belts No. of V-belts	7	7	11	11
Refrigerant	Ammonia	Ammonia	Ammonia	Ammonia

Other Lipman Equipment

Detailed specifications gladly given on Lipman Unit Water Coolers, Milk Cooling Plants, Re-circulating Water Cooling Systems, Ice Cream Cabinets, Special Cabinets, Brine Tanks, Coils, and Drop Forged Fittings.

THE AUTOMATIC REFRIGERATING COMPANY

Automatically Controlled Refrigerating and Ice Making Plants
Patented Individual Room Control

MAIN OFFICE AND WORKS
HARTFORD, CONN.

BRANCH SALES and SERVICE OFFICES
BOSTON, MASS., 185 Lincoln Street
NEW YORK, N. Y., 228 East 41st Street
SPRINGFIELD, MASS., 33 Lyman Street

Products

AUTOMATIC REGULATORS for use with Ammonia Machines.

"Automatic" Refrigerating Systems

Installations — Complete refrigerating plants for any kind of service, including drinking water cooling, air conditioning, markets, restaurants, dairies or general storage, using either ammonia or carbondioxide.

If you have a refrigerating problem of any kind, make use of our engineering service.

Operation—By means of the "Automatic" Refrigerating System any number of cold storage rooms can each be held at different temperatures automatically and connected to the same refrigerating machine.

TRADE-MARK
Reg. U. S. Pat. Off.

Regulators

These have been developed after over 30 years of building and installing automatic controls for refrigerating plants. They can be used on new plants or to improve efficiency of present plants.

"Automatic" Liquid Ammonia Valves

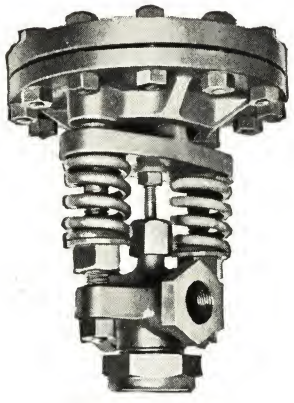
One of these valves placed in the liquid line will shut off the liquid supply when the machine is shut down, either through the thermostat or failure of power. The valve can be operated directly from a thermostat for individual room control.

Thermostatic Expansion Valve

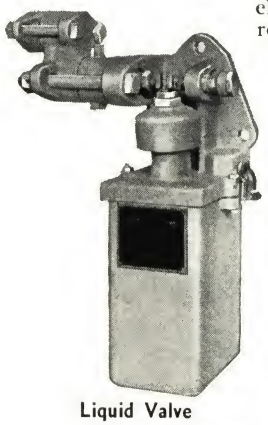
This valve can be used to good advantage either on a refrigerating plant with a single circuit, or in parallel circuits using any number of these valves. The amount of ammonia fed to the expansion coils is controlled by a thermostatic chamber placed in the outlet from the last coil fed by the valve. This type of expansion valve maintains the frost on all of the piping to which it is connected within a few feet of the thermostatic chamber. This means maximum efficiency and minimum operating cost.

Back Pressure Regulator

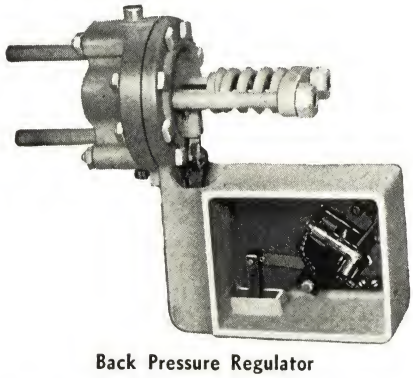
The back pressure regulator is connected to the suction line of the refrigerating machine. This regulator is set to shut down the machine at the highest suction pressure possible and obtain the desired temperatures in the boxes. This eliminates the additional expense involved in producing refrigeration at low suction pressures.



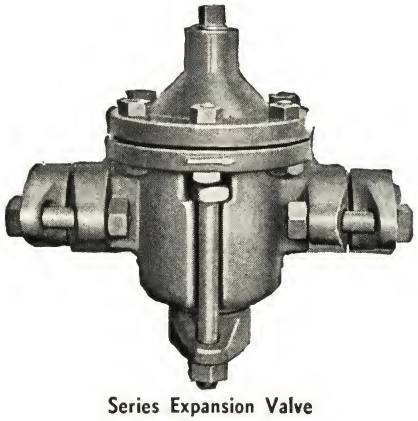
Water Regulator



Liquid Valve

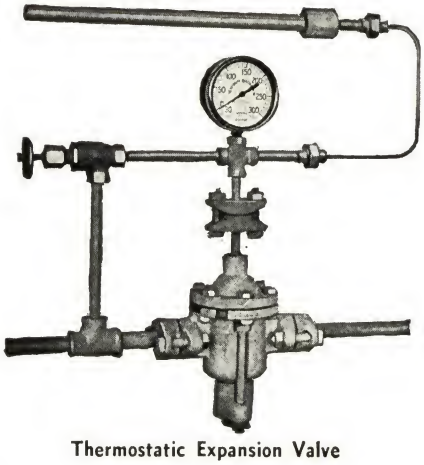


Back Pressure Regulator



Series Expansion Valve

Ammonia Float Valve



Thermostatic Expansion Valve

Pioneers in Automatic Refrigeration

D 5367

ELEVATORS

ACTIVE ELEVATOR COMPANY

TELEPHONES
Bell: Lombard 5398
Keystone: Main 1335

212 Chancellor Street
PHILADELPHIA, PA.

Products

HAND and ELECTRIC POWER DUMBWAITERS and ELEVATORS for interior and exterior service; ELECTRIC SIDEWALK ELEVATORS; ELECTRIC FREIGHT ELEVATORS; ELECTRIC AUTOMOBILE ELEVATORS; ASBESTOS FIRE CURTAIN HOISTS.

Also Invalid Elevators; Steel Sidewalk Doors and Frames.

TRADE MARK
(Reg. U. S. Pat. Office)

Some Installations

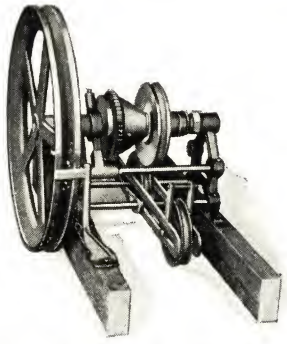
New York Shipbuilding Corporation, Camden, N. J.
E. J. Kenney & Co., New Britain, Conn.
Wright, Haw y Jaen Guardia Ltd., Panama
Haskell & Durfey Company, Elmira, N. Y.
J. S. Mathers, Covington, Va.
E. W. Marland, Ponca City, Okla.
School for Blind, Talladega, Ala.
Dresser Company, Cleveland, Ohio
Norfolk & Western R. R., Roanoke, Va.
Algernon Blair, Montgomery, Ala.
E. J. Roper & Son, Paducah, Ky.
U. S. Battleship Wyoming, for U. S. Navy Department
A. L. Oesendorf, Dayton, Ohio
Braeckels, Joplin, Mo.
Hotel Pennsylvania, Philadelphia, Pa.
Cramp & Company, Philadelphia, Pa.
State of West Virginia, Beckley, W. Va.
Memorial Library, Gettysburg, Pa.
Girard College, Philadelphia, Pa. (John T. Windrim, Archt.)
Washington Heights School, Battle Creek, Michigan.

Residence and Commercial Dumbwaiter

Capacity 75, 150, 300 and 500 lbs.

These dumbwaiters are equipped with automatic brake which sustains the loaded car at any point but locks it on downward motion only. This leaves the upward movement free from friction.

Type 21 has one door opening. Type 22 has door opening on opposite sides. Equipped with automatic lock, anti-friction roller bearings, wire hoist rope, adjustable guide shoes and exposed weights.



Type 21 Hand Power Dumbwaiter Machine with Automatic Brake

Geared Hand Power Dumbwaiter Machine with Automatic Brake

RESIDENCE AND COMMERCIAL DUMBWAITERS

Type	Car size, in. *WxDxH	Compartments		Cap., lb.	Shipping weight for 10-ft. travel, lb.
		Number	Height, in.		
21	24x20x30	2	14 and 12	75	300
22					
27	30x24x34	2	16 and 14	150-300	450
28	30x42x48	1		150-300	500
29	30x42x48	1		500	

*W=width. D=depth. H=height.

Hoisting Machine—Mounted in iron frame, including wheels for deflecting hoist rope, and has a polished, turned steel shaft, rotating smoothly on roller bearings. All parts are machined and accurately fitted.

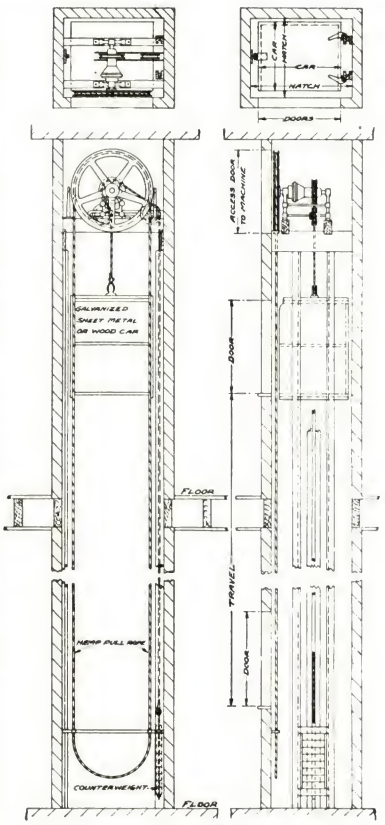
Type 27, 28 and 29 hoisting machines are of the geared type with ratio of gearing adapted to lifting capacity. The lift wheel cast directly on the side of large spur gear, eliminating keys and set-screws, thereby relieving the main shaft of all torsional strain. The large diameter lift wheels increase the traction and lengthen the life of cables. Gears are cast from machine cut patterns.

Car—Made of either galvanized sheet steel, rigidly riveted and well braced, or of hardwood and fitted with adjustable guide shoes.

Counterweight—Slightly heavier than car to aid in lifting the load and is sectional to permit accurate adjustment.

Guides—Made of hard maple and yellow pine runs to guide both car and weight, and insure smooth, quiet operation. Counterweight guides are in sections to avoid warping. This construction conserves shaft space and eliminates the usual weight box.

Cable—Flexible steel cable with all attachments necessary to secure to car and weight. Hemp operating rope without splinters.



Typical Layout of Active Hand Power Dumbwaiter

Exterior Dumbwaiter for Apartments

Capacity 75 to 150 lbs.

Type 31 is rapidly coming into general use because of exclusive features appealing to apartment house owners, operators and tenants. It requires no inside space as the entire equipment is placed outside, permitting delivery men to serve tenants without entering the building.

Hoisting Machine—This is a self-contained unit similar to Type 21 protected from the weather by a galvanized iron hood.

Car—The car size, capacity, etc., is similar to the Type 21. Shipping weight for 10-ft. travel, 425 lb.

Ornamental Dumbwaiter

Capacity 25 lbs.

Type 41 is suitable for hotels, offices, restaurants and stores where light, quick service is necessary. Attractive brass work and ornamental design produce a handsome outfit.

Car—Made of hardwood carefully finished, with bottom and intermediate trays reinforced at the corners.

Guides—Two brass tubes, flanged top and bottom with intermediate clamps for securing.

Rope—Operating rope is $\frac{9}{16}$-in. hemp, free from splinters.

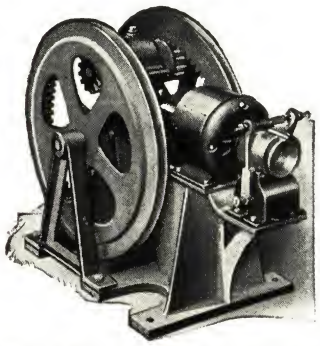
Electric Dumbwaiter (Type 51)

Capacity up to 500 lbs.

Operated by a series of push buttons at each landing.

Machine—Worm gear reduction unit is equipped with a phosphor bronze worm gear, hardened steel worm with threads ground, giving the smoothest possible tooth bearing, which is so important with worm gears due to their sliding contact. They are machined from solid steel blank. Worm and worm wheel shafts are equipped with Timken roller bearings.

TIMKEN BEARING EQUIPPED



Type 51 Electric Dumbwaiter Machine

The lifting wheels which rotate on roller bearings are driven by spur gears, on worm wheel shaft, meshing with large internal gear on lift wheels. The electrically operated brake has a large gripping surface.

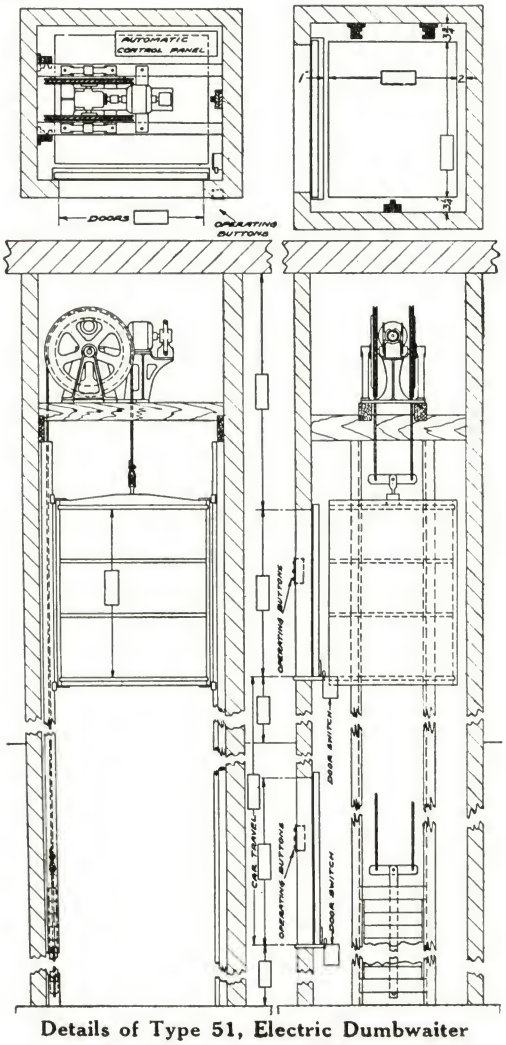
Shaft limit switches automatically stop the car at upper and lower landings.

Car—The car can be made of either hardwood or galvanized sheet steel, not over 3 ft. square or 4 ft. high.

Counterweight—The counterweight is sectional to secure accurate adjustment and is slightly heavier than the car to obtain uniform service in either direction of travel.

Guides—Guides consist of a maple run on one side and yellow pine on counterweight side to guide both the car and the weight.

The yellow pine guides are sectional to prevent warping and twisting.



Details of Type 51, Electric Dumbwaiter

Hand Power Elevator (Type 72)

Capacity 500, 1000, 1500 and 2000 lbs.

This machine is built to meet all standard requirements.

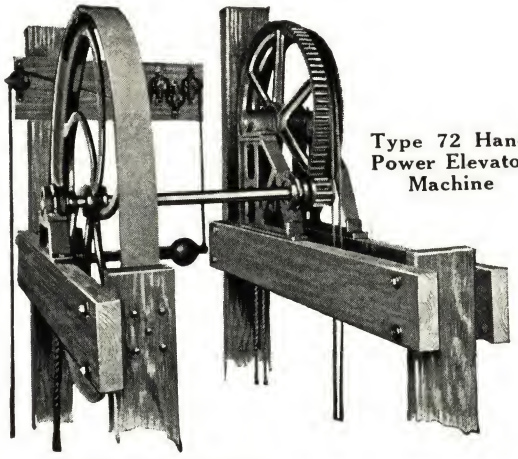
It is mounted in iron stands and the pull wheel shaft rotates on steel roller bearings. The lift wheel is cast on the side of the large spur gear and rotates on large steel roller bearings. This arrangement of lifting eliminates all keys and torsional strain on main shaft and simplifies erection. The band brake operates on both flanges of the large pull wheel and is operated from all floors by means of a brake rope.

The car is built of hardwood with iron side braces and corner angles where upright stiles and crossbeam join. A safety attachment is provided that will instantly lock the car in the guides if the hoisting cables should break or become slack.

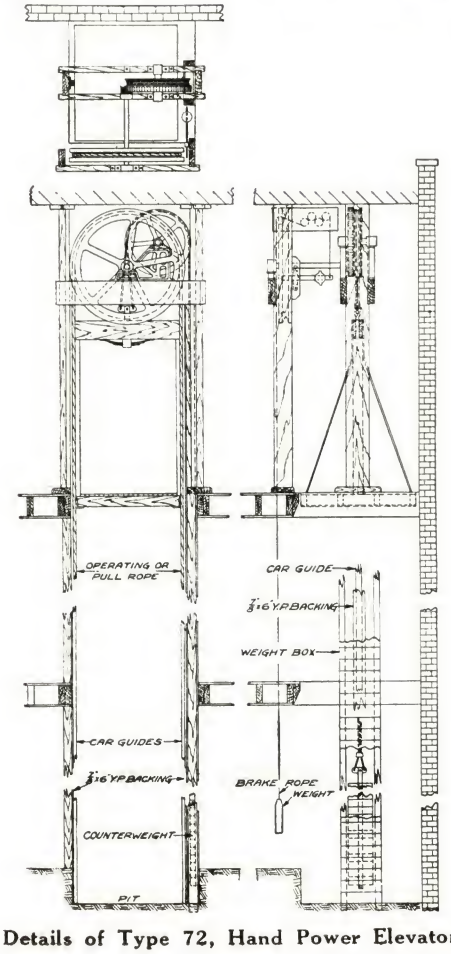
To Quote Prices

We require the capacity, size of car, number and height of each floor from top to top.

Detailed instructions and blue prints for erection will be furnished with each order.



Type 72 Hand Power Elevator Machine



Details of Type 72, Hand Power Elevator

ESTABLISHED 1889

BECKWITH ELEVATOR CO., INC.

INCORPORATED 1917

TELEPHONE
Liberty 8333

113 Albany Street, BOSTON, MASS.

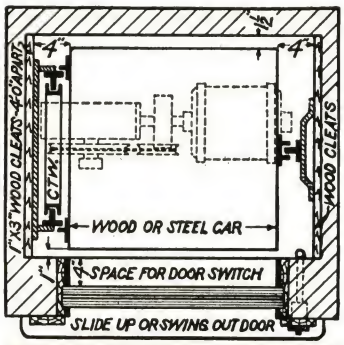
CHICAGO, ILL., L. G. Tingwall Co., 549 West Randolph Street
PHILADELPHIA, PA., Security Elevator Co., 901 Callowhill Street
DALLAS, TEX., Hunter-Hayes Co.
SEATTLE, WASH., E. C. Hanselpacker & Co., 721 Virginia Street
SAN FRANCISCO, CALIF., Price Building Specialties Co., 683 Howard Street

Products

We specialize in the manufacture and installation of DUMBWAITERS, SMALL PASSENGER and FREIGHT ELEVATORS, INVALID ELEVATORS, etc.; electric, hydraulic or hand power types.

Material is sold f.o.b. or installed. Send for catalogues with prices and data.

For our pages on Ash Hoists, see Manufacturer's Index.



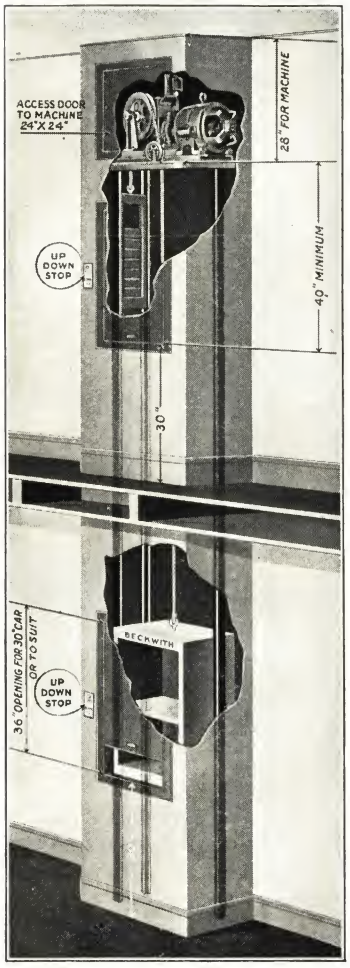


Fig. B. Traction Type Electric Dumbwaiter Installation with Machine Overhead

For two or more landings, push button control. Car stops automatically at top and bottom. Counterweight is used to overbalance car. Can be used for any number of floors, any speed or capacity

Electric Dumbwaiters

Automatic push button operated. Any capacities up to 500 lb. at speeds of 50 to 200 ft. per minute. Standard equipment furnished for 110-220 volts d-c., or single phase 60 cycle a-c. and 220-440-550 volts, 2 or 3-phase 60 cycle a-c.

General Specifications—Machine-traction (or drum) type consists of bronze gear, steel worm with ball bearing thrusts, well lubricated, fully enclosed and mounted on machined bed plate. Simple electric brake, spring-actuated to stop motor immediately the power is shut off. Reversible motor is high grade especially arranged for dumbwaiter service. All very simple and compact. Controller of latest approved design, mounted on slate panel, with ample size carbon-to-copper contacts. Push buttons, door and limit switches of neat, reliable design. Cars made any size of wood or metal. Guide rails and hoist rope of steel. Electric switches on doors arranged to make machine and car inoperative while landing doors are open, thus avoiding accidents. Mechanical locks to keep doors from being opened unless car is at landing. Note 4-in. recess or sill space for door switches and locks.

Standard Push Button Control Systems—

No. 1—Full automatic for two landings. Buttons marked *Up-Down*. Momentary pressure on button sends or calls car as desired. Inoperative when door is open. *Stop* button optional.

No. 2—Semi-selective for three or more landings. Buttons marked *Up-Down-Stop*. Momentary pressure on button sends car as desired. It will continue to either terminal unless *Stop* button is pressed at intermediate landing.

No. 2A—Constant pressure. Buttons marked *Up-Down*. Pressing button starts car—stopped by releasing button.

Systems No. 2 and 2A require vision panels for landing doors. Car stops automatically top and bottom.

No. 3—Full automatic selective for three or more landings. Button bank at each landing giving complete control of car from any landing. Inoperative when doors are open.

No. 4—Bank of buttons on car. "Call" button at landings. Momentary press of proper button in car and closing door sends car to desired landing.

No. 5—Bank of buttons at one floor only. "Send" button at other floors to return car to controlling station. Call buttons if wanted.

In all cases control buttons are inoperative while car is in motion. Other combinations furnished where required.

Installation Data—

Provide fireproof shaftway with landing doors. Allow one opening of sufficient size to admit assembled car and an opening for access to machine, wherever it may be located. Provide wood cleats, about 1x3 in., set flush in sidewalls of shaftway, 4 ft. apart, for fastening guide rails.

Use 2 or 3-phase current for motors where possible. If higher voltage than 220 is to be used, the cost will be greater to cover a transformer, changing push buttons and secondary circuit to lower voltage for safety feature. Electric current, with suitable cut-out switch, should be provided in machine room or close to motor.

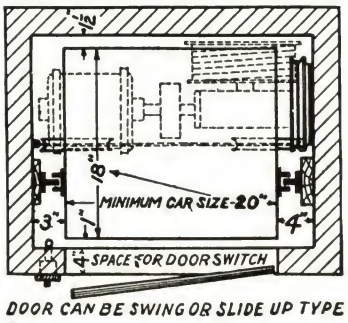
STANDARD CAPACITIES AND SPEEDS

Capacity, lb.	Speed, ft. per min.	Motor hp.
100	60–75–100	¾
150	75	¾
200	60	¾
200	75	1
250	60	1
300	75	1½
400	75	2
500	75	2½

INSIDE DIMENSIONS OF STANDARD SIZE CARS
(Wood or Steel-Box Type—With One Removable Shelf)

Width, in.	Depth, in.	Height, in.
20	18	30
24	20	30
30	24	30
36	30	36
36	36	36

Note: Wood cars have ¾-in. ash sides, top and bottom and shelf with ½-in. 5-ply back. Steel cars have angle framework with sheet steel sides, back, top and bottom, and shelf. All reinforced and braced. Cast iron guide shoes



DOOR CAN BE SWING OR SLIDE UP TYPE

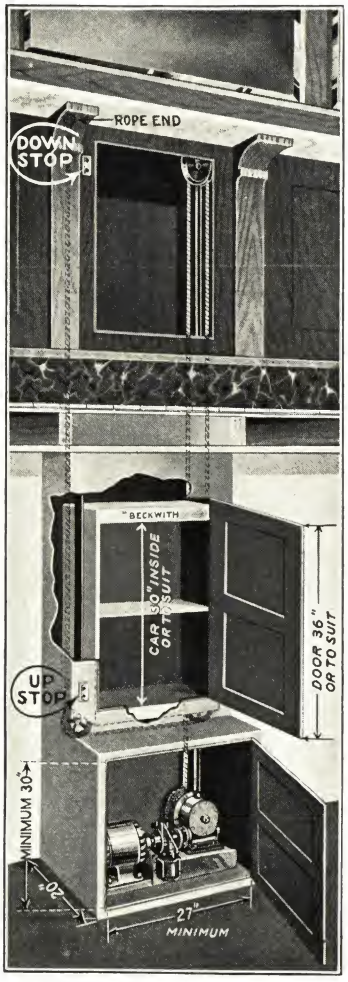


Fig. D. Counter Type Electric Dumbwaiter Installation with Drum Type Machine Located at Bottom of Shaft

Machine can be placed at side or back, push button control, car stops automatically by limit switch geared to machine. No counterweight needed except for loads over 200 lb.

Hand Power Dumbwaiters and Elevators

Dumbwaiters may be had in capacities up to 500 lb. with car having platform area up to 9 sq. ft. Larger cars and with greater capacity are classed as hand elevators and should be equipped with safety devices to hold car in case of rope breakage. Machines are the band brake types in any capacities or the automatic, self-sustaining type in capacities up to 200 lb.

Hydraulic Dumbwaiters, 100 to 500 lb.

Where there is a maintained water pressure of at least 40 lb., and the rise does not exceed 15 ft., the hydraulic dumbwaiter is the most economical of the power types to install and maintain. Silent and very reliable, it is still preferred by many for a power proposition. A slight pull on the operating rope or handle starts the car. It stops automatically at the top and bottom.

The piston type, with the cylinder directly under the car, is most commonly used. Where this is not possible, we set a special hydraulic machine at the side or back of the shaft above the floor. The operation is the same.

For both kinds, a suitable supply and waste pipe must be provided.

Invalid Lifts or Small Passenger Elevators

Especial care is taken to make these machines simple, quiet, easy running and absolutely safe.

Electric—Automatic push button (Fig. 8) or shipper rope control. Interlocks and electric contacts can be installed on shaft doors to prevent operation of car unless all doors are closed and to prevent the opening of any door unless car is at that door. Electric brake, worm geared machines of best type are used. We include safety devices on car, hatch switches, etc., as required for safety features.

Hydraulic—Fig. 6 hand rope control. Car stops automatically top or bottom. Exceptionally safe and quiet, very low installation and maintenance cost. Car cannot drop as it is pushed up from beneath by piston. Collapsible gate at front of car is used. Recommended for one-story rise and especially for invalid lifts. Electric lock on operating cable makes car inoperative while doors or car gate are open. Landing door cannot be opened except when car is at the landing.

Hand Power—Operates by pulling hand rope. Speed of descent is controlled by separate brake rope. Car has safety devices to hold it in case of rope breakage. Standard size for invalid lift is 3 ft. square by 6 ft. 6 in. high. Size for wheel chairs is 3 ft. wide by 4 ft. 4 in. deep, by 6 ft. 6 in. high (Fig. 7).

Freight Elevators

For use in factories, commercial buildings, etc.

Electric—Operated by cable, lever or push button. Capacities up to 4000 lb. Speeds to 100 ft. per min. Rise up to 60 ft.

Hydraulic—Operated by cable or lever. Capacities up to 6000 lb. Rise up to 20 ft.

Hand Power—Operated by hand rope. Capacities up to 1500 lb. Rise of 20 ft.

Information Required for Estimating

General for All Types—Inside size and type of car; number and location of openings in car (if dumbwaiter); number of shelves wanted in car; clear inside dimensions of shaftway; total height and height at top landing from floor to ceiling; travel of car; live load capacity; number of landings served; total number of door openings and whether located at front only, front and back, or front and side of shaftway.

For Electric Type—Besides general information, state voltage, phase and cycle of electric current available; speed of car in feet per minute, and type of control.

For Hydraulic Type—Besides general information, state water pressure and size of supply pipe.

For Hand Power Type—Besides general information, state type of machine desired, band brake, automatic brake or balanced type.

Fig. 5. Hand Power Automatic Brake Dumbwaiter

Suitable for loads up to 200 lb. Rise, 20 ft. or less. For larger capacities or longer travel, band brake type is recommended. Clear inside sizes of shaftways should be 5 in. wider and 3 in. larger, front to back, than the outside sizes of car desired. A 16-page booklet, with 41 illustrations and diagrams, mailed on request

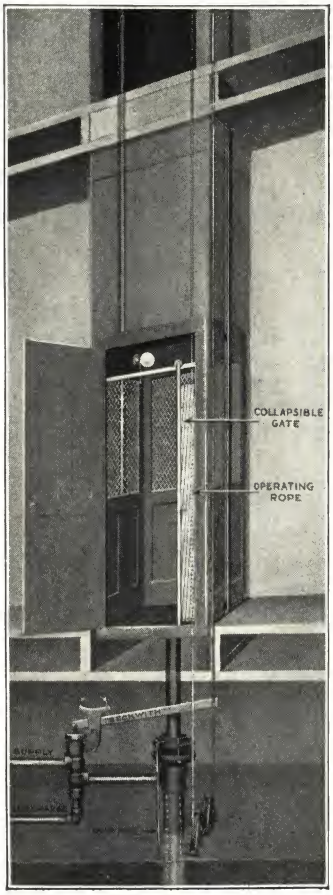


Fig. 6. Hydraulic Invalid Lift, Plunger Type

Exceptionally quiet and safe with low installation and maintenance costs. Recommended for rise up to 20 ft., any capacities to suit. Water pressure should be 40 lb. or over with 1 in. or larger supply pipe according to capacity and speed desired

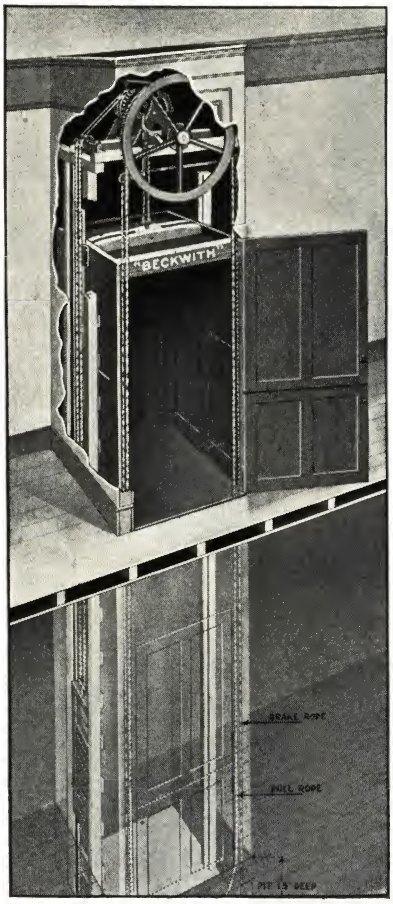


Fig. 7. Hand Power Invalid Lift, Operated by Pull Rope

Capacity, 400 lb. or larger, to suit. Clear inside sizes of shaftway should be 12 in. wider and 4 in. larger, front to back, than size of car desired. Standard size car is 3x3 ft. Size for wheel chair is 3 ft. x 4 ft. 4 in.

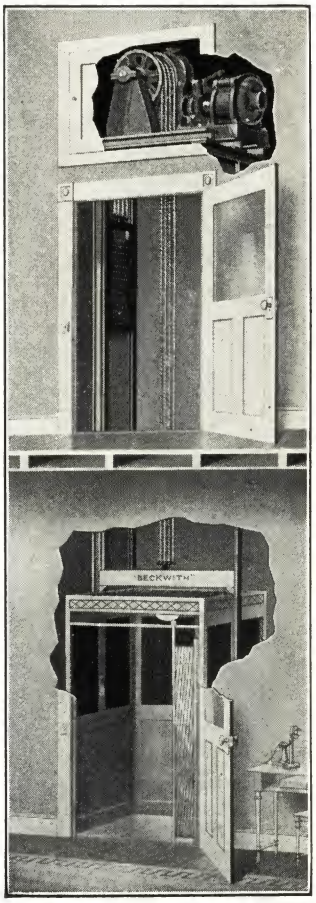


Fig. 8. Electric Invalid Lift or Small Passenger Elevator

Automatic push button or cable control. Capacities up to 2000 lb. Speeds to suit

CAPITAL LIFT & MANUFACTURING CO.

Manufacturers of Hand and Electric Dumbwaiters

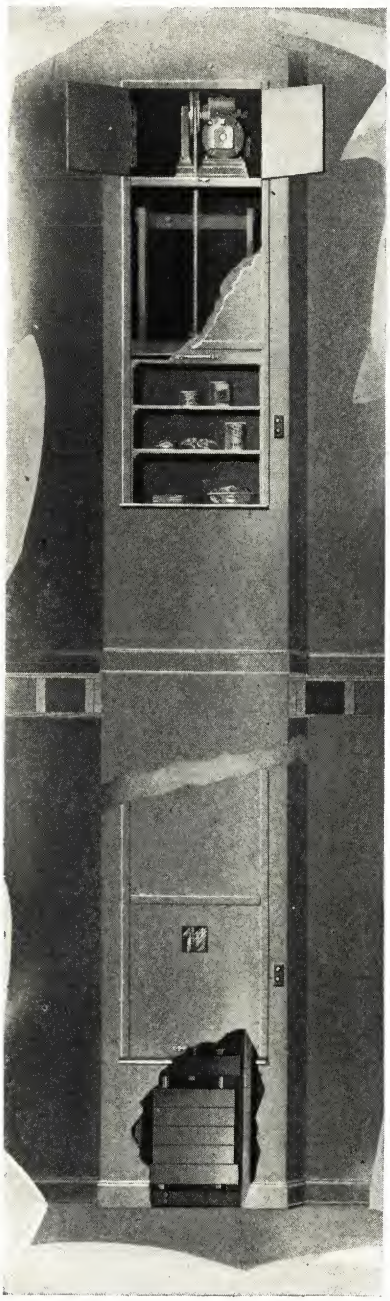
Town and Lucas Streets
COLUMBUS, OHIO

REPRESENTATIVES

AKRON, OHIO, C. M. Wilkinson Co., 1003 Central Depositors Bank Bldg.
CHARLESTON, W. VA., Kanawha Equipment Co.
CHICAGO, ILL., E. P. Haugen, First National Bank Bldg.
CINCINNATI, OHIO, Central Building Products Co., 622 Broadway
CLEVELAND, OHIO, C. M. Wilkinson Co., 819 Citizens Bldg.
DAVENPORT, IOWA, Herbert Hoefer, 2304 W. 3rd St.
INDIANAPOLIS, IND., Pierson Lewis Hardware Co., 115 E. Vermont St.
LANSING, MICH., Jas. E. Payne, 410 W. Saginaw St.
MILWAUKEE, WIS., Stanley Roth, 533 Farwell Ave.
MONTREAL, QUE., International Agency, Ltd., 309 St. Nicholas Bldg.
NEW YORK, N. Y., A. W. Berghoefer, 122 E. 42nd St.
PASADENA, CAL., F. G. Breidinger, 1000 E. Orange Grove
PHOENIX, ARIZ., Vernon L. Clark B. M. Co., 341 No. First Avenue
ST. LOUIS, MO., Atlas Machinery & Supply Co., 1407 Pine Street
ST. PAUL, MINN., John G. Pease, 296 Cecilia Place
SAN FRANCISCO, CAL., Walter E. Day, 16 California St.

For our pages on Electric and Hand Operated Elevators, Dumbwaiters and Ash Hoists, see Manufacturers' Index

CAPITAL UTILITY ELECTRIC DUMBWAITERS



Capital Electric Dumbwaiter

Fig. 30-F-12

Fig. 30-F-14

Suitable for many purposes, such as food lifts in hospitals, hotels, restaurants, clubs and private residences, book lifts in libraries, offices, banks and public buildings, tools and parts in manufacturing plants, accessories in garages, etc.

Made in sizes, capacities and speeds to suit individual requirements.

Control may be as follows:

Control No. 1

Constant pressure push buttons with up and down buttons at each opening. Pressure is maintained on the button while car is in motion and it stops immediately when the pressure is released.

This is the least expensive control system as it eliminates floor relays and selectors.

A small glass window should be provided in the enclosure doors to enable the operator to properly land the car.

Control No. 2

Automatic multi-station push button control with a bank of buttons at each landing corresponding to the number of floors served. The operator on one floor may call the car from or send it to any other floor by momentary pressure of the corresponding button, provided car is not in transit and all doors are closed.

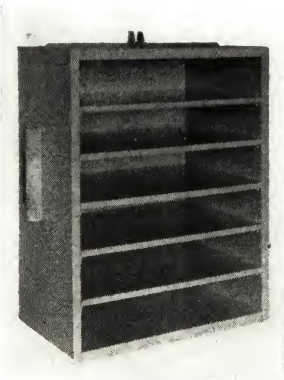
Control No. 3

Automatic single station control with push buttons marked for the various floors at one floor only and single buttons at each floor, the momentary pressure of which will return the car to the sending station.

Various other control combinations may be had when desired.

Cars may be made in any form desired and finished with paint, duco or baked enamel.

When desired, we can furnish any standard make of dumbwaiter door, or we can furnish our standard vertical sliding door, as shown at left, with stationary panel or with panel omitted, arranged for inside of masonry wall.



HAND POWER ELEVATORS AND DUMBWAITERS

Capital Roller Bearing Hand Power Freight Lift

For use in stores, factories, warehouses, residences, hotels, dormitories, etc., for handling trunks and miscellaneous goods.

Overhead Equipment—Consists of heavy cast iron rope wheel with machined flange for brake surface, cast iron gear and pinion with machine cut teeth, V-groove Traction Drum, machine scored for cables and cast integral with the master gear. All mounted on heavy steel shafting revolving in roller bearings. The brake is self-adjusting, positive in operation and will hold the loaded car in position. It is also convenient for lowering loads quickly and easily.

Car—Is of steel construction, well braced and bolted and floored with 1¾-in. yellow pine plank or ⅞-in. hard maple on pine joists, as desired.

Guide Posts—Are of yellow pine, compounded to prevent warping and faced with hardwood guide rails.

Cables—The car and counterweights are connected by two ½-in. iron hoisting cables. Hand rope is 1⅛ in. in diameter and brake ropes are ⅜ in. in diameter.

Capital Ball Bearing Dumbwaiter—Model A—Capacity 25 to 75 Lbs.

Has various uses in many types of buildings.

Overhead Equipment—Consists of cast iron rope wheel, machine cut gear and pinion, full diameter hoisting sheave, machine scored, cast integral with master gear. All mounted on heavy steel shafting revolving in ball bearings. Automatic brake is instantly applied but is not effective while hand rope is in motion.

Cars—Standard cars are wood as shown but steel cars or steel enclosures with hardwood shelves may be had at small additional cost.

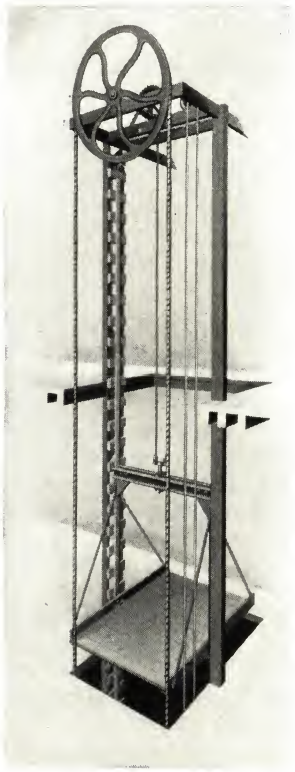
Counterweights—Consists of cast iron frame with easily removable filler weights.

Hoisting Cable—Is ⅜-in. Swedish iron. The hand rope is ¾-in. diameter hemp.

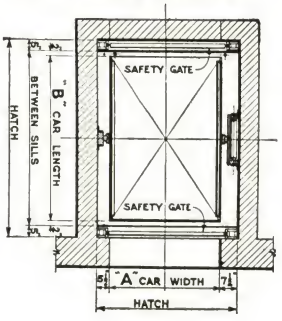
Guides—Are of clear yellow pine grooved to receive counterweights and attached to ⅞-in. pine back strips for easy erection.

Made in three standard sizes as shown in the table below. However, cars may vary somewhat in depth front to back to suit local conditions.

The use of 2:1 cable threading with each of the above dumbwaiters will double the lifting capacity at a corresponding reduction in speed.



Roller Bearing Freight Lift



FREIGHT LIFT SIZES AND DIMENSIONS

Size No.	Car size, ft. A	Car size, ft. B	Diam. rope wheel, ft.	Capacity, lbs.	Cable threading
1	3	3	3	600	1:1
2	4	4	4	800	1:1
3	5	5	5	1000	1:1
4	3	3	3	1000	2:1
5	4	4	4	1200	2:1
6	5	5	5	1500	2:1

Note: No. 6 may be double geared with 2:1 cabling for a capacity of 3000 lbs.

Cars may vary in size and shape to suit requirements.

Counterbalance weights are equal to the weight of the car plus about 200 lbs. which will cause the empty car to ascend with the brake released—for special purposes where the load is practically uniform, counterweights may be increased for easier operation.

Where desired a special type of car may be furnished, permitting access from three sides.

Enclosures of No. 16-gauge steel may be furnished on two or three sides of the car, with or without wire grille over the top.

Safety grips mounted under the car are furnished on request.

DUMBWAITER SIZES, HAND POWER TYPE

Size No.	A in.	B* in.	C in.	D in.
1	20	16	30	22
2	24	20	30	26
3	28	24	30	30

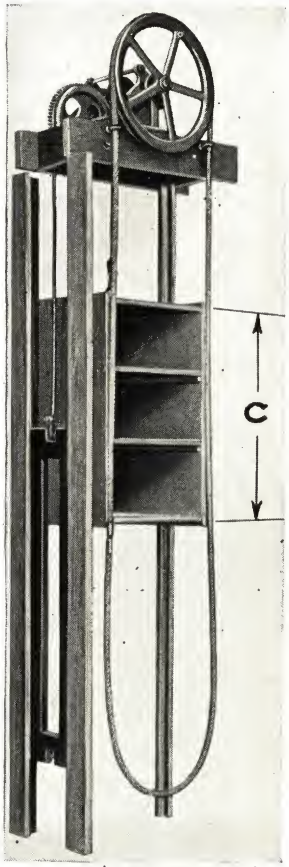
*Dimension B may be varied from the standard to suit conditions.

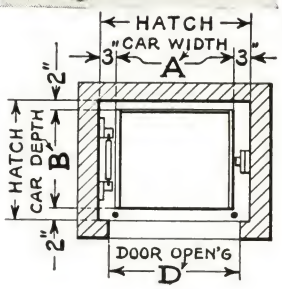
Model B Dumbwaiter

Model B is in every respect the same as the above with exception that it has hand operated brake and therefore may be geared for greater capacity, the cars may be odd sizes and the load may be lowered by gravity through the hand operated brake.

Idler wheels are used for centering cables and the capacity may range from 75 to 500 lbs.

Clearances are the same as for Model A.





ESTABLISHED 1876

CHELSEA ELEVATOR CO.

INCORPORATED 1912

Manufacturers of Electric and Hand Operated Dumbwaiters and Elevators

GENERAL OFFICE
Architects Building, 101 Park Avenue, NEW YORK, N. Y.
FACTORY: NORTH BERGEN, N. J.
REPRESENTATIVES IN ALL PRINCIPAL CITIES OF THE UNITED STATES

Products

ELECTRICALLY OPERATED DUMBWAITERS, PUSH BUTTON PASSENGER ELEVATORS and SIDEWALK ELEVATORS.

HAND OPERATED DUMBWAITERS and ELEVATORS for all purposes.

Our machines include Dumbwaiters for residences, apartments, hotels, restaurants, hospitals, etc.; Trunk Lifts, Book Lifts, Fuel Lifts, and Tube, "Tellerwaiter," and Under-counter Dumbwaiters; also various kinds of elevators, including Invalid, Freight, Sidewalk and Automobile Elevators; Ash Hoists, Mortuary Lifts, Hatchway Hoists; also Sidewalk Elevator and Dumbwaiter Doors and Semiautomatic Gates.

A selection of various types is available, such as High Speed, Automatic Brake, Band Brake, "Plain" and Geared types, and "Chelversal" Double Geared machines.

LOCAL REPRESENTATIVE

CHELSEA
TRADE-MARK

The Company

CHELSEA ELEVATOR CO. with 55 years of experience in the elevator industry maintains agents in all the principal cities who are competent to give service and will co-operate with architects, owners and builders. We will supply drawings showing hatchway sizes, car sizes, clearances, loads on overhead beams, shipping weights, outline specifications and other desired information. CHELSEA ELEVATOR CO. maintains a competent staff of Engineers capable of solving any problem connected with vertical transportation and this department is at your service at all times.

Quality of Products

CHELSEA ELEVATOR CO. realizes the value of its reputation of long standing for integrity and quality, and architects and their clients can depend upon it that CHELSEA ELEVATOR CO. intends to maintain this reputation, and products purchased from this company may be relied upon to be of the highest grade obtainable.

References and Installations

Dwight W. Morrow, Englewood, N. J., Delano & Aldrich, Architects

L. K. Liggett Co., New York and Chicago, W. T. Williams, Architect

Bankers Trust Co., 10 Wall Street, New York, P. Dugan, Engineer

New York Times Building, New York, Ludlow & Peabody, Architect

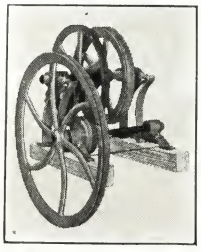
Morgan Library, New York, B. W. Morris, Architect

Strauss Residence, New York, Horace Trumbauer, Architect

Rockland State Hospital, Orangeburg, N. Y., T. F. Farrell, Engineer

CHELSEA HAND OPERATED DUMBWAITERS

The chart on the following page lists and gives essential features of all Chelsea Hand Operated Dumbwaiters. Type designations herein mentioned are given in the first left-hand column of chart.



No. 5 Geared Automatic Brake Machine F.D.C.G.
Iron frame patent No. 645,812

Types 5D to 5K—These are full diameter, cut geared, iron frame, roller bearing, double automatic brake dumbwaiters, all of a similar model. This is the very latest model obtainable and it is safe to specify it for any purpose, for capicities from 15 lbs. to 280 lbs. Ratios 1:1 to 8:1. Full diameter center wheel reduces friction and center rope is therefore many times more lasting. Cut gears and roller bearings assure ease of operation. This is the highest quality handpower dumbwaiter obtainable. This model "Chelversal" type, double geared, is obtainable up to 400-lbs. capacity.

Types 5AA to 5C—These are plain automatic brake type. All parts are similar to the geared types except machines. No gears are used and the center wheel is not full diameter. It is, however, fitted with roller bearings and should be used where initial cost is considered for apartments, stores and residences.

High Speed Teller Type Dumbwaiter—This type is particularly suitable for libraries, banks, offices where light loads are lifted and rapid motion is required. Car may be of wood or metal. Guide rails may be of wood or tubes of steel, brass, aluminum, etc.

Heavy Duty Band Brake Iron Frame Type—Dumbwaiter No. 6 is of this type, and is useful in factories, banks, stores and elsewhere where heavy loads are to be raised with ease. Refer to data pages following for dumbwaiter car sizes, etc.

CHELSEA HAND OPERATED ELEVATORS

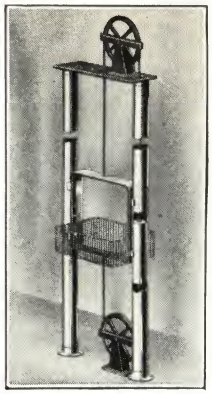
The chart and tables on second following page lists and gives the essential features of all Chelsea hand operated elevators.

Hand Operated Passenger Elevators—Chelsea Hand Operated Passenger or Invalid Elevators are so manufactured that simplicity of design assures the owner a most practical and safe equipment. These elevators are fitted with safety devices of every necessary kind. They are not only reliable but ease of operation is assured as friction is reduced to a minimum. Thousands of Chelsea Hand Operated Invalid Elevators are in operation in all parts of the United States. This class of elevator is our specialty.

Hand Operated Freight Elevators—Chelsea Hand Power Freight Elevators include many forms of store, sidewalk and automobile elevators. They are extensively used where reliable service is in demand in industrial, institutional, garage and other buildings. They are economical in price and operation and all parts are built with surplus strength. See tables.

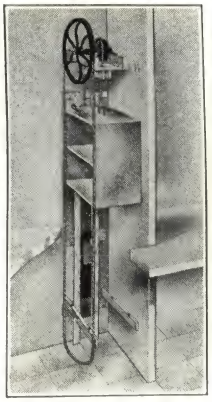
Chelsea Sidewalk Lifts and Ash Hoists are built to withstand hard usage. They contain all modern improvements of merit.

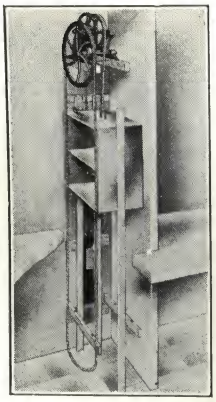
They are durable, safe, economical, and easy to operate. Equipments can be arranged to suit any condition in or outside of building.



No. 0 Teller Type Rapid Dumbwaiter
1 to 20-lb. capacity
High speed

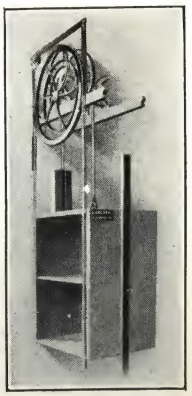
No. 5. Plain Double Automatic Brake Dumbwaiter
25 to 75-lb. capacity
Class AA, A, B, and C





No. 5. Full Diameter Geared Automatic Brake Dumbwaiter
15 to 150-lb. capacity
Class D, E, F, G, H, I, J, and K
Cut gears, iron frames

No. 6. Iron Frame Band Brake Dumbwaiter
100 to 500-lb. capacity
Band brakes. Slow speed



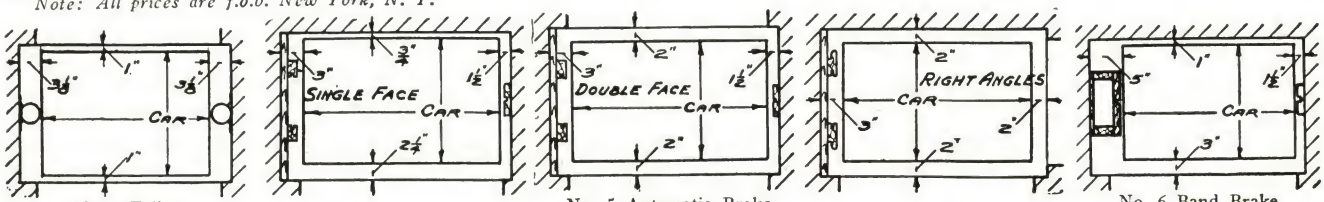
DATA OF SOME OF THE CHELSEA HAND OPERATED DUMBWAITERS

No.	Car size	Hatchway size, single face	Hatchway size, double face	Hatchway size, right angles	Headroom required above door for machine	Ratio	Maximum capacity, lb.	Normal capacity, lb.	Complete ship. wt., approx., lb.	Service best adapted for	Specification writers' data and general description
0A	9″ x 9″	17″ x 11″	.....	.....	.....	1:1	20	5	.....	Libraries, banks, offices, clubs, showrooms, restaurants, etc. Rapid motion for books, papers, letters, messages, files, small packages, etc.	**Specify**—MACHINE—Iron wheels set in iron frames; wheels of full diameters and to have self-oiling bearings. Guide rails of No. 16 gauge seamless drawn tubing of [steel, brass, aluminum] to suit surroundings. CAR—Of [ash, mahogany, steel, Monel, brass, wire mesh]. Rope of braided cotton neatly fastened to top and bottom of car and counterweight. Lead counterweight travels in one tube. Automatic catch sustains load at upper floors.
0B	14″ x 9″	22″ x 11″	.....	.....	.....	1:1	20	5	.....		
5AA	20″ x 16″	24″ x 19″	24″ x 20″	25″ x 20″	2′ 0″	1½:1	52	25	250	The plain automatic brake type is best adapted for use in residences, apartment houses and elsewhere, where a number of different people have the use of car and initial cost is considered. No check line required, as automatic brake holds loads within the capacity of machine.	**Specify**—MACHINE—Double automatic brake type as made by Chelsea Elevator Co., New York, N. Y., to hold any load within the capacity of the machine which is . . . lb. without the use of check line or fastening. Cold rolled steel shafts. Steel roller bearings. Cast iron flywheel of proper diameter securely fastened to steel shaft, cast iron center wheel bored to fit shaft; lock full automatic both on down and up motion of car set in a reinforced casing with double brake shoes of ample braking surface. CAR of first quality ash, dovetailed and varnished; of size to suit hatchway, shelved as directed, wrought iron eye for weight rope. Cast iron guide shoes. Guide runs of Georgia pine, grooved for guides on car and counterweight. Counterweight of size and weight to properly balance car. Rope for counterweight is manila. Hand rope, Russian hemp. All necessary hardware, rubber bumpers, etc. Machine timbers Georgia pine, sheaves cast iron. **Guarantee**—Equipment, 1 year; machine, 5 years.
5A	22″ x 18″	26″ x 21″	26″ x 22″	27″ x 22″	2′ 2″	2:1	70	50	275		
5B	26″ x 22″	30″ x 25″	30″ x 26″	31″ x 26″	2′ 6″	3:1	105	60	350		
5C	30″ x 24″	34½″ x 27″	34½″ x 28″	35″ x 28″	2′ 10″	3½:1	122	75	450		
5D	34″ x 28″	38½″ x 31″	38½″ x 32″	39″ x 32″	3′ 2″	8:1	230	150	600	The geared automatic brake type is best adapted for service in high grade buildings of every character where heavy duty is required. Hospitals, sanitariums, schools, residences, apartment house, libraries, stores, restaurants, clubs, and public buildings and elsewhere, where a number of different people have the use of car. No check line required, as automatic brake holds loads within the capacity of machine. Full diameter weight wheel reduces friction and increases ease of operation and more than doubles life of center rope.	**Specify**—MACHINE—Of the geared, double automatic brake, iron frame, full diameter wheel type as made by Chelsea Elevator Co., New York, N. Y. Wheels of full diameter; no leading sheaves permitted; automatic to hold any load within capacity of machine which is . . . lb., without use of check lines or fastenings; roller bearings throughout. Flywheel of proper diameter to suit car. Accurate cut tooth gears and full automatic brake both on up and down motion of car; reinforced casing, double brake shoes. CAR—First quality ash, dovetailed, varnished and shelved as directed, wrought iron eye for weight rope; cast iron guide shoes. Georgia pine guide runs and milled grooves. Counterweight at least 10 lb. heavier than car weight. Durable wire center rope; hand rope, Russian hemp. All necessary hardware, rubber bumpers, etc. Georgia pine machine timbers, etc. **Guarantee**—Equipment, 1 year; machine, 5 years.
5E	30″ x 24″	34½″ x 27″	34½″ x 28″	35″ x 28″	3′ 0″	7:1	245	125	550		
5F	26″ x 22″	30½″ x 25″	30½″ x 26″	31″ x 26″	2′ 8″	6:1	210	100	475		
5G	22″ x 18″	26½″ x 21″	26½″ x 22″	27″ x 22″	2′ 6″	5:1	175	75	400		
5H	30″ x 24″	34½″ x 27″	34½″ x 28″	35″ x 28″	3′ 0″	4:1	140	50	550		
5I	26″ x 22″	30½″ x 25″	30½″ x 26″	31″ x 26″	2′ 8″	3:1	105	35	475		
5J	22″ x 18″	26½″ x 21″	26½″ x 22″	27″ x 22″	2′ 6″	2:1	70	25	400		
5K	20″ x 16″	24½″ x 19″	24½″ x 20″	25″ x 20″	2′ 4″	1:1	35	15	350		
6A	34″ x 28″	40″ x 32″	40″ x 33″	40″ x 33″	4′ 0″	10:1	350	150	975	Strong and substantial. Store service. Heavy packages, etc. Good for lowering.	MACHINE—Shafts of steel; wheels of full diameters; gears of size to suit hatch and capacity of machine; flywheel proper diameter; band and leather cushioned band brake; heavy babbitted boxes; necessary pulleys for check; lever for brake. CAR—As for 5 D, E, F, G, etc.

Note: Width means right to left; depth, front to rear. If doors are at right angles, use prices given for double face; machine has two flywheels and two hand ropes. Standard cars are to be 3 ft. 6 in. high with one loose shelf.

Ratio: Capacity and speed. Example: To raise a 280-lb. load in car with 8 to 1 ratio, 35 lb. of energy must be exerted when pulling hand rope. 8 ft. of rope through hands raises car 1 ft.

Note: All prices are f.o.b. New York, N. Y.

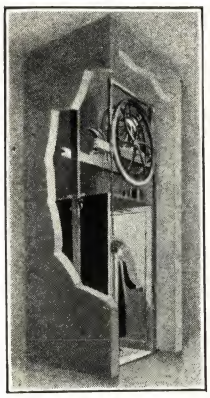


No. 0 Teller — No. 5 Automatic Brake — No. 6 Band Brake

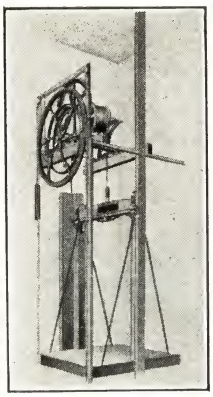
Usual door sill 2 ft. 6 in. up from floor—Door 1 in. higher and wider than car—Machine headroom, see tables above

Chelsea Dumbwaiter Hatchway Arrangements for Varying Conditions

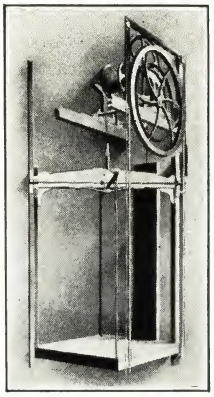
In ordering, state preferable arrangement, and give clear inside measurements and total height of hatchway; also door size in height and width



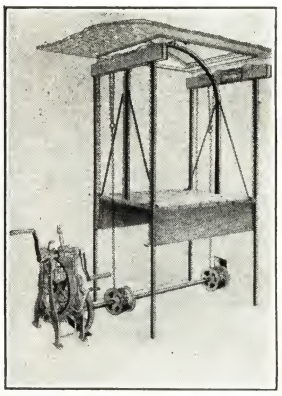
No. 7. Patent Frame Passenger Elevator
500 to 1000-lb. capacity



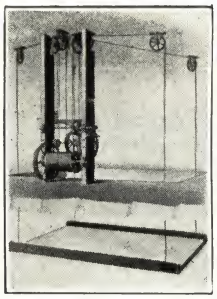
No. 8. Patent Frame Side-Post Store Elevator
1000 to 3000-lb cap.



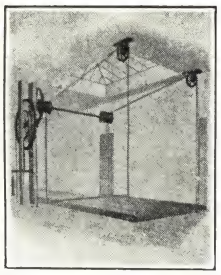
No. 9. Patent Frame Cornerpost Store Elevator
1000 to 3000-lb cap.



No. 10. Hand Power Sidewalk Elevator
1000 to 6000-lb. capacity



No. 11. Four-cable Windlass Elevator
2000 to 6000-lb. cap.

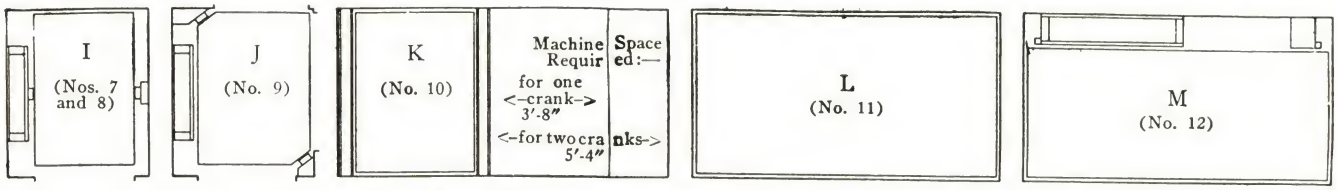


No. 12. Four-cable Hand-rope Carriage Elevator
2000 to 6000-lb. capacity

DATA OF SOME OF THE CHELSEA HAND OPERATED ELEVATORS

No.	Type	Platform size, outside	Hatchway size, single face	Hatchway size, double face	Capacity lb.	Complete ship. wgt., approx., lb.	Service best adapted for	Outline specifications
7A	Patent frame passenger elevator	3′ x 3′	4′ x 3′-4″	4′ x 3′-6″	600	1800	General passenger service, invalids, hospitals, sanitariums, schools, public buildings, private residences, trunk lifts, etc.	MACHINE—Patent iron frames; steel shafts; drums, wheels and gears keyed to shafts. Steel keys; drums spirally grooved for cables; roller bearings; babbitted boxes; lubricating candles; finished brake; steel brake band, leather cushioned; wrought iron lever; iron pulleys and pulley supports. CAR—Ash or other hardwood, dovetailed, filled, varnished and rubbed, iron braced. Safety attachment; guide shoes; cushioned counterweight; car and counterweight cables Swedish iron; drop forged sockets; Russian hemp hand and check ropes; fair leaders; check weights; maple guide runs.
7B	Patent frame passenger elevator	4′-6″ x 4′	5′-6″ x 4′-4″	5′-6″ x 4′-6″	1000	1950		
8A	Patent frame store elevator, side post	4′-6″ x 4′	5′-6″ x 4′-4″	5′-6″ x 4′-6″	1500	2000	Stores, lofts, factories, banks, bakeries, laundries, etc., wherever used from one side or opposite sides.	MACHINE—Same as 7A and 7B above, except brake is not turned and brake band not leather cushioned. PLATFORM—Side post type. Shoes, post and crosshead, ash or other hardwood; flooring strongly lagged to shoes; crosshead and shoes tenoned and bolted to posts; posts braced with iron straps and rods and reinforced with iron brackets; safety attachment; guide shoes; cushioned counterweight; platform and counterweight cables Swedish iron; drop forged sockets; Manila hand and check ropes; check weights; fair leaders; maple guide runs.
8B	Patent frame store elevator, side post	5′-6″ x 5′	6′-6″ x 5′-4″	6′-6″ x 5′-6″	2000	2500		
9A	Patent frame store elevator, corner post	4′-6″ x 4′	5′-2″ x 4′-4″	5′-2″ x 4′-6″	1500	2200	Stores, lofts, factories, banks, bakeries, laundries, etc., wherever used from right angles or three sides.	MACHINE—Same as 8A and 8B above. PLATFORM—Corner post type. Floor framing, post and crosshead of ash or other hardwood; frame for floor of platform tenoned and bolted securely fastened to posts; crosshead tenoned and bolted to posts; flooring N. C. pine; posts braced with iron brackets; iron straps and rods secure floor frame to crosshead; safety attachment, etc., as for 8A and 8B above.
9B	Patent frame store elevator, corner post	5′ x 5′-4″	5′-8″ x 5′-8″	5′-8″ x 5′-10″	2000	2800		
10A	Sidewalk elevator or ash lift	3′ x 3′	3′-10″ x 3′-2″	See hatchway, Plan K for machine room	1000	1600	Stores, lofts, etc., basement service, ashes, boxes, etc. Operated from one floor only.	MACHINE—Frames; cast iron; steel shafts; iron drums, gears, pulleys keyed to shafts; steel keys; brake and steel brake band; wrought iron lever; pinion can be put out of mesh and loads lowered with brake lever; lip to hold pinion in mesh; pawl to hold loads; iron trough. PLATFORM—Hardwood, iron braced; iron guides; solid iron posts or T iron guideways; proof chain to four corners of platform and to drums; iron overhead sheaves grooved for chains; wrought iron frames for sheaves; iron boxes; one or two cranks with maple handles.
10B	Sidewalk elevator or ash lift	4′ x 4′	4′-10″ x 4′-2″		2000	1800		
11	Carriage or auto elevator, windlass type	7′-6″ x 16′	7′-8″ x 16′-2″	C. W. T. box outside of hatch about 6′x30″	2500	3800	Garage, stables, etc., for short rise. No part shows be-below ceiling.	MACHINE—Same as for 10A and 10B above, except drum has back drum counterbalance and is grooved for cables. PLATFORM—Hardwood shoes; flooring lagged to shoes; hung from four corners with Swedish iron cables; leaded in steel sockets. Counterweight hung similar cable; overhead sheaves on steel shafts set in iron brackets; additional wrought iron safety straps; cushioned counterweight.
12A	Carriage or auto elevator, hand-rope type	7′-6″ x 16′	8′-11″ x 16′-3″	Counterweight box in hatch	2500	4500	Garage, stables, etc. Operated by hand-rope and controlled by brake rope from any floor.	MACHINE—Frames hardwood; steel shafts; iron wheels, drum, gears keyed to shafts; steel keys; drums spirally grooved for cables; roller bearings; babbitted boxes; brake and steel brake band; wrought iron lever; pulleys and pulley supports; back drum counterbalance; babbitted wall box or bearing. PLATFORM—Same as 11 above, except fitted with iron guides; maple guide runs. 12B same as 12A, except double geared for increased capacity.
12B	Carriage or auto elevator, hand rope type	8′ x 18′	8′-11″ x 18′-3″		5000	6600		

Note: In the above, stock sizes and capacities are given. No extra charge if size varies slightly. Prices quoted on request for outfits of any capacity; also on steel platforms and steel rails. Estimates quoted for erection anywhere. Above prices are for complete machines, including machine lumber and bolts. Weight-boxes, blocking and supporting timbers not included. Detail plan and instructions sent with each outfit. Prices f.o.b. New York City.



Chelsea Hand Power Elevator Hatchway Arrangements for Various Types

In ordering send sketch showing location of hatchway in building, show entrance to platform, give size of hatchway, and total height

ELECTRIC DUMBWAITERS

Chelsea Electric Dumbwaiters are complete equipments designed by our own engineers and manufactured in our own plant where facilities are ample and especially suitable for the manufacture of this product.

The permanence of the business and the ability to secure parts for replacements which are standardized and carried in stock at all times are assured by the fact that this company has ample resources and can also point to equipments that have been in constant service and have given entire satisfaction for more than a decade.

Chelsea machines are compact and sturdy and all parts are properly designed to perform the duty expected. Control apparatus, selectors, push button boxes, hatch limit switches, mechanical door locks, electrical door switches, motors, brakes, etc., are especially designed for dumbwaiter duty and all parts are in proportion, thereby insuring economical manufacturing and also an economy of motor room and floor space that is very desirable.

Chelsea equipments are on hand at our factory and delivery can be made promptly. Combinations of capacities, speeds and sizes are obtainable to suit every requirement. Classes, hatchway sizes, car sizes, shipping weights, prices, outline specifications, etc., may be obtained from Chelsea data tables which will be sent upon request.

All types of control systems and complete signal systems as well as complete door units are obtainable from the company and we recommend that the complete operating unit be purchased from the CHELSEA ELEVATOR CO. and their guarantee obtained for the entire equipment.

For details, specifications, etc., see next page.

Class "AA" Engine
Capacity 1 to 350 lb.

ELECTRIC ELEVATORS

We make a specialty of push button passenger elevators. We also make electric sidewalk and hatch hoists for all commercial and industrial purposes. These elevators are complete in all respects.

Push Button Electric Elevators

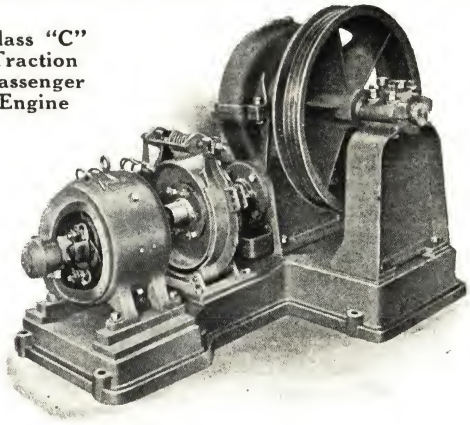
For passenger elevators we are equipped to install the complete machine, car platform, completely finished car, car gates, and full control system and all wiring from outlets provided by the electrician.

We will submit suggestions for car designs or we will work to architects drawings and specifications for the car, car gates and gate control.

Every possible feature necessary to make a safe and dependable elevator is incorporated. All parts are not only artistically designed but they are also smooth and quiet in operation. A full bank of operating buttons is provided in the car with emergency stop and bell ringing button and electric light button in one bank. Call buttons are provided at each floor and all types of safety and non-interference devices with gate and door locks and contacts which insure full safety are included.

The car sling and platform are built of strong members bolted and braced and a safety device suitable for car capacity and speed is mounted on the car. Cabs are furnished, well designed, at a cost in keeping with the balance of the equipment. Gates are furnished on the car with interlocks and these may be manually opened and closed or automatic as desired. Speed governors to stop car in case of excessive speed are also furnished.

Class "C" Traction Passenger Engine



The Machine—The passenger elevator machine is rugged in design with reinforced bedplate upon which is mounted the worm and gear enclosed in an oil bath in a heavy cast iron housing. The worm shaft and worm is made from a solid steel blank and the gear is of phosphor bronze meshing accurately. The thrust bearings are of the ball type. Motors are of slow speed, with long bearings, self oiling boxes, especially built for elevator service, and connected directly to the worm shaft. The electric brake is one of the most efficient obtainable and is noiseless and positive.

All the required switches and relays, positive in action, are furnished and make accurate floor stops possible.

Controllers are the product of those who have had more than 25 years experience in producing this class of equipment and are satisfactory for every available current supply.

Sidewalk Elevators

Our sidewalk elevators are of the platform type with either push button or hand cable control. They are designed for capacities from 300 to 2500 lbs. and suitable speeds, 20 to 30 ft. per minute being average.

We are equipped to make a complete installation including hatch doors to meet municipal requirements.

Guarantee

All parts are guaranteed for one year free from defects in both workmanship and materials.

Shipment Orders

Our organization is prepared to furnish and also erect full equipment in any part of the United States. We are fully prepared, however, to furnish any portion or the full equipment with complete instructions for erection by local mechanics.

CHELSEA OVERHEAD TRACTION ELECTRIC DUMBWAITER

CHELSEA ELEVATOR CO.'s Engineering Department presents to you a typical hatchway arrangement for an overhead Traction Electric Dumbwaiter equipment and a concise specification of this class of equipment.

The machine room detail over top of hatchway shows an unusual economy of space requirements, the machine room having the same size as hatchway below.

The typical section through hatchway shows the car, guide-rails, conduit outlet boxes, locks and contacts and bi-parting door and the clearance required for these portions.

The car may be of any size desired up to nine square feet in floor area which is the maximum size ordinarily permitted by building codes of large cities.

Details and specifications may be generally used; however, variations to suit special requirements such as right angle openings, double face openings, etc., are possible and our Engineering Department will be pleased to cooperate with those desiring additional information.

Specification Data

Car—Shall be built to suit hatchway and travel from .... floor to .... floor. It shall be constructed of steel angles with mitred corners strongly riveted to steel sheets No. 16 gauge and shelved as directed. Shall have lifting capacity of .... lb. and travel .... ft. per min. Available power current will be .... volts .... phase .... cycles.

Machine—To consist of traction sheave operated by worm gear and motor fastened to foundation beams. Traction sheave shall be accurately grooved for cable and sheave. Shaft shall be highest grade steel with accurate keyway. Worm and worm shaft to be made from a solid steel blank. Gear shall be of phosphor bronze accurately cut from solid blank, meshing with driving worm. Worm and gear contained in cast iron housing running in oil bath to insure lubrication at all times. Sight oil gauge to be furnished in gear case. All bearings throughout to be of ball type suitable for required duty maintaining perfect alignment of worm and gear.

Motor—Electric, slow speed, long bearings of ball type and self-adjusting brushes. Motor to be specially designed for electric dumbwaiter work, having high efficiency, great starting torque, and durability.

Electric Brake—Shall apply automatically at all times when dumbwaiter is stopped to securely hold car, except when electrically released during normal operation, and shall apply instantly in case current supply is interrupted from any cause. Limit switches to be provided to stop car at upper and lower limits of travel which will cut off current supply to machine and apply brake.

Operating Device—A bank of buttons to be placed at each floor so that car will immediately start for desired floor by means of momentary pressure on designated button. There will be .... landings, ... openings. If more than two landings are shown on plans. The required floor selectors are to be mounted in the hatchway and no part of the equipment is to project outside of the hatchway.

Safety Door Switches—To each door in the hatchway there is to be attached an electric contact so arranged that control buttons are inoperative and car cannot be operated unless all doors are closed.

Safety Door Locks—To be attached to each door in hatchway so door cannot be opened unless car is opposite same.

Counterbalance—To be so proportioned as to give most economical operation of dumbwaiter.

Cables—Car and counterweight to be suspended with cables with liberal factor of safety not less than ⅜-in. diam., 6 strands, 19 wires.

Guide Rails for Car and Counterweight—To be of cold drawn steel.

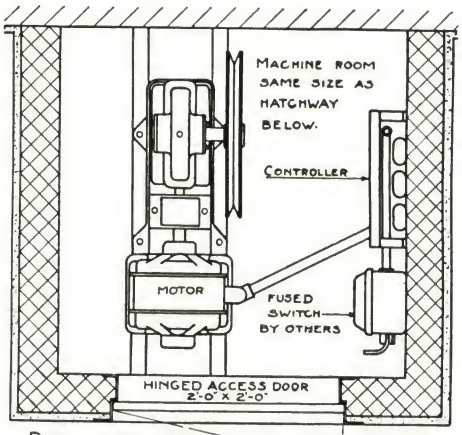
Controller—To be full magnet type on slate panel in machine room at top of shaft.

Overload Relay—Shall prevent passage of excessive current to motor.

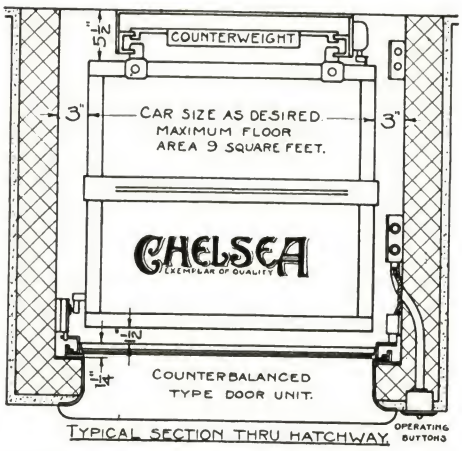
Wiring—All electric wires to be run in solid iron conduit except at short bends where flexible conduit may be used.

Painting—All metallic parts to receive one shop coat of machinery paint.

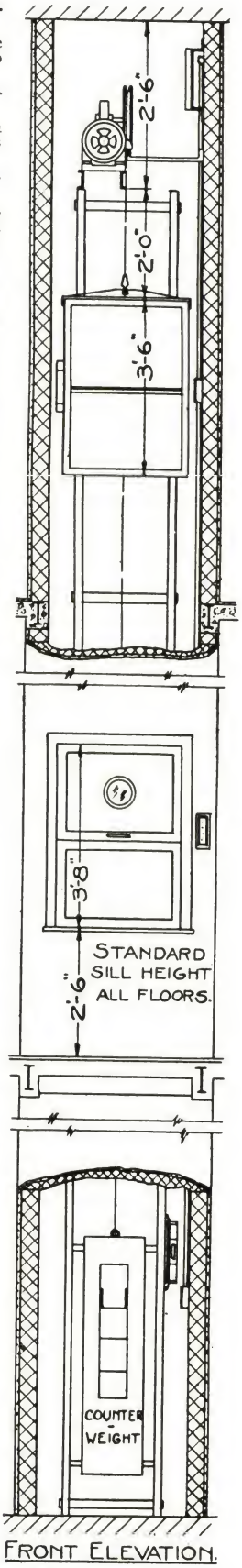
Guarantee—Every part of this apparatus is to be guaranteed to be free from defects in both workmanship and material.



DETAIL OF MACHINE ROOM-TOP OF HATCHWAY



TYPICAL SECTION THRU HATCHWAY



FRONT ELEVATION.

HATCHWAY AND SPECIFICATION DATA—CHELSEA CLASS AA ELECTRIC DUMBWAITERS

Car size width and depth, in.	Hatch size required, in.	Height required above top door, in.	Capacity, lb.	Car speed, ft. per min.
22x18	28x27	42	100	100
26x22	32x31	42	150	75
30x24	36x33	42	200	100
34x28	40x36	42	300	90
38x32	44x41	42	400	70
36x36	42x45	42	500	40

Note: The table above is given for comparative purposes, between car size and hatch. Any size car can be furnished and capacities and speeds may be varied to suit individual needs.

Types Control Systems—Chelsea Electric Dumbwaiters

Type 2—Push button control for two landings. Bank of push buttons at each floor marked "Up" and "Down." Momentary pressure on buttons sends car in designated direction. Control buttons inoperative while car is in motion.

Type 4—Full automatic, full selective (three floors or more). Full bank of buttons at each floor, one button corresponding to each floor served. By pressing corresponding button car can be sent to or from any desired floor. Momentary pressure on an additional "stop" button stops the car immediately. All other buttons are inoperative while car is in motion.

Note: Two control systems only are mentioned but a great variety can be obtained from Chelsea, such as: one point control where car is sent or called from one central point and only be returned from other floors, etc.

Types Signal Systems—Chelsea Electric Dumbwaiters

Glass Vision Panel in Door—Simplest form of signal device. (See drawing.) Enables attendant to see car when opposite door.

Red Bull's-eye—Red signal lamp at each opening lights automatically when car is opposite door and goes out when it leaves.

Buzzer or Bell on Car—Connected to a push button at each floor. Pressure on push button calls attention of attendant to arrival of car at floor.

Automatic Buzzer or Bell at Each Floor—Rings automatically when car arrives and ceases when door is opened.

Note: Only the simpler forms of signal devices are mentioned. All the above may be used in conjunction—or a telephone or annunciator system used. Special signal systems can be furnished.

Note: Electric contact on doors makes car inoperative while door is open. A mechanical lock locks door so it cannot be opened unless car is opposite. Standard cars are 42 in. high. 1 loose shelf. Standard door sill 30 in. above floor. Complete sliding door units furnished if desired.

ESTABLISHED 1889

JOHN W. KIESLING & SON, INC.

INCORPORATED 1923

Manufacturers of Ball Bearing Hand Power Dumbwaiters, Elevators

TELEPHONE
HADingway 3-8070

1795-1803 Atlantic Avenue, BROOKLYN, N. Y.

SALES REPRESENTATIVES

ALBANY, N. Y., Cassius J. Logan, 271 Washington Ave.
BALTIMORE, MD., Welchans Elevator Works, Lancaster, Pa.
BIRMINGHAM, ALA., Louis K. Plosser, Jr., 2124 Highland Ave.
BOSTON, MASS., Caigan Engineering Equipment Co., 162 Tyler St.
CHARLESTON, W. VA., Fireproof Products Co., Professional Bldg.
CLEVELAND, OHIO, R. L. Quiesser Co., 9105 Woodland Ave.
COLUMBUS, OHIO, Hy. P. Howe Co., Huntington Bank Bldg.
DENVER, COLO., Rocky Mountain Architect & Builders Service, California Bldg.
DETROIT, MICH., Kernerator Sales Co., Book Bldg.
DOVER, DEL., Welchans Elevator Works, Lancaster, Pa.
DUBUQUE, IOWA, Baumgartner Sales Service, Federal Bank Bldg.
DULUTH, MINN., Hauenstein & Burmeister, Inc., Minneapolis.
ELMIRA, N. Y., F. S. Burgess & Son, 101 E. Chemung Pl.
EL PASO, TEX., Neff-Stiles Co.
ERIE, PA., Henry Althof's Sons Co., 115 E. 23rd St.
EVANSVILLE, IND., J. C. Vaught, 712 So. Norman Ave.
FLINT, MICH., Kernerator Sales Co., Book Bldg., Detroit
FORT WAYNE, IND., Don E. White, Cooper Bldg.
FORT WORTH, TEX., Moran Bldg. Supply Co., 806½ Taylor St.
GRAND RAPIDS, MICH., W. A. Quigley, 200 Iona Ave., N. W.
HARRISBURG, PA., Welchans Elevator Works, Lancaster
HAVANA, CUBA, Luis R. Rios, Manzana De Gomez Bldg. 564
HUNTINGTON, W. VA., Fireproof Products Corp., Professional Bldg., Charleston
INDIANAPOLIS, IND., Hoover Bros. Co., 1008 Majestic Bldg.
JACKSON, MISS., Clark Bldg. Material Co., Majestic Theatre Bldg.
KANSAS CITY, MO., Montgomery Elevator & Service Co., 7th and Washington Sts
KNOXVILLE, TENN., Chas. M. Allen Co., 712 So. Gay St.
LANCASTER, PA., Welchans Elevator Works, James and Water Sts.
LANSING, MICH., Kernerator Sales Co., Detroit
LEXINGTON, KY., Clay-Ingels Co., 347 E. Main St.
LITTLE ROCK, ARK., Wherry & Company, Gem Bldg.
LOS ANGELES, CALIF., Kerner Sales Co., Ltd.
LOUISVILLE, KY., R. B. Tyler Co., 1448 Levering St.
MEMPHIS, TENN., Geo. O. Friedel, Builders Exchange
MIAMI, FLA., Paul E. Shipe, 25 S. W. Third St.
MINNEAPOLIS, MINN., Hauenstein & Burmeister, 614 Third Ave., So.
MONTERREY, MEX., Holck y Cia, Apartado Postal No. 1
NASHVILLE, TENN., Geo. W. Ruth Co., 149 Fourth Ave., No.
NEW ORLEANS, LA., J. T. Mann Co., 319 Drydaes St.
NORFOLK, VA., J. S. Archer, 200 Davis Bldg., Richmond
OAKLAND, CALIF., Kerner Sales Co., Ltd., San Francisco
OMAHA, NEBR., Wright & Mack Co., 418 So. 13th St.
PEORIA, ILL., C. E. Kallister Co., Peoria Life Bldg.
PHOENIX, ARIZ., Neff-Stiles Co., El Paso
PITTSBURGH, PA., Frank Limbach Co., 1722 E. Ohio St.
PORTLAND, ME., Marston Supply Co.
PORTLAND, ORE., Kerner Sales Co., Ltd., San Francisco
RICHMOND, VA., J. S. Archer, 200 Davis Bldg.
ROANOKE, VA., Roanoke Builders Supply Co., 11 Franklin Road, Southwest
ST. LOUIS, MO., Wm. A. Miller Mach. & Elevator Co., 920 No. Main St.
ST. PAUL, MINN., Hauenstein & Burmeister, 903 Builders Exchange
SAN ANTONIO, TEX., Wm. S. Seng, Builders Exchange Bldg.
SAN DIEGO, CALIF., Kerner Sales Co., Ltd.
SAN FRANCISCO, CALIF., Kerner Sales Co., Ltd., 450 Clementina St.
SAN JUAN, P. R., Carlos R. Rossi, P. O. Box 1412
SALT LAKE CITY, UTAH, Hawley, Richardson, Williams Co., 204 Dooly Bldg.
SEATTLE, WASH., Kerner Sales Co., Ltd.
SIOUX CITY, IOWA, Haakinson & Beaty Co., First and Nebraska Sts.
SOUTH BEND, IND., South Bend Bldg. Specialties Co., 232 So. Michigan St.
SYRACUSE, N. Y., Cassius J. Logan, Albany
TAMPA, FLA., E. L. March, 303 Third Ave., North, St. Petersburg
UTICA, N. Y., Cassius J. Logan, Albany
VANCOUVER, B. C., CAN., 530 Howe St.
VICTORIA, B. C., CAN., 551 Yates St.
WICHITA, KANS., Haines Tile Shop, 248 North Market St.
WILMINGTON, DEL., Welchans Elevator Works, Lancaster, Pa.

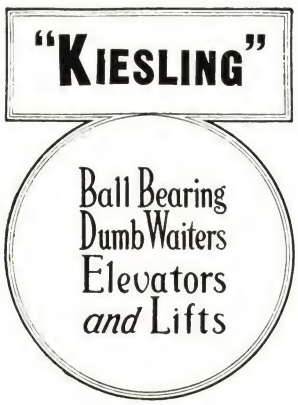
Products

DUMBWAITERS: Ball Bearing Wood Track or Steel Track—for restaurants, stores, residences, clubs, hospitals, libraries, schools, colleges, Government, State and City institutions, etc.

ELEVATORS or LIFTS: Steel Track—for conveying freight in various form, such as trunks, crates, boxes, barrels, bags of laundry, coin, ashes, etc.

DOORS: Dumbwaiter; Sidewalk Elevator—for use in conjunction with the above mentioned dumbwaiters, elevators or lifts.

GATES: Automatic and Semi-automatic.



For our pages on Elevator Cable Equalizers, Sidewalk Elevators and Ash Hoists, see Manufacturers' Index.

Kiesling Service

Our experience of over forty-two years in the manufacture and installation of hand power equipment qualifies us to advise authoritatively concerning all problems incident to the installation and use of dumbwaiters and elevators.

Our Service Department or nearest representative will gladly assist architects or prospective users in the selection of the most suitable outfit for the particular requirements.

Shipments

Through the co-operation of our many representatives and distributors throughout the principal cities of the United States and Canada, we are in position to make prompt shipments, supervise or effect installation of Kiesling products.

Where the purchaser desires to make his own installation, we furnish complete working drawings and written instructions.

Installations

Our unsurpassed record of over 100,000 installations has qualified us to solve the most intricate problems promptly and efficiently.

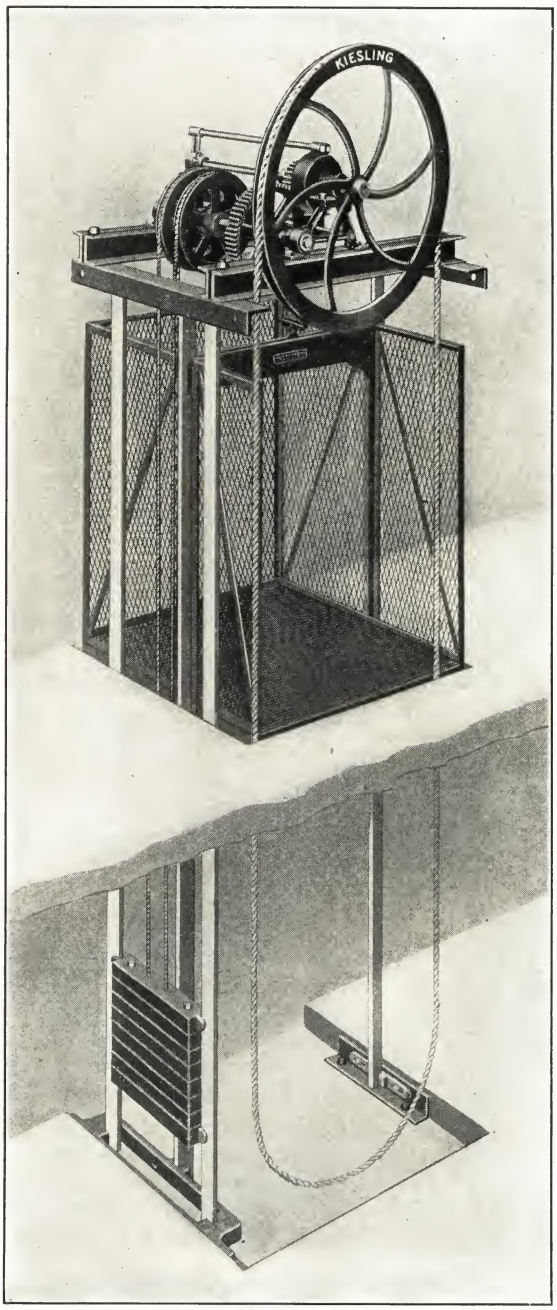
Doors

Wherever possible we suggest that *Kiesling Bi-Parting Type, Counterbalanced, Ball Bearing Dumbwaiter Doors* be included in the dumbwaiter specifications.

Guarantee

We guarantee the *entire* outfit and not the machine alone. It is essential that the tracks, cables, etc., should be covered by a suitable guarantee to assure a product that will prove an economical investment to the purchaser.

"STEEL-TRACK" BALL BEARING ELEVATOR OR TRUNK LIFT
(Cut Gears and Two Hoist Wheels)



Steel Tracks and Platform Flooring of Diamond Checkered Steel Plate Will Wear Indefinitely

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions, in.		Capacity, lb.
	Width	Depth	Width	Depth	
1	36	36	45	39	600
2	42	36	51	39	750
3	42	42	51	45	750
4	48	42	57	45	1000
5	48	48	57	51	1000
6	54	54	64	57	1200
7	60	60	70	63	1500
8	72	72	82	75	2000
9	48	84	58	87	1500

Note: Intermediate sizes shipped within *four* days.
Blue prints of standard stock sizes furnished on request.

Designed for the purpose of conveying freight in various forms, such as furniture, trunks, crates, boxes, barrels, bags of laundry, coin, books, etc., from one floor to other floors.

Local building regulations may necessitate special equipment, such as gates, etc. We are prepared to furnish any special equipment which may be required.

Where the installation is to be made by other than our own mechanics, simplicity of erection is effected as each outfit is prepared in accordance with the dimensions on the working drawing, and written instructions are furnished with every shipment.

Five Year Guarantee

This "Steel-track" Ball Bearing Elevator or Trunk Lift is guaranteed for *five years* against defective material and workmanship.

How to Specify

Furnish (and install) where indicated on the plans and in accordance with the manufacturer's specifications and drawings "Steel-track" Ball Bearing Elevator (or Trunk Lift) Size No.....[with gates] as manufactured by JOHN W. KIESLING & SON, INC., 1797 Atlantic Avenue, Brooklyn, N. Y.

Manufacturers' Specification

Steel Tracks (Cold Drawn)—Two individual steel tracks guide the car and two individual steel tracks guide the counterweight.

Machine—*Band brake, cut geared, ball bearing.* Assembled and set as a complete unit in a self-contained iron frame.

Steel Machine Supports—The entire machine is supported on steel I-beams and securely bolted thereto.

Steel Car Sling—The car is inserted in a steel sling and securely bolted thereto.

Steel Car—The car is of all-steel construction, diamond checkered steel plate flooring, heavy gauge wire screen enclosure.

Guide Shoes—Four ball bearing guide shoes.

Cables—Two in number and of flexible steel.

Counterweight—Steel rod, sectional design and adjustable to additional weight.

Operating Rope—Braided cotton cord, purple or black.

KIESLING "STEEL-GUIDE" GEARED AUTOMATIC BRAKE DUMBWAITER

Full Diameter Hoist Wheel and Cut Gears

(Replacing Type "A-1-A")

Scope of Use and Various Installations

Rockefeller Residence	Greenwich, Conn.	Noel & Miller
Vanderbilt Residence	West Palm Beach, Fla.	Fatio & Trainor
DuPont Residence	Southampton, N. Y.	Cross & Cross
Fahnestock Residence	Newport, R. I.	Russell & Clinton
Guggenheim Dental Clinic	New York, N. Y.	York & Sawyer
Childs' Restaurants	New York, N. Y.	Pruitt & Brown
N. Y. Telephone Co.	New York, N. Y.	Voorhees, Gmelin & Walker
National City Banks	San Juan, Porto Rico	Walker & Gillette
Tuxedo Club	Tuxedo, N. Y.	John Russel Pope
Lincoln Baths	Saratoga Springs, N. Y.	Kenneth Murchison
Mary Immaculate Hospital	Jamaica, N. Y.	Wm. I. Bogel
Sailors' Snug Harbor Apts.	New York, N. Y.	Helmle, Corbett & Harrison

Capacity

Furnished in any capacity desired up to four hundred pounds. (Consult Chart below.)

Doors

We recommend Kiesling Ball Bearing Vertical Biparting Doors be included with dumbwaiter as dimensions of both items are governed by each other.

Five Year Guarantee

This "Steel-Guide" Dumbwaiter equipment is guaranteed for *five years*, against defective material and workmanship.

How to Specify

Provide where indicated on the plans and in accordance with the manufacturer's specifications and drawings, Kiesling "Steel-Guide" Automatic Brake Ball Bearing Dumbwaiter, Capacity Load.....lbs., Size No.....[with Kiesling Doors] as manufactured by JOHN W. KIESLING & SON, INC., 1797 Atlantic Avenue, Brooklyn, N. Y.

Manufacturers' Specification

Steel Guides—Two individual cold drawn steel rails guide the car and counterweight. Guides must be adjustable from 1-1000th to 2 in.

Wood Tracks—Georgia or N. C. Pine properly milled out that the counterweight travels between same without requiring additional shaft space.

Car—Of selected clear hardwood [monel metal] [duralumin] [allegheny metal] [sheet metal], etc. One or more shelves as desired.

Guide Shoes—To be phosphor bronze. [Roller bearing type.]

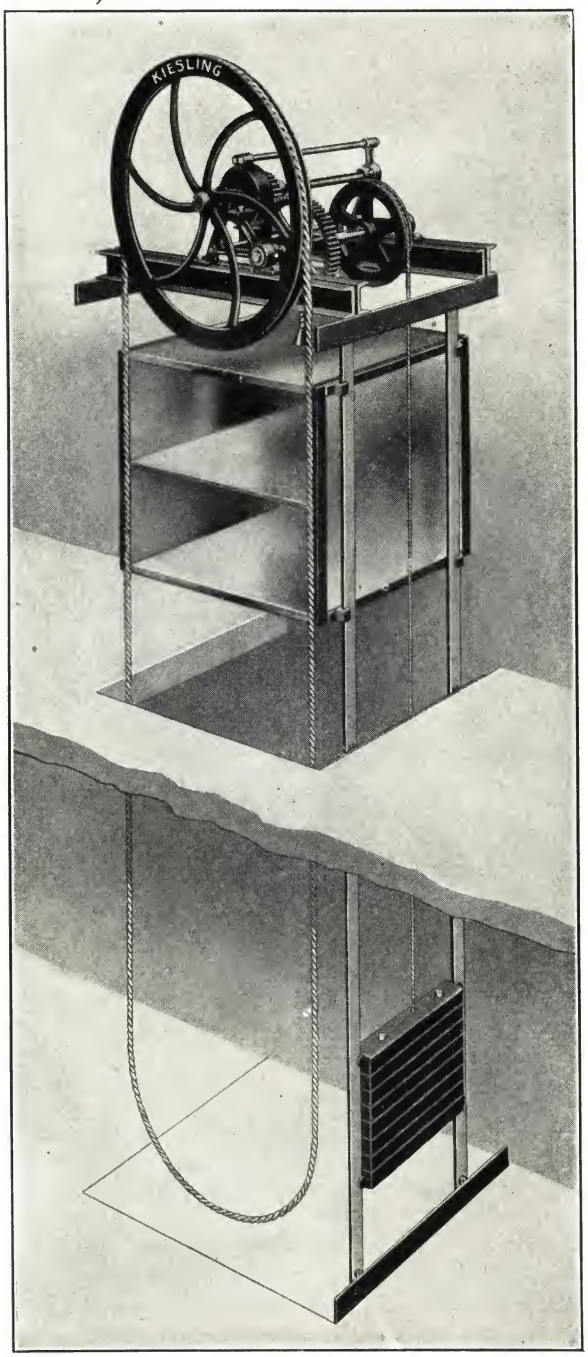
Machine—Ball bearing, cut gears—automatic brake type (18 sq. in. locking surface). Machine is assembled and set as a complete unit in a self-contained iron frame.

Steel Cable—Flexible steel hoisting cable, 288 wires.

Operating Rope—Russia hemp. [Cotton braided cord—black.]

Counterweight—Sectional design steel rod counterweight, adjustable to additional weight.

Doors—Bi-parting ball bearing counterbalanced type. Steel [kalamein] [monel metal] [allegheny steel], etc.



Steel Guides or Wood Tracks Are Standard Equipment, for the Same Price

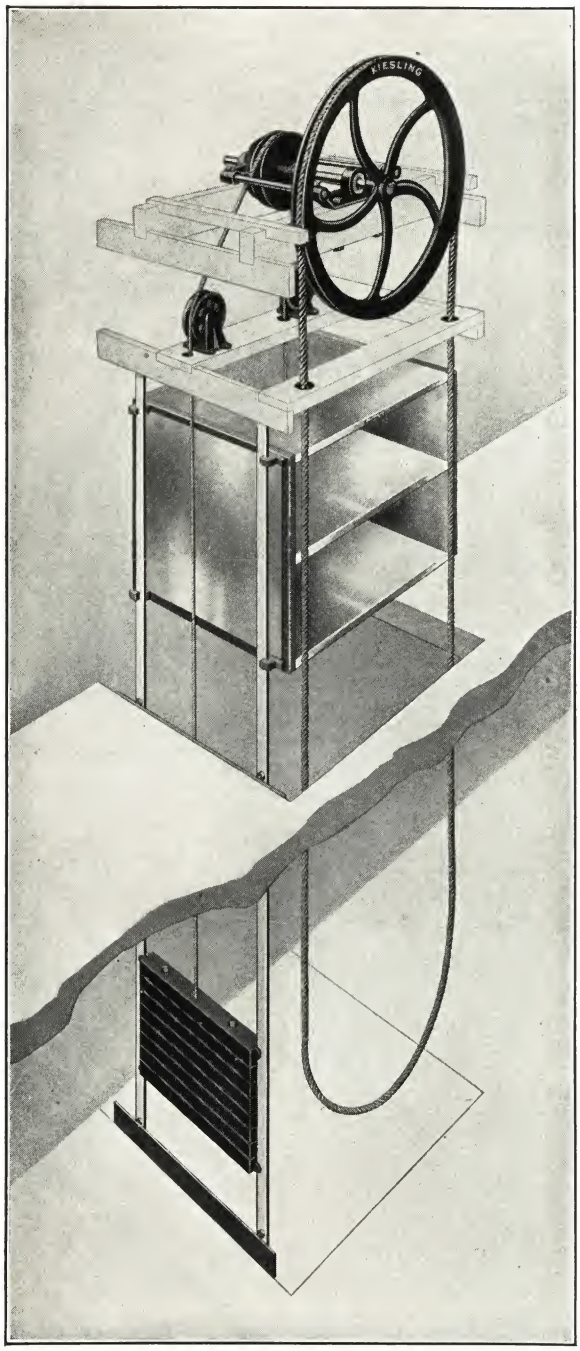
STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions, in.		Shaft dimensions, in.		Car height, in.	Capacity load, lb.
	Width	Depth	Width	Depth	Width	Depth		
	Single face				Double face			
1	16	16	20	19	20	20	36	75
2	20	16	24	19	24	20	36	100
3	20	20	24	23	24	24	36	100
4	24	20	28	23	28	24	40	150
5	24	24	28	27	28	28	40	150
6	28	24	32	27	32	28	40	200
7	28	28	32	31	32	32	40	200
8	32	28	36	31	36	32	48	250
9	36	36	43	39	43	40	48	400

Blue prints furnished on request.

KIESLING "STEEL-RAIL" AUTOMATIC BRAKE DUMBWAITER

(Replacing Kie-son Type)



Steel Rails or Wood Tracks Are Standard Equipment, for the Same Price

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions, in.		Shaft dimensions, in.		Car height, in.	Capacity load	
	Width	Depth	Width	Depth	Width	Depth		Silent roller chain, lb.	Flexible steel cable, lb.
	Single face				Double face				
1	16	16	20	19	20	20	36	75	35
2	20	16	24	19	24	20	36	100	50
3	20	20	24	23	24	24	36	100	50
4	24	20	28	23	28	24	40	150	75
5	24	24	28	27	28	28	40	150	75
6	28	24	32	27	32	28	40	200	100
7	28	28	32	31	32	32	40	200	100
8	32	28	36	31	36	32	48	250	
9	36	36	43	39	43	40	48	400	

Blue prints furnished on request.

This Dumbwaiter has been designed to accommodate either light or heavy loads. Equipped with our Silent Roller Steel Chain Drive, in place of cable drive, the capacity can be increased up to 400 lbs. It is a known fact that the Silent Roller Steel Chain will render service for a far greater period than that of a cable.

Capacity

Furnished in any capacity desired up to four hundred pounds. (Consult table in opposite column.)

Doors

We recommend Kiesling Ball Bearing Vertical Biparting Doors be included with dumbwaiter as dimensions of both items are governed by each other.

Five Year Guarantee

This "Steel-Rail" Dumbwaiter equipment is guaranteed for *five years*, against defective material and workmanship.

How to Specify

Provide where indicated on the plans and in accordance with the manufacturer's specifications and drawings, Kiesling "Steel-Rail" Automatic Brake Ball Bearing Dumbwaiter, Capacity Load.....lbs., Size No.....[with Kiesling Doors] as manufactured by JOHN W. KIESLING & SON, INC., 1797 Atlantic Avenue, Brooklyn, N. Y.

Manufacturers' Specification

Steel Rails—Two individual cold drawn steel rails guide the car and counterweight. Rails must be adjustable from 1-1000th to 2 inches.

Wood Tracks—Georgia or N. C. Pine properly milled out that the counterweight travels between same without requiring additional shaft space.

Car—Of selected clear hardwood [monel metal] [duralumin] [allegheny metal] [sheet metal], etc. One or more shelves as desired.

Guide Shoes—To be phosphor bronze. [Roller bearing type.]

Machine—Ball Bearing—Automatic brake type (18 sq. in. locking surface). Machine is assembled and set as a complete unit in a self-contained iron frame.

Steel Cable—Flexible steel hoisting cable, 288 wires.

Steel Roller Chain—Silent, case hardened B. B. B. quality.

Operating Rope—Russia hemp. [Cotton braided cord—Black.]

Counterweight—Sectional design steel rod counterweight, adjustable to additional weight.

Doors—Bi-parting ball bearing counterbalanced type. Steel [kalamein].

KIESLING DUMBWAITER DOOR

Bi-Parting Type—Counterbalanced—Ball Bearing

Scope of Use and Various Installations

Rockefeller Residence	Greenwich, Conn.	Noel & Miller
Vanderbilt Residence	West Palm Beach, Fla.	Fatio & Trainor
DuPont Residence	Southampton, N. Y.	Cross & Cross
Fahnestock Residence	Newport, R. I.	Russell & Clinton
Guggenheim Dental Clinic	New York, N. Y.	York & Sawyer
Childs' Restaurants	New York, N. Y.	Pruitt & Brown
N. Y. Telephone Co.	New York, N. Y.	Voorhees, Gmelin & Walker
National City Banks	San Juan, Porto Rico	Walker & Gillette
Tuxedo Club	Tuxedo, N. Y.	John Russel Pope
Lincoln Baths	Saratoga Springs, N. Y.	Kenneth Murchison
Mary Immaculate Hospital	Jamaica, N. Y.	Wm. I. Bogel
Sailors' Snug Harbor Apts.	New York, N. Y.	Helmle, Corbett & Harrison

Principal Features

These doors are neat in appearance, easily operated by means of ball bearings and *steel tracks,* and can be furnished with aluminum, monel metal, duralumin, kalamein, steel or other rust resisting metal, etc. Furnished with or without trim, and are constructed to conform to our standard stock sizes of our various dumbwaiters, however, we can also furnish intermediate sizes.

The doors, frame, hardware, etc., are all completely assembled at our factory and shipped as one unit, ready to be placed in the shaftway eliminating erection expense.

Guarantee

These doors are guaranteed for a period of *three years* against defective material and workmanship.

How to Specify

Provide where indicated on plans and in accordance with the manufacturer's specifications and drawings, Kiesling Vertical Sliding Type Dumbwaiter Doors, Size No. ..... to accommodate Kiesling Dumbwaiter Type..... Size No..... as manufactured by JOHN W. KIESLING & SON, INC., 1797 Atlantic Avenue, Brooklyn, N. Y.

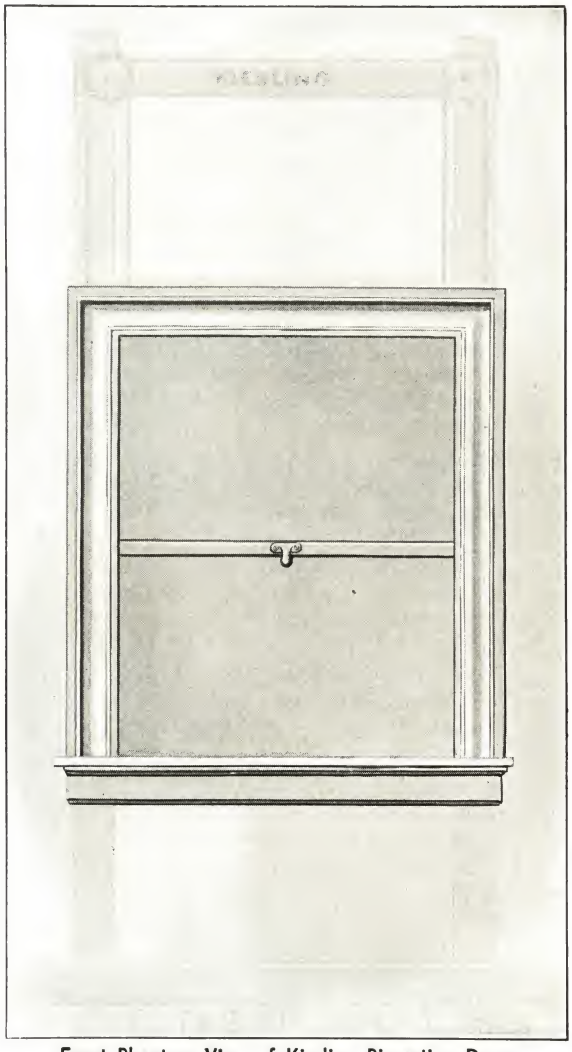
Manufacturers' Specification

Doors—To be two section type, completely covered with [monel metal], [aluminum], [kalamein], [duralumin], [copper], [steel], [galvanized metal], etc., counterbalanced by each other without necessity of weights.

Frame—Guide frame shall be steel, extending from floor level to at least three feet above door jamb.

Shivs—All Shivs shall be Ball Bearing.

Hardware—Operating handle shall be [nickel], [bronze], [brass] or [steel].



Front Phantom View of Kiesling Bi-parting Door

Dumbwaiters

We recommend that Kiesling Ball Bearing Dumbwaiters be included with the door specifications as the dimensions of both these items are governed by each other.

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Door No.	Door opening, in.		Shaft opening, in.		
	Width	Height	Width	Height	Depth
1	17	36	19	38	2
2	21	36	23	38	2
3	21	36	23	38	2
4	25	40	27	42	2
5	25	40	27	42	2
6	29	40	31	42	2
7	29	40	31	42	2
8	33	48	35	50	2
9	37	48	39	50	2

Note: Intermediate sizes shipped within *two* days
Blue prints furnished on request

ELECTRIC DUMBWAITERS INC.

HOME OFFICE AND FACTORY
BUFFALO, N. Y.

PUSH BUTTON OPERATED ELECTRIC DUMBWAITERS

Electric Dumbwaiter Equipment

"Electric" dumbwaiters are made in several sizes. They consist of a hoisting engine with controller all assembled and wired complete; car, counterweight, sheaves, guide rails, hoisting rope, push buttons, hatchway limit switches, door interlock switches and electrical fittings.

"Electric" DUMBWAITERS

Where Used

In apartments, residences, stores, factories, offices, schools, restaurants, hospitals, laundries, bakeries.

Construction

The car is guided by rails at rear of hatchway; these rails are also used to guide the counterbalance weight. This construction is the simplest and most substantial, allowing the largest size car possible in a given hatchway.

The worm and worm gear shaft are made of high grade steel and run on the best make of ball bearings. Gear is of best phosphor bronze, accurately cut on machines built exclusively for this work.

Car and weight are each suspended from two steel ropes of ample capacity to carry the loads and flexible enough to last a long time. Cars are made of sheet steel, riveted and welded together; after finishing, cars are given two coats of baked furniture enamel, green. Cars are also made of select lumber, well seasoned and kiln dried before working.

The guides are of steel; very strong, and supported at frequent intervals. All moving parts are self-oiling.

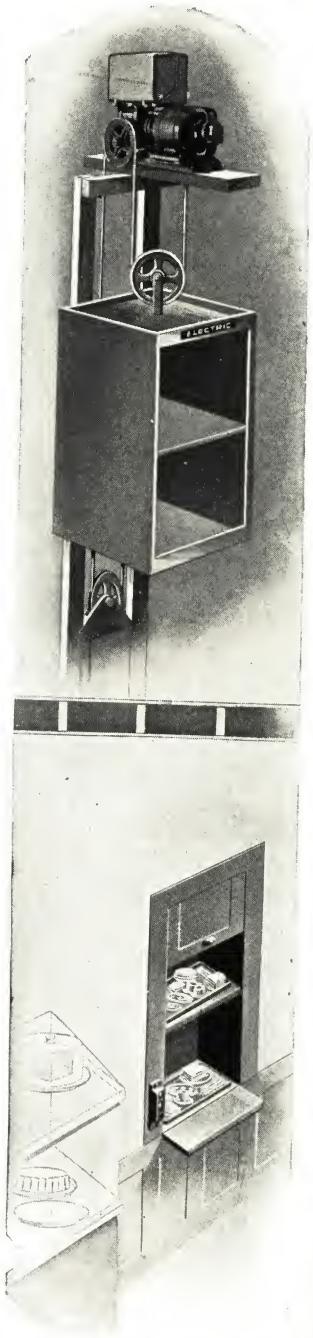
Installation

The "Electric" has been particularly designed and manufactured so it can be connected to electric service or power line and installed by the ordinary mechanic. It takes very little current in operation due to the special motor. All parts are interchangeable.

Full instructions, wiring diagrams and drawings furnished with each outfit.

Guarantee

We guarantee the material and workmanship, and, if any part or parts prove defective within one year, we will supply the defective part or parts free of charge f.o.b. our factory.



Dumbwaiter Installation

Electric Control System

UD1—Two or More Landings, Constant Pressure Push Button Control—Two buttons at each landing marked "up" and "down." Maintaining pressure on button will call or send car in any desired direction. Releasing pressure on button will stop car.

UD2—Two-floor Momentary Pressure—Three buttons at each landing marked "up," "down" and "stop." Momentary pressure of button will send car up or down where it will automatically stop.

With Steel Guides Only—

CCS1—Single Station Call and Send—A bank of buttons at one floor. Maintaining pressure on any button will send car to the floor indicated.

CCS2—Single Station Call and Send—A bank of buttons marked to correspond to the floors served by the car is located at the terminal floor, and, by means of a maintained pressure on the button, gives complete control of the car from this point. A bank of two buttons marked "call" and "send" is located at all other floors and by means of constant pressure on button, car can be called to those floors and returned to controlling station.

CCS3—Same as CCS1 with momentary operation.

CCS4—Same as CCS2 with momentary operation.

MCS—A Full Selective Floor Call and Send Control—Multistation control at each landing. Bank of buttons corresponds to number of floors served by car.

Momentary pressure on the button automatically calls or sends the car from any floor to any other floor.

MCS1—A bank of buttons is placed at some particular station and car can be called or sent to any floor from this station. Closing door will return car to station.

MCS2—A bank of buttons is placed at some particular station. Momentary pressure on any button will send the car to any floor desired. A call button placed at every floor allows the car to be called to that floor and closing of the door returns the car to the station.

Minimum Current Required

The motor is one of standard make and has been specially adapted by the manufacturers to this machine. Has high torque and moderate speed of ample capacity, and due to special design of the "Electric," it takes very little current to run.

General Dumbwaiter Data

Capacity—75, 100, 150, 200, 250, 300, 400 and 500 lb.

Power—Alternating or direct current, 110 or 220 volts.

Speed—50, 75 and 100 ft. per minute.

Car Sizes—Steel or wood, up to 3x4x4 ft. high or as large as local regulations permit.

Space Required—Plans and elevations below give various types of installations with overhead machines and are for plumb dimensions. Allow for out-of-plumb sizes.

Elevation gives desirable heights. Height of car or height from top floor line to sill or space between machine and ceiling may be reduced slightly.

Information Required for Estimates

(1) State number of floors to be served—giving number and position of all door openings.

(2) Give finished inside dimensions of hatchway; of what material constructed—wood, brick, gypsum, etc.

(3) Give total height from lowest floor served to ceiling of top floor served.

(4) Give the height from floor to ceiling and from sill to ceiling at top floor.

(5) State capacity of car and speed of travel.

(6) State whether swinging or sliding doors.

(7) State available power—if direct current, give voltage; if alternating, give voltage, cycles and phases.

SUGGESTIONS FOR THE PREPARATION OF ARCHITECTS' SPECIFICATIONS

Capacity to lift a load of .. lb., exclusive of the weight of car at a speed of .... ft. per minute.

Power to be .... volts, ... phase, ... cycles, d-c.

Travel of car to be from basement to ..... floor, a distance of about .... ft. .... in.

Door openings to be located as follows:

Doors to be vertical sliding, inside of hatch or in door frame, or swinging doors if desired. If any particular make or type is to be used, mention same.

Car to be of steel, not less than No. 16 gauge sides and No. 14 gauge top, parts riveted solidly, and then welded. To be properly finished in baked enamel; color to be specified. A furniture green is a good wearable color.

If a light is wanted in car it can be specified. In specifying, state light must be so recessed in top of car to give clear, full height.

Guide rails to be of steel, properly fish plated and supported rigidly by brackets not less than eight feet apart.

Counterbalance weight to be sufficient to secure proper and economical running, sliding parts on rails to be of babbitt or other similar metal.

Steel rope to be used of sufficient size to have a factor of safety as used in standard elevator practice.

The hoisting machine to be of the worm gear traction type, made of the best materials and workmanship. The worm to be made of high grade steel. The gear to be made of the best phosphor bronze gear metal, accurately machined and cut.

All parts to be mounted on one continuous iron bed-plate of substantial construction and all running parts to be thoroughly self-lubricating.

The motor to be of the elevator type with high starting torque with the minimum of starting current, slow speed and adapted to meet the requirements of the service as specified.

The machine to be provided with a magnet brake which automatically stops and holds the car during normal operation; or if the current is interrupted the brake will stop and hold the car.

The machine to be provided with a magnet controller of the most improved type which automatically starts, stops and reverses the motor and applies brake. Must have overload and single phasing protection. Adjustable metal to carbon contacts.

Machine to be located ..... Location can be overhead or in basement or any floor. But overhead is the best if possible.

One limit switch at top and one at bottom of hatch to automatically stop car at terminal landing.

One mechanical and electrical door lock to be provided for each opening so car cannot be operated if door is opened or door cannot be opened if car is not at landing.

Push buttons of the proper number to be placed at the landings as specified.

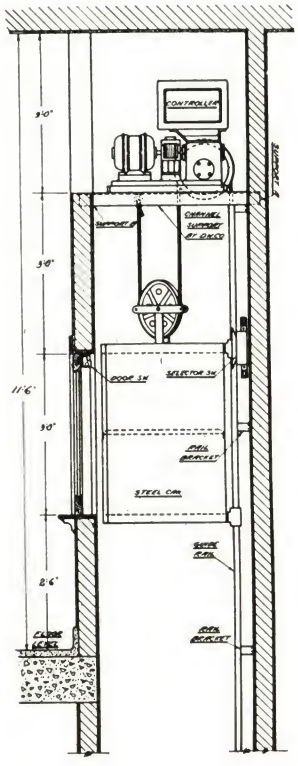
For different type of operation see preceding page.

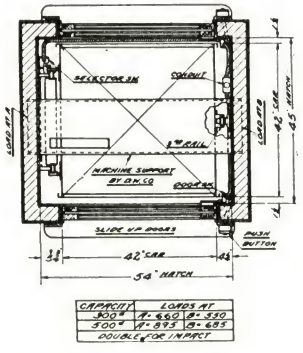
Signals can be of several types as—

A light or buzzer to be placed in car to operate when car stops and cease when door is opened and not operated again until door is closed and button again operated.

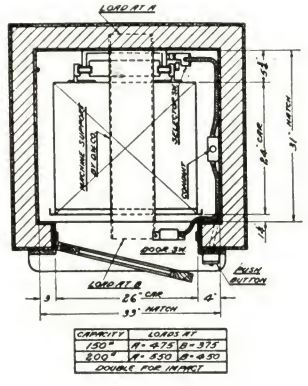
A light or buzzer placed over door to be operated when car stops and cease when door is opened and not operated again until door is closed and button again operated.

If wanted, a light can show in push button to indicate car is in operation.

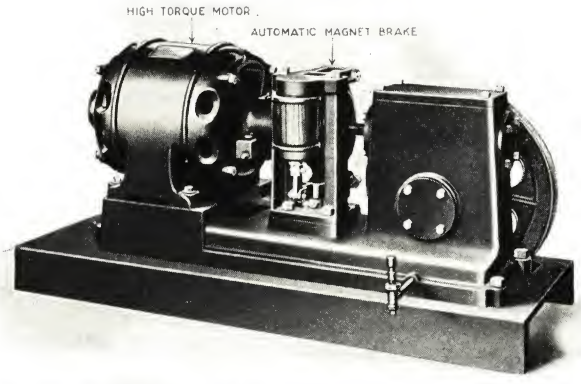


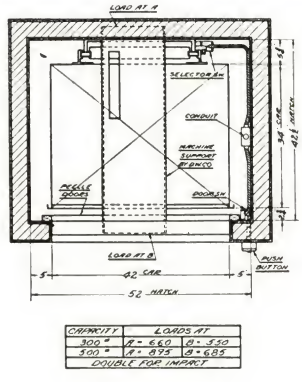


CAPACITY	LOADS AT
300#	A- 660 B- 550
500#	A- 895 B- 695
DOUBLE FOR IMPACT	

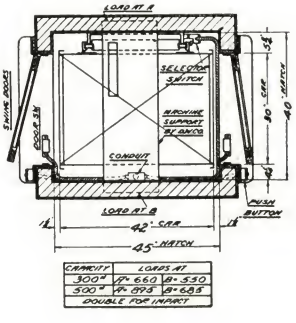


CAPACITY	LOADS AT
150#	A- 475 B- 375
300#	A- 630 B- 430
DOUBLE FOR IMPACT	





CAPACITY	LOADS AT
300#	A- 660 B- 550
500#	A- 895 B- 695
DOUBLE FOR IMPACT	



CAPACITY	LOADS AT
300#	A- 660 B- 550
500#	A- 895 B- 695
DOUBLE FOR IMPACT	

ESTABLISHED 1887

ENERGY ELEVATOR COMPANY

TELEPHONE
MARket 0821

210-218 New Street
PHILADELPHIA, PA.

AGENTS IN ALL PRINCIPAL CITIES

Products

DUMBWAITERS, HAND-POWER and ELECTRIC.

SIDEWALK ELEVATORS, HAND-POWER and ELECTRIC.

INVALID LIFTS, HAND-POWER and ELECTRIC.

FREIGHT ELEVATORS, HAND-POWER and ELECTRIC.

Energy Features

Backed by over 44 years of engineering experience and performance. Energy Elevators and Dumbwaiters are simple in design and adaptable to varying conditions. Tested materials of adequate strength, plus careful workmanship have resulted in the long and satisfactory service for which Energy Equipment is noted.

Designed and fitted for easy erection by local mechanics.

Prices

Prices of Energy Equipment are consistently moderate because of features which eliminate useless equipment.

Engineering Department

Energy Engineers are constantly at work on improvements and designs to meet the ever increasing variety of lifting needs. Drawings and erecting instructions are always furnished for an installation. Blue prints of standard sizes of various types of equipment furnished on request. We invite inquiries for special quotations on any unusual installation.

Guarantee

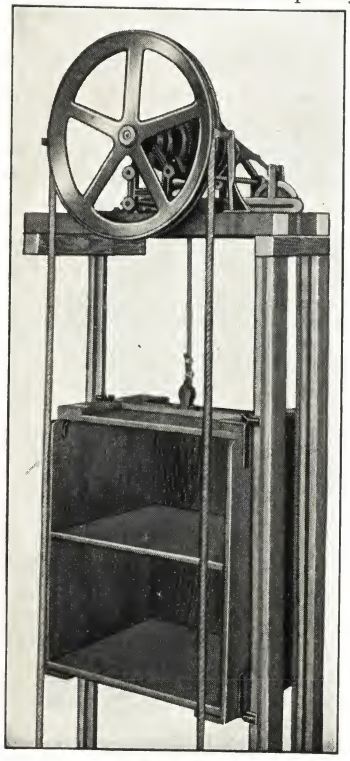
All Energy Equipment is fully guaranteed for materials and workmanship, and can be installed with the knowledge that it will give utmost service over the years.

ENERGY HAND-OPERATED DUMBWAITERS

Energy, or Residence Dumbwaiter, Type 632

For use in residences, apartments, restaurants, stores, and light manufacturing plants for the quick transfer of food, dishes, and supplies between floors.

It has a maximum capacity of 75 lbs. The strength of the equipment, which is much greater than this maximum capacity, and the simple, practical construction insure a long life of service, without trouble.



Type 632

Features—

(1) Automatic brake acts independently of the operator, of a type which applies on the downward motion of the car only, being free of all friction on the up motion.

(2) Especially designed and fitted for easy erection by local mechanics.

(3) Assembled machine.

(4) Adjustable counterweight.

(5) Finished car.

(6) Roller bearings.

(7) Compounded guides.

Specifications

Machine—The automatic lock type, which sustains loaded car at any point of its travel, and requires no hand brake. The lock applies in the downward direction only, eliminating all brake friction when raising loads. Main shaft is polished turned steel, revolving on roller bearings, and the entire mechanism, including the wheels to deflect the hoist cable, is mounted in one rigid iron frame. All parts are accurately machined and carefully fitted, to make a substantial and adequate hoisting machine.

Car—First quality, well-seasoned hardwood, finished with filler and varnish. The top and bottom are gained into the sides, braced, and bound with irons. Standard size is 24 ins. wide, 20 ins. deep, and 30 ins. high, with one middle shelf, making two compartments 14 and 12 ins. high. Guide shoes are of iron, and are adjustable to the guide runs.

Counterweight—Heavier than the car to assist in raising loads and runs smoothly in guides. It is sectional in construction and easily accessible for adjustment to the average load conditions.

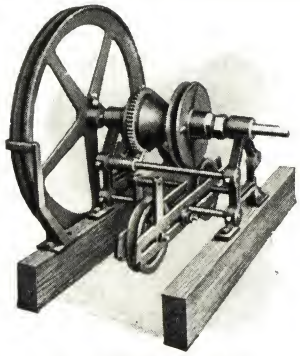
Guides—Consist of a maple strip on one side, and two grooved pine runs on the opposite side, arranged to guide both car and weight, conserving shaftway space and assuring quiet, easy operation. Grooved runs are compounded to prevent warping.

Hoist Cable—Flexible iron cable, of ample strength, with necessary fastenings for the car and weight.

Operating Rope—First quality hemp, free from splinters, with guards to hold it always in place.

Variations—Can be furnished open front and back, front and either side, equipped to run on brass tubes; can be any size to maximum (see table) with any number of shelves. Steel car can also be furnished.

Equipment — Machine, car, counterweight, guides for car and weight, hoist cable, hand rope and guards.



Type 632 Dumbwaiter Machine

Heavy Duty Dumbwaiter, Type 432

For use in hospitals, schools, bakeries, shipping rooms, garages, etc., for movement of food in quantity, containers, tools, supplies, etc.

This dumbwaiter is made in various capacities for maximum loads of 150 to 300 lbs. Each machine is geared, according to the duty required, to handle the average load with ease.

Features—

(1) Finished car.

(2) Compounded guides.

(3) Geared machine.

(4) Automatic brake acts independently of the operator; of a type which applies on downward motion of car only, being free of all friction on up motion.

(5) Adjustable and accessible counterweight.

(6) Designed and fitted for easy erection by local mechanics.

(7) Antifriction bearings.

Type 432

Specifications

Machine — Automatic lock type, sustaining loaded car at any point without hand brake. Lock applies on downward motion only, eliminating all friction in raising loads. Geared to raise average load easily. Spur gearing, cast from machine-cut patterns, and shafts of turned steel on antifriction bearings, all contained in an iron frame. All parts accurately machined and carefully fitted.

Car—Cabinet type, of first quality well-seasoned hardwood finished with filler and varnish, braced and bound with irons. One middle shelf. Adjustable guide shoes of iron.

Counterweight—Heavier than car to assist in raising load. Sectional and adjustable to average load conditions.

Guides—Maple strip on one side, two grooved pine runs opposite to guide both car and weight, compounded to prevent warping.

Hoist Cable—Flexible steel of ample strength.

Operating Rope—First quality hemp, free from splinters, with guards.

Variations—Car can be furnished double face, open front and either side, or of steel. For maximum sizes, see table below.

Equipment—Machine, car, counterweight, guides for car and weight, hoist cable, hand rope and guides.

Little Giant Dumbwaiter, Type 413

For apartments, institutions, dormitories, warehouses, laundries, etc., for transporting trunks, cases, supplies, barrels, and heavy smaller articles. It has a capacity of 300 lbs.

Features—

(1) Large substantial platform.

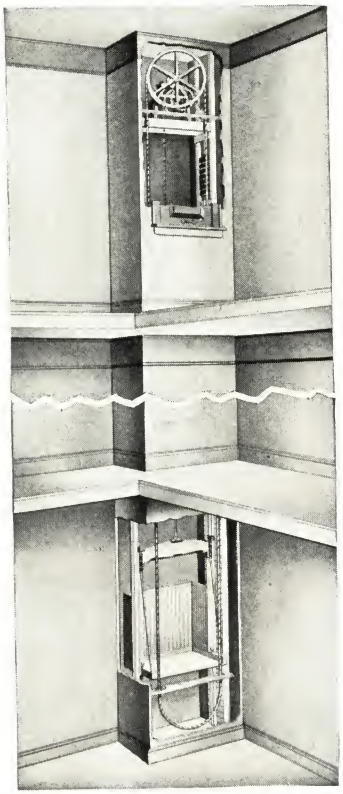
(2) Geared machine.

(3) Automatic brake acts independently of the operator. Allows car to move upward without friction.

(4) Antifriction bearings.

(5) Adjustable counterweight.

(6) Designed and fitted for easy erection by local mechanics.



Type 413

Specifications

Machine—Automatic lock type sustaining loaded car at any point without hand brake. Lock applies on downward motion only, eliminating all friction in raising loads. Geared to raise average load easily. Spur gearing, cast from machine-cut patterns, and shafts of turned steel on antifriction bearings, all contained in an iron frame. All parts accurately machined and carefully fitted.

Car—Platform type of first quality well-seasoned hardwood, finished with filler and varnish, braced with irons and reinforced with angles. Enclosed on rear, sides and back with yellow pine fencing 18 ins. high. Guide shoes are iron, adjustable to the guide runs.

Counterweight — Heavier than car, sectional for adjustment to average load, runs smoothly in closed box.

Guide Runs—Two hard white maple strips to fit guides on car, drilled and countersunk for screws.

Cable—Hoist cable is flexible iron of ample strength with necessary fastenings.

Operating rope of first quality hemp, free of splinters, with guards to keep it in proper position.

The "Little Giant" Machine

Variations—Car any size to maximum (see table) with maximum height of 4 ft. to headbeam. Can be fully enclosed, furnished with shelves, open in rear, equipped with special safety device to prevent falling. Steel car can also be furnished.

Equipment — Machine, car, counterweight, guide runs for car, hoist cable, hand rope and guards.

ENERGY HAND-OPERATED DUMBWAITER DATA

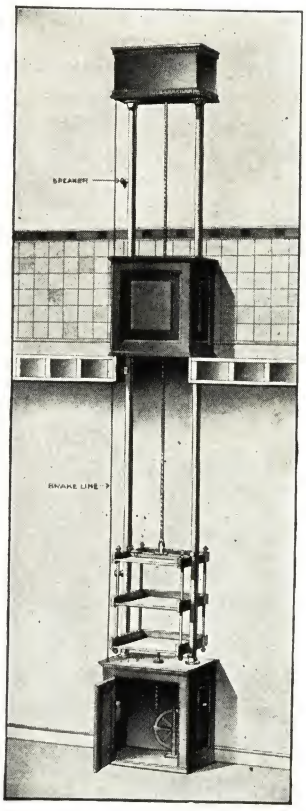
Lifting capacity, lb.	Energy dumbwaiter	Standard car size, in.			Maximum car size, in.			Size of shaft for standard car, in.		Shipping weight, lb. (for 10-ft. travel)
		Width	Depth	Height	Width	Depth	Height	Width	Depth	
25	Little Beauty—Type 362	20	16	30	24	20	30	26	18	275
50	Undercounter—Type 1063	20	16	30	30	24	30	25	18	120
75	Energy—Type 632	24	20	30	36	24	30	29	23	300
150–300	Heavy Duty—Type 432	30	24	36	9 sq. ft.		*48	36	27	450
300	Little Giant—Type 413	30	42	*48	9 sq. ft.		*48	38½	45	500

All dumbwaiters and dumbwaiter cars subject to wide variations to fit service needs. See descriptions for full information.

*To headbeam.

Little Beauty Dumbwaiter, Type 362

For use in restaurants, banks, offices, light manufacturing plants, etc., for quick movement of short orders, papers, letter trays, and small objects.



The sturdy and simple construction provides actual strength far in excess of its capacity of 25 lbs.

Features—

(1) Quick acting.
(2) Ornamental finish.
(3) Easy erection.
(4) Self-holding brake.
(5) Roller bearings.
(6) Speaker arrangement.
(7) Rubber bumpers.

Specifications

Operating Gear—Consists of rope passing over iron wheels mounted on iron stands at top and bottom of shaft. Wheels turn on roller bearings and equipped with rope guards. Self-holding brake applied or released by one line securely sustains car loaded or empty at any point. Loaded car descends by gravity, speed being controlled by brake line which prevents burning hands on car rope.

Cabinet Enclosure—Of paneled hardwood for top wheel and brake. Finished golden oak unless otherwise desired.

Car—Hardwood trays finished golden oak unless otherwise desired, spaced with square brass tubes. Fitted with adjustable guide shoes, polished brass connections and rubber bumpers on bottom. One shelf making two compartments 12 and 14 ins. high.

Counterweight—Moulded lead in steel jacket. Steel coil spring provided for weight, which runs in one tube.

Guides—Two polished brass tubes with flanges at the top and bottom and intermediate clamps for fastening at floor line. Mouthpiece in one tube at each floor for speaker.

Operating Rope—Braided cotton, fitted with necessary connections for car and weight.

Variations—Car can be furnished any size up to maximum (see table) with one or two compartments, completely enclosed, or in special metals.

Equipment—Guarded wheels and brake, overhead cabinet with mechanism mounted, car, counterweight, brass tube guides with collars and clamps, operating rope with connections, speakers. If desired, cabinet base and cabinet stand for each floor opening can also be furnished.

Energy Undercounter Dumbwaiters

Undercounter dumbwaiters are used extensively in soda fountains and bakeries for bringing up ice cream churns and supplies; in restaurants for handling food and dishes from the basement kitchen, and in stores of all kinds for quick replenishment of shelves from stockrooms below.

The car rises directly under the counter, and the machine is located in the basement, thus saving valuable floor space above and bringing new usefulness to the floor below.

Type 1063 (illustrated) is one of our standard Undercounter arrangements. It uses the Energy self-retaining machine with a winding drum for the cable, and a large handwheel for operating. The machine is contained in an iron frame for rigidness, and the lock applies on the down motion of the car only.

The car is of well-seasoned hardwood filled and varnished, with "gained in" shelves and iron braced corners. Roller bearing, guarded pick-up pulleys are through-bolted to the car leg and adjustable iron guide shoes hold the car in hard white maple guides.

Energy Undercounter Dumbwaiters are built in various other arrangements to suit all working conditions, and are designed to use a minimum of space under the counter and in the basement. We will be glad to submit blue prints and specifications of the dumbwaiter best suited to your needs if you will outline the particular problem.

Electric Undercounter Dumbwaiters are also available with push button control and a traction type machine, mounted on the basement floor beside the shaftway.

Energy Electric Dumbwaiter, Type R

Capacity — up to 300 lbs. at any practical speed desired.

This dumbwaiter is extremely capable in service and adaptable to every type of building condition and vertical transit need. It makes available the advantages of electric service at places where it has heretofore been considered impossible or too expensive.

Features—

(1) Quiet operation.
(2) Speed to suit the service.
(3) Maximum safety, because of traction drive.
(4) Machine designed for long life, with all internal working parts and surfaces of bronze or steel.
(5) Motor fully protected against overload, no voltage and phase reversal.
(6) Full call and send push button control.
(7) Push buttons inoperative while car is in motion.

Specifications

Machine—Latest improved direct-connected traction type. Overhead or basement floor mounting. Worm gear is solid bronze and worm and worm shaft are cut from one blank of hardened steel and coupled directly to the motor. Ball bearing thrusts are located on all shafts, and all bearings and heads are bronze.

Motor—Ample capacity, manufactured especially for dumbwaiter service and guaranteed to comply with standards of the A. I. of E. E. Alternating or direct current, 220-440 volts. Brake is the solenoid type, self-holding and automatic.

Control—By push button at each landing to call or send the car from or to any floor. Effected by a single momentary pressure of the proper button.

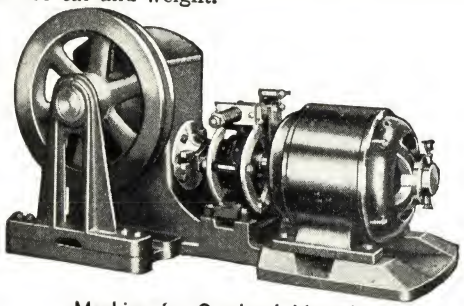
Car—Any size up to 3 ft. square and 4 ft. high, with or without shelves, of material to fit surroundings. Furnished in wood, steel, or special metals.

Guides—Hardwood or planed steel rails, according to service and speed desired. Wood rails are economical for light duty, while steel is better for heavy duty and high speed.

Cables—Special flexible steel construction, of such size and number as to give a high factor of safety.

Variations—Can be adapted to any building condition.

Equipment—Machine with motor and brake; idler wheels, shafts and bearings; automatic push button control units; car (size and type desired); counterweight, cables and connections; guide runs for car and weight.

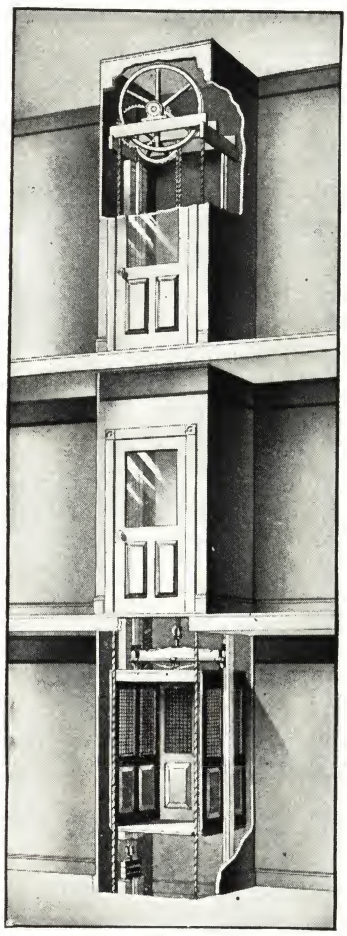


Machine for Overhead Mounting

Note: Machine can be built for installation at top of shaftway or at the foot, offering an additional feature of adaptability to all types of building construction.

ENERGY INVALID ELEVATORS

Hand-Operated Invalid Elevator, Type 61



Energy Hand-Operated Invalid Elevator

Primarily designed for use in homes where there are invalids and convalescents, but now in more general use as a convenience in many modern homes. An ideal home lift where hand operation is desirable, offering many important advantages in this type of service.

Features—

(1) Geared to make operation an exceedingly easy task.

(2) Surrounded by every safety precaution.

(3) Automatic brake holds car, loaded or empty, at any point of travel.

(4) Quiet and smooth in movement.

(5) Constructed of materials to match surroundings in well-appointed homes.

Specifications

Machine—Has steel shafts, with turned journals, fillet finished. Cable wheel is machine scored. All spur gears have machine cut teeth and are keyed to shafts. Entire machine is set up in heavy iron stands, fitted with roller bearings, keeping gears in perfect alignment. Brake is automatic in both directions with solid bronze bands making equalized contact on an iron drum, and positively holding car, either empty or loaded, at any point of travel.

Car—Hardwood frame construction, 3 ft. wide, 4 ft. deep, with maple floor, well-braced with irons and fitted with adjustable guide shoes. It has a spring grip safety device which will lock car to guides instantly in the remote event of both cables breaking. Side and back enclosures are recessed panels of hardwood, with upper sections fitted with wire grilles. Top is also made of recessed panels. It is finished in light oak, with grille work and hardware painted bronze.

Cables—Steel cables suspend car and counterweight and have a combined strength of 18,000 lbs., are connected with equalizing fittings that distribute strain equally on each cable.

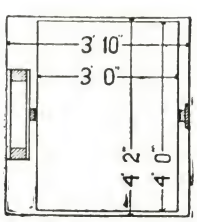
Counterweight—In sections, for convenience in adjusting total weight to balance loaded car. Weights are strung on a wrought iron bar and run between wood guides to insure quietness.

Operating Rope—The best grade of Italian hemp, durable, yet free from splinters. Suitable eyes are provided to guide the rope in proper course.

Guide Runs—Hard white maple, milled for car guide shoes, and drilled and countersunk for erecting screws.

Equipment—Machine, hardwood car, hoist cables with fastenings, counterweight, operating rope, guide runs.

Note: If desired, safety gates can be supplied to protect the entrances to elevator while the car is away from the landing.



Plan of Hatch for Hand-Operated Invalid Elevators

Energy Electric Invalid Elevator, Type 884

No more satisfying electric lift could be found for home use than this electric invalid elevator developed by Energy Engineers. It combines appearance to match the finest surroundings with a degree of service, safety and quietness which has resulted in a multiplying demand. Many architects are repeatedly specifying it.

Features—

(1) Quiet operation.

(2) Maximum safety.

(3) Push button control system in car and at every landing, inoperative while car is in motion.

(4) Automatic brake that stops car at floor desired.

(5) Starts smoothly; stops without jar.

(6) Constructed of materials to match surroundings in well appointed homes.

Specifications

Machine—Overhead, direct-connected traction type, capacity of 500 lbs. with high factor of safety. Worm and worm shaft cut from one blank of solid steel, turning on phosphor bronze bearings with roller bearing thrusts on all shafts. Brake is solenoid type, self-holding and automatic.

Motor—Of ample capacity, guaranteed to comply with standards of the A. I. of E. E. Alternating or direct current.

Control—By push button at each landing to call or send car to or from any landing, or by push button within car. Outside control system inoperative while car is in motion or while any landing door is open—a safe, sure precaution against control accidents.

Car—Hardwood frame construction, 3 ft. wide, 4 ft. deep, with maple floor, well-braced with irons and fitted with adjustable guide shoes. It has a spring grip safety device which will lock car to guides instantly in the remote event of both cables breaking. Side and back enclosures are recessed panels of hardwood, with their upper sections fitted with wire grilles. Top is also made of recessed panels. It is finished in light oak, with grille work and hardware painted bronze.

Cables—Two of steel to suspend car and counterweight, having a combined strength of 18,000 lbs. and connected with equalizing fittings that distribute strain equally on each cable.

Counterweight—In sections, for convenience in adjusting total weight to balance loaded car. Weights are strung on a wrought iron bar and run between wood guides to insure quietness.

Guide Runs—Hard white maple, milled for the car guide shoes, and drilled and countersunk for erecting screws.

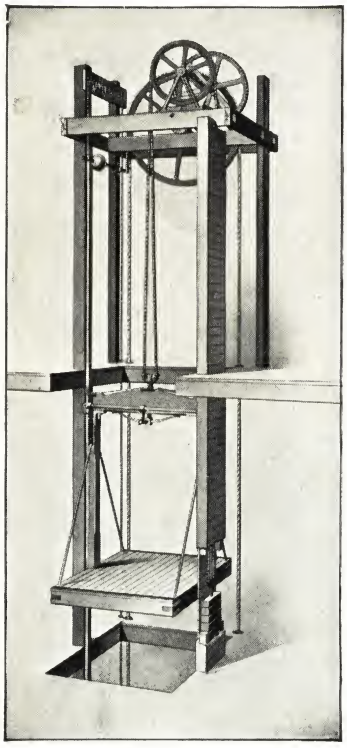
Equipment—Machine for alternating or direct current; hardwood car with safety device; two steel cables and fastenings; counterweights on wrought iron bar; maple guide runs; controller, door contacts, reverse phase relay, limit switches, push buttons.

Hand-Operated Hospital Elevators

For use in sanatoriums, small hospitals and similar institutions where proper electric power is not available, or where infrequent service does not warrant the expense of an electric passenger elevator, we have developed smooth running hand elevators with cars up to 5x8 ft., and safe capacity up to 1000 lbs. They have been found highly economical and serviceable, requiring very little attention in the way of upkeep or repairs, yet always dependable when needed.

ENERGY FREIGHT ELEVATORS

Energy Hand-Operated Elevator, Type 992



Hand Elevator, Type 992

In four standard sizes—500, 1000, 1500 and 2000 lbs., maximum working loads. Geared for operation by one man with the maximum load on the car. To reduce exertion in raising loads, and to balance descending loads safely, each is counterweighted enough to neutralize part of the average load. The empty car rises without exertion, and a capacity load descends by gravity. Controlled by brake line beside the operating rope.

Specifications

Machine — Shafts are steel with turned journals. Cable wheel is machine scored. Gearing is made from machine-cut patterns and keyed to shafts. Reversible yokes, with bearings cut integrally, keep gears in perfect alignment and are equipped with heavy steel rollers, unit assembled. Pull wheel is of largest diameter consistent with capacity and car size. Brake band is of leather lined steel, making equalized contact on two separate flanges at the outer diameter of the pull wheel. The brake is counterbalanced and adjustable to service and wear.

Car—Heavy first grade hardwood tenoned and through-bolted at every joint; reinforced with irons and braced with corner brackets and stay rods. Flooring is hard maple. Guide shoes are of iron easily adjusted. Safety catch is instantaneous and of ample size to lock car with capacity load to guide runs should both cables break.

Counterweight—Sufficient to overbalance empty car, made in sections to provide adjustment to actual load conditions.

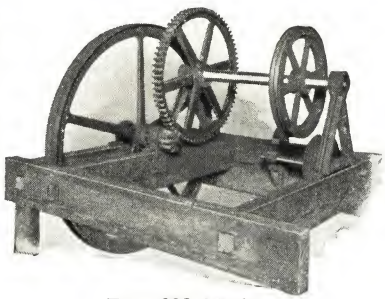
Ropes—Operating rope and brake line first grade hard manila.

Cables—Two of steel to suspend car and counterweight, having a strength of 10 times the load, and connected with equalizing fittings.

Guide Runs—Hard white maple milled for car guide shoes, and drilled and countersunk.

Equipment—Machine, car with safety catch, counterweights on a wrought-iron bar, hand rope, two hoist cables and fastenings, check line, car runs.

Note: Guide posts, machine supports, weight box, and bolts for installing elevator are not included in the shipment, as they can be purchased locally with a considerable saving of freight charges.

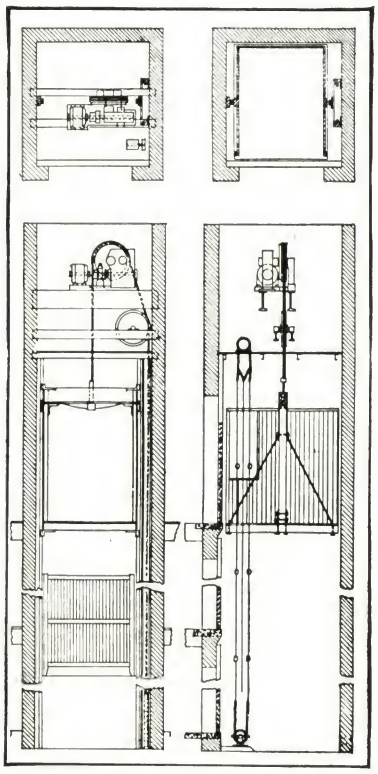


Type 992 Machine

ENERGY HAND ELEVATOR, TYPE 992

Maximum capacity, lbs.	Car size outside, ft.		Shaft size		Shipping weight, lbs.
	Width	Depth	Width ft. in.	Depth ft. in.	
500	3	3½	3 11	3 8	1100
1000	3½	4	4 5	4 2	1400
1500	4	4½	4 11	4 8	1700
2000	4½	5	5 6	5 2	2100

Energy Electric Traction Elevator, Type 892



Plan and Elevation of Electric Traction Elevator, Type 892

Capacity 2000 lbs.

A dependable elevator for general, frequent use in factories, stores, warehouses, etc. Controlled by reversing switch operated by hand cable inside hatchway in easy reach from car or at any floor. Can also be operated by push buttons in the car or at each landing.

Specifications

Machine — Assembled in one unit. Traction sheave is of one piece with its gear, which is cut internally. Pinion is of steel, of one piece with the worm gear shaft. Worm gear is formed solidly of phosphor bronze. Worm is of special carbon steel, of one piece with its shaft, submerged in oil, with bronze radial bearings and ball thrust bearings. Electric brake on drive shaft automatically applies when power is shut off; it has a gravity grip and natural adjustment of wear. Motor has closed frame, high starting torque with low starting current, and rotor practically indestructible. Idler wheel has machine-finished grooves.

Car—Frame is of hardwood, mortised and tenoned at all joints, and through-bolted in all joints and shoulders; reinforced with iron at vital joints and braced with castings at corners. Flooring is of hard maple. Enclosures are of yellow pine wainscoting and wire grille top. Guide shoes are iron and adjustable. Safety catch has positive instantaneous grip and keyed fittings.

Counterweight—Heavier than car by one-third of the capacity; it is of cast iron sections, through-bolted and guided.

Cables—Three of steel, for traction duty with a safety factor of 12 and with equalizing connections to distribute the strain.

Guide Runs—Hard white maple for car and counterweight, drilled and countersunk for setting screws.

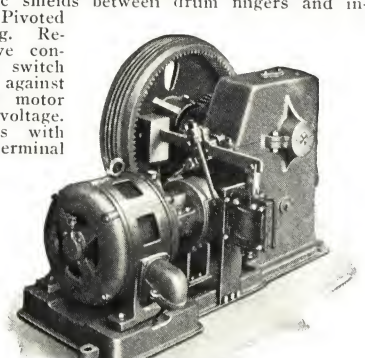
Controller—Cutler-Hammer drum reverse switch mounted in dust-proof safety enclosure with arc shields between drum fingers and insulated all-steel finger boards. Pivoted contact fingers prevent stubbing. Reverse phase relay with positive contacts and main line magnetic switch to give absolute protection against phase reversal and to protect motor against phase failure and low voltage. Hand rigging of iron cables with locks and with stop balls at terminal landings.

Limit Switches—Double pole with rugged contacts, dust-proof enclosure and rubber tired wheels.

Bumpers—Steel coil springs.

Signal Bell—With button for each floor.

Equipment — Machine with motor for alternating current, 2-3 phase, 220 volts, 60 cycles; hardwood car with safety device; three steel hoist cables and connections; maple guide runs; counterweight on wrought-iron bar; control rigging; reversing switch; limit switches; electric call bell; steel bumpers for pit; car lock.



Type 892 Machine

Other Electric Freight and Automobile Elevators

Write for quotations on Energy belt and chain drive types, capacities from 1000 to 5000 lbs.

ENERGY HAND-OPERATED SIDEWALK ELEVATORS

The basement represents money invested in valuable space. Energy Sidewalk Elevators make this space available for all purposes. They are in use in stores, banks, hotels, schools, apartment buildings, restaurants, factories and hospitals, saving man power and keeping the sidewalk free from litter. They eliminate the necessity for cluttering up the street entrance and make easy the quick dispatch of goods and ashes.

Being primarily built for work, Energy Sidewalk Elevators stand up under hard usage through the years.

Designed for All Kinds of Building Conditions—

In addition to their service usefulness and sturdy construction, Energy Sidewalk Elevators are designed to meet all kinds of building conditions.

Features—

(1) All mechanism and accessories possible mounted on structural frame, requiring a minimum number of shaftway connections. This provides easy erection and assures permanent alignment.

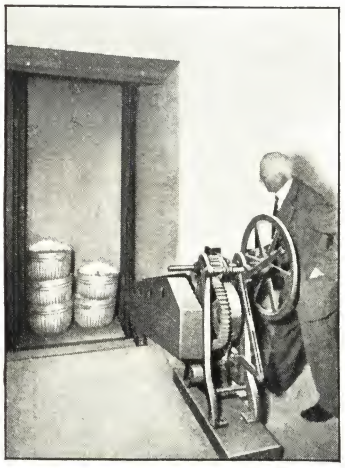
(2) Transmission is positive.

(3) Heavy drive wheel provides momentum and safety for operator.

(4) Self-holding brake sustains loaded car at any point.

(5) Platform of steel frame preserves alignment in exposed conditions.

Specifications



Energy Hand-Operated Sidewalk Elevator, No. 1004

Machine — Compound gearing on steel shafts, set up in yoke bearings or on a heavy iron floor stand, according to whether it is placed in hatch beside car or inside building line. Equipped with a counterbalanced brake. Drive wheel is heavy cast iron and disengages for descents of car by gravity. Main shaft is of heavy steel with two iron drums. Shaft bearings are solid and removable.

Car—Structural steel frame braced diagonally, with heavy plank floor and a renewable top floor of hard maple with scuffing irons at edges. Cable members are slung from underside of car bottom.

Guides—Heavy structural steel angle at each side supporting machine when mounted beside car and overhead wheels.

Overhead Wheels—They turn on steel studs bracketed to the structural guides by heavy steel gusset plates.

Cables—Flexible iron with a combined strength many times in excess of rated capacity and with all necessary connections.

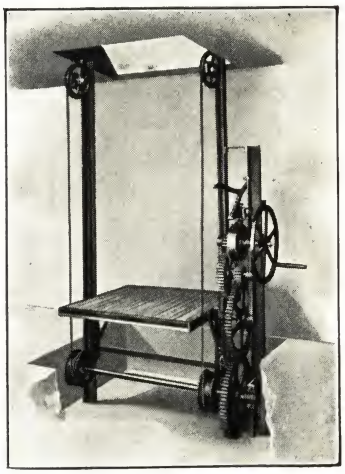
Equipment—Machine with brake, main shaft and hoist drums, two structural steel guides with main bearings and overhead wheels; platform car with fittings, hoist cables and connections.

All Energy Sidewalk Elevators, both hand-operated and electric, can be made to conform to local municipal ordinances.

Sidewalk doors furnished on request.

Types—

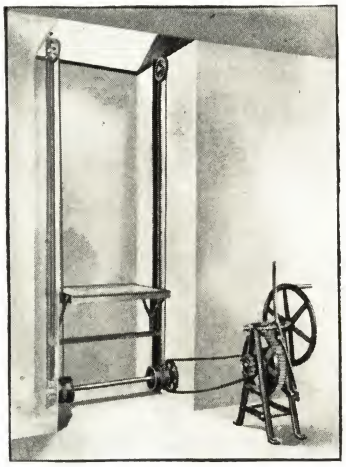
The four types below will meet most general needs. To meet any unusual condition, Energy Engineers will render an adaptation of any of these types, on request.



Sidewalk Elevator, Type 977

Type 977 — Capacity 1000 lbs. This sidewalk elevator shows the ideal installation, with operating mechanism mounted in triple yoke bearings beside car in the hatch, permitting direct connection of gearing. It is recommended wherever hatch space permits. The geared machine enables one operator to raise capacity loads with very reasonable exertion.

Type 1004—Capacity 1000 lbs. For use where operating mechanism cannot be placed alongside of car (see illustration). Outstanding in this type is the train of gears which positively transmits power to hoisting drums, absorbs all shocks and evenly distributes stress of heavy loads.



Sidewalk Elevator, Type 994

Type 1002—Capacity 500 lbs. This is similar in design to Type 977, with machine in hatchway beside car, but is lighter in construction for lighter capacity.

Type 994 — Capacity 500 lbs. This sidewalk elevator is a lighter arrangement of Type 1004. Machine is located outside hatchway and power is transmitted from machine to hoisting drums by sturdy sprocket chain.

ENERGY HAND OPERATED SIDEWALK ELEVATOR DATA

Capacity, lb.	Type	Car size, outside measurements, ft.	Size of door openings required, ft.-in.	Size of pit, ft.-in.	Size of hatch, ft.-in.
1000	977	4 x 4	4-10 x 4-2	5-10 x 4-2	4-10 x 4-2
1000	1004	4 x 4	5- 3 x 4-2	5- 3 x 4-2	5- 3 x 4-2
500	1002	3 x 3	4- 0 x 3-2	4- 6 x 3-2	3- 8 x 3-2
500	994	3 x 3	3- 8 x 3-2	3- 8 x 3-2	3- 8 x 3-2

Energy Electric Sidewalk Elevators

Designed and constructed to give dependable service where the need is frequent or the loads uniformly heavy. Adaptable to all types of building conditions.

Write for detailed specifications and prices.

INCLINATOR COMPANY OF AMERICA

Originators and Manufacturers of Simplified Electric Passenger Lifts for the Home

1408 Vernon Street, HARRISBURG, PA., U. S. A.

INCLIN-ATOR

TRADE-MARK REG. U. S. PAT. OFF.

The INCLIN-ATOR—Description

The *INCLIN-ATOR* is not an elevator, but performs a similar service. The installation provides a simple, safe, and economical method of ascending and descending stairs in private homes, apartment houses, and institutions, where costly elevator installations are not practical.

The *INCLIN-ATOR* can be installed quickly and economically in both new and old buildings, and will not in any way interfere with the customary use of the stairs.

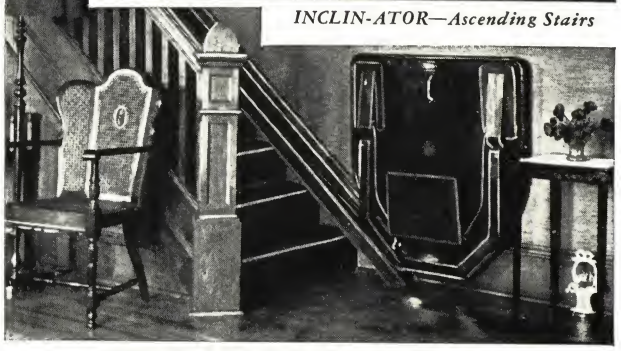
Operation—The *INCLIN-ATOR* is controlled by electric switch buttons on the car and at top and bottom of stairs. The motive power is supplied by a small electric motor driving a worm-gear, winding drum and cable.

The car is carried on a multiroller steel truck, traveling in a special steel channel securely attached to the baseboard on one side of the stairway, and resting on the treads. Both seats and the foot platform fold against the car, therefore when not in use the *INCLIN-ATOR* extends less than 6 ins. from the wall.

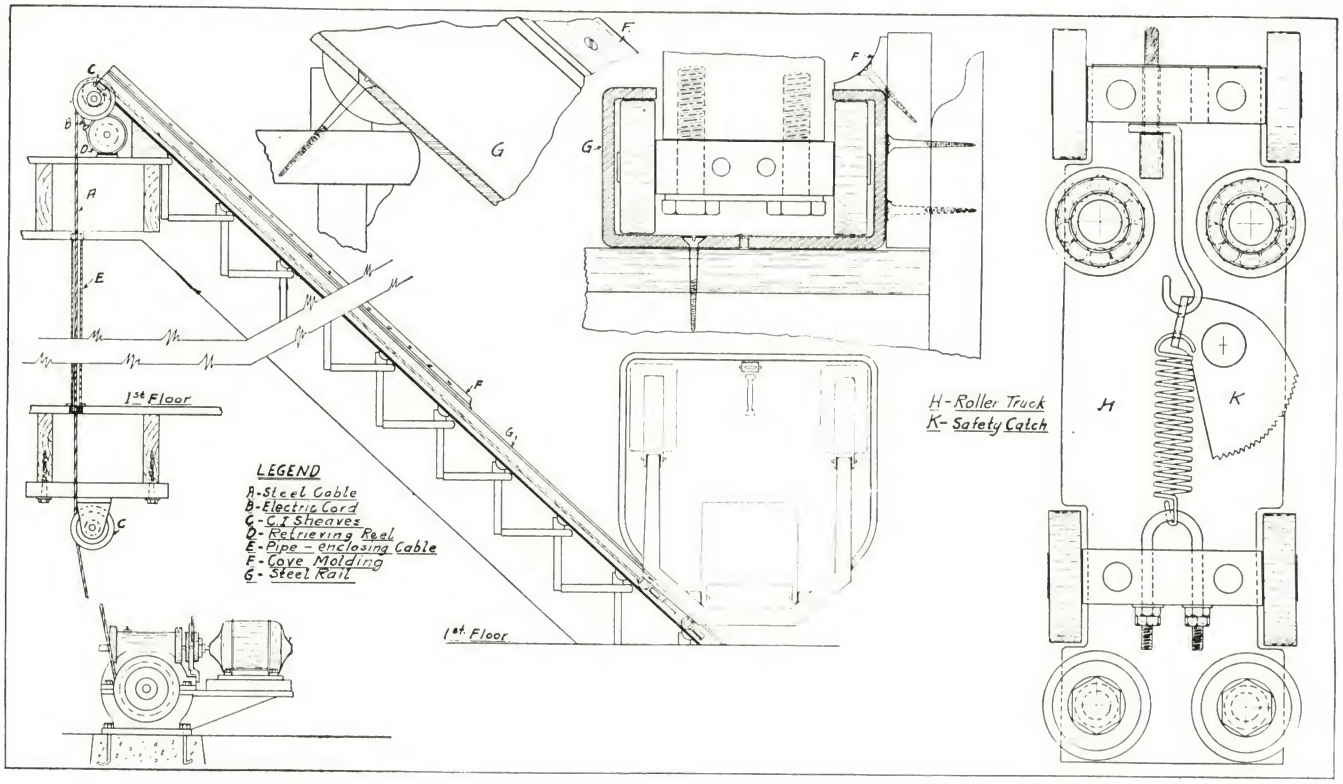
Installation—On new construction provision can readily be made to accommodate the equipment. On existing stairways few, if any, changes will be needed. Installation is simple and does not require cutting or defacing the building.

The operating mechanism may be placed on the ce-

INCLIN-ATOR—Ascending Stairs



INCLIN-ATOR—Folded at Bottom of Stairs



ment floor of the basement, in a closet underneath the stairs, or at the head of stairway (enclosed to resemble a window seat). The cable travels within the truck channel and after leaving the channel may be concealed in partition wall, or in tubing to the winding drum, over suitable sheaves.

Construction—The channel is $\frac{7}{32}$-in. gauge rolled steel. The car is pressed steel. The operating cable is $\frac{1}{4}$-in. diameter, flexible plow steel.

Finish

The *INCLIN-ATOR* can be finished in oak, walnut, mahogany, or other color to harmonize with the wood trimmings of the house. Thus it becomes a desirable and useful piece of furniture.

Specifications—For existing buildings, architects are requested to furnish information as to location of stairs, number of steps, width of tread, height of riser, and other conditions of construction.

"Elevette"

TRADE-MARK REG. U.S. PAT. OFF.

The "Elevette"—Description

A new and unique form of elevator especially adapted to private homes where curving stairs interfere with the installation of the *INCLIN-ATOR*.

Location—The "Elevette" can be located in the stair-well, or elsewhere in the house. Only small space is required for the car, and no overhead construction is used.

Construction—The car frame is of rolled steel angles, with hardwood floor.

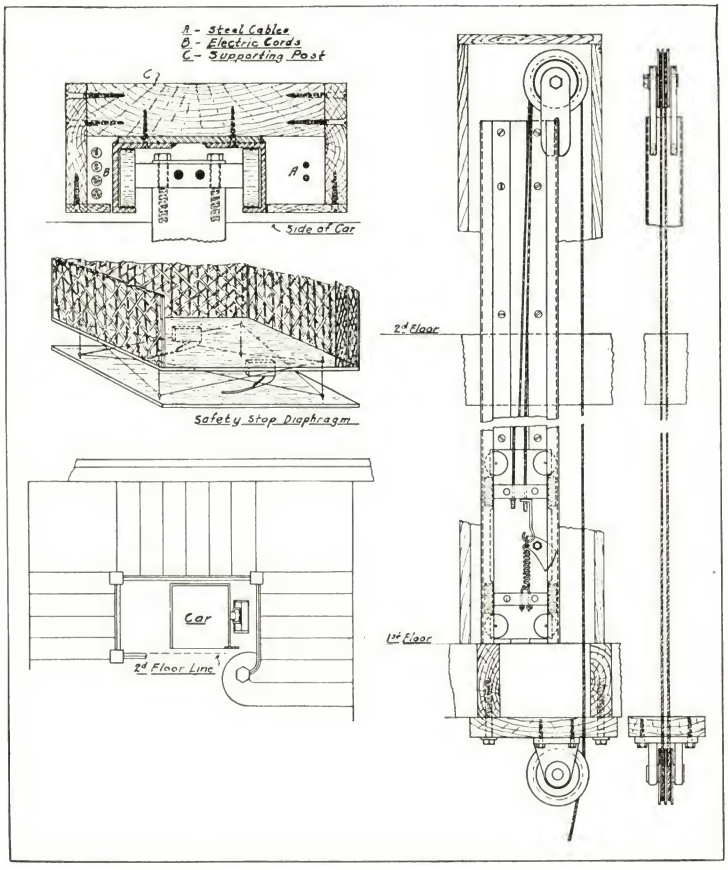
The car is enclosed with metal grille imitating woven cane, and may be finished in a color to harmonize with the surroundings. The size and shape of the car will be determined by the available space, but can be sufficiently large to accommodate a small wheel chair.

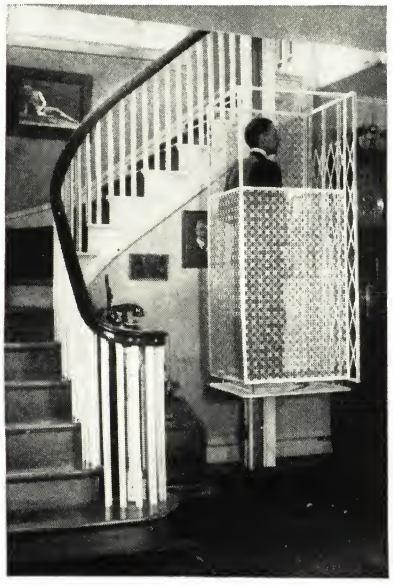
Safety Devices—The "Elevette" is equipped with push button controls, automatic stops, full safety provisions, and electrical and mechanical interlocking.

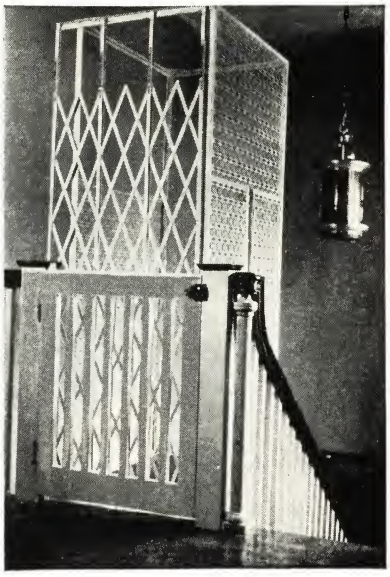
Installation—In new structures space is easily provided. In older buildings the installation usually is a simple operation.

Guaranty

The INCLINATOR COMPANY OF AMERICA guarantees the *INCLIN-ATOR* and the "Elevette" against defects in material and workmanship for a period of one year after installation.







D. A. MATOT

Manufacturers of Hand Power Dumb Waiters and Elevators

TELEPHONE
Lincoln 0002, 0003, 0004

1538-1546 Montana Street, CHICAGO, ILL.

Products

All types of HAND POWER DUMB WAITERS for private houses, apartment houses, hospitals, restaurants, hotels, clubs, etc., made in Automatic Brake, Band Brake and Geared Types; also Brass Tube and High Speed.

UNDER COUNTER DUMB WAITERS.

Also Hand Power Elevators, all types: Hospital, Invalid, Domestic and Freight; Lifts for Library Books, Fuel and Trunks.

Service

In order to assist architects in selecting the dumb waiter and elevator outfits which will be best suited to the requirements of each installation, this company maintains a service or consultation department. By availing themselves of the services of this department the trade may obtain the benefit of our specialized experience of over forty years in this field.

Shipping Facilities

A sufficient stock of regular size dumb waiters and elevators is always carried on hand to guarantee prompt shipment of all orders—regular sizes shipped the same day order is received. Special sizes furnished within two or three days.

Guarantee

All Matot Dumb Waiter and Elevator Machines are guaranteed for five years. They will be repaired free of charge any time within that period if parts are returned to us, charges prepaid.

Installation

Complete instructions for erecting, including blue prints, are furnished with each Matot Dumb Waiter or Elevator Outfit. This enables them to be satisfactorily installed by local labor. Where desired, we will install same. Although we sell machines only, and complete outfits, we strongly recommend that the complete outfit be specified. This will give the best results and insure complete satisfaction.

Dumb Waiter Cars

Matot Dumb Waiter Cars are made of selected, kiln dried, ash lumber, carefully machined and assembled by first class workmen. This deliberate care is responsible for the extra long service given by Matot Dumb Waiter Cars. The cars are varnished two coats, presenting an exceptionally neat appearance.

We carry in stock all regular catalogue sizes of dumb waiter cars, equipped with one hinged or removable shelf. The No. 1 size cars are 2 ft. 6 in. high inside, and the Nos. 2, 3, 4 and 5 sizes are 3 ft. 0 in. high inside. The outside height of dumb waiter cars is 6 in. higher than the inside measurements.

Door openings in hatchway should always be at least 6 in. higher and 2 in. wider than dumb waiter cars, wherever possible, so as to secure a full swing on the hand rope, and also to allow leeway for placing the car in the hatchway. We build to order any special size dumb waiter cars, and also furnish them of galvanized steel construction at a small additional charge.

Matot Types and Their Capacities

(Specification Data, page 7)

Capacity up to 75 Lbs.

Automatic Brake Type—This equipment is full automatic, both up and down. The load is automatically held by the machine itself, without any check or brake lines, and is so arranged when operator releases pull on hand rope the car stops automatically, traveling up or down, loaded or empty.

Band Brake Type—Best adapted for use in high hatchways, such as are found in factories, etc., where a harder service is encountered. This type is more practical for lowering loads, as it does not require the operation of the hand rope. The speed and positive stops are regulated by the brake cord.

Economy Type—A low priced outfit having a spring catch on the hand rope to hold the load. Best adapted where a moderate cost dumb waiter is wanted for light use and will receive reasonable care.

High Speed Type—These are small rapid running outfits best adapted for light loads such as copy work, invoices, letters, messages, etc., as are passed from one department to another.

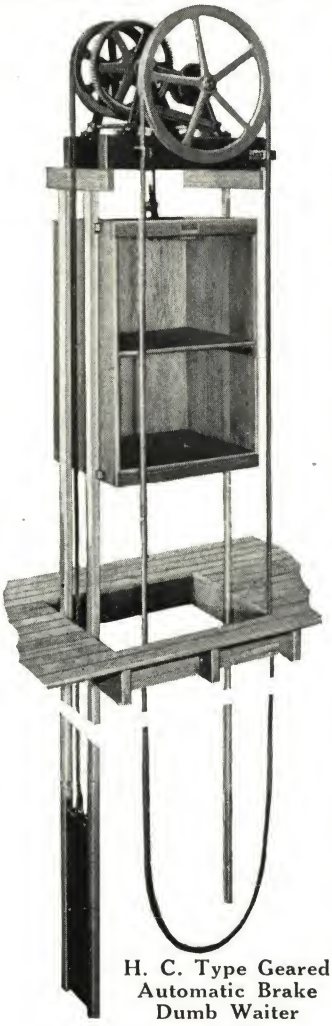
Brass Tube Type—Designed for light service but somewhat heavier in construction than the high speed type, having brass tubes for guides where an enclosure is not wanted.

Undercounter Type—Designed so as to eliminate space for overhead machine and adapted to such places where lack of space does not permit the machinery to be placed overhead.

Fuel Lift Type—A most convenient arrangement for hoisting wood from basement to fireplace upstairs.

Capacities up to 300 Lbs.

Machines arranged with full diameter hoist wheels. These types are designed for use where the service would be too severe for the lighter types as described above. They are made in two types, each having the same qualifications as in the lighter outfits, in addition to which, however, they are more substantially constructed and geared for heavier loads. They are known as follows: Geared Automatic Brake H. C. Type and Geared Band Brake H. C. Type.



H. C. Type Geared Automatic Brake Dumb Waiter

Capacities up to 500 Lbs.

Depending upon size of car, arranged with leading sheave.

Substantially constructed and geared for heavy loads. Made in two types: Geared Automatic Brake L. S. Type and Geared Band Brake L. S. Type.

Capacity from 250 to 500 Lbs.

Arranged with compound gears having 2 cable hoisting sheaves and heavier construction than above geared outfits.

Also made in Two-Speed Two-Capacity Type which is arranged with two sets of gears for different speed and capacity. They are: Compound Geared Automatic Brake Type, Compound Geared Band Brake Type and Two-Speed Two-Capacity Type.

Invalid Lifts, Capacity up to 500 Lbs.

Designed for use of disabled people who cannot walk stairs.

Freight Elevators, Capacity from 500 to 2000 Lbs.

Designed for severe service and easy operation. The smaller sizes are suitable for private residences as trunk lifts, and the larger sizes for all around use in industrial buildings, warehouses, etc. *Also made in Two-Speed Two-Capacity Type.*

Sidewalk Elevators, Capacity up to 2000 Lbs.

Best adapted where operating machine is on the lower floor.

Mostly used for loads traveling from sidewalk to basement.

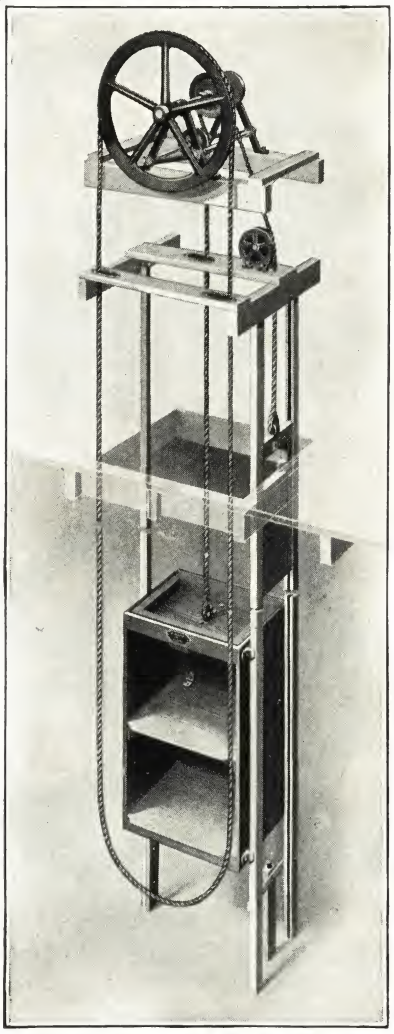
Matot Automatic Brake, Band Brake and Economy Dumb Waiters

Capacities up to 75 lb., depending on size of car.
Special sizes made to order.
Any of the outfits listed in the following table is strong enough to lift a much greater load, but to do so will require more energy.

STOCK SIZES

No.	*Capacity, lb.	Car outside, in.			Space required, in.				Hand wheel dia., in.	Hand rope ratio	Feet pull on hand rope to raise car one foot ft. in.	Machine space, ft. in.	Headroom ft. in.	Approx. shipping weight, lbs.
					Single face		Double face or right angle							
		Wid.	Dep.	Height	Wid.	Dep.	Wid.	Dep.						
With 6-in. Lift Sheave														
1	48	20	16	36	25	19	25	20	16	2.17	2 8	1 10	8 2	250
2	60	24	20	42	29	23	29	24	20	3.33	3 3	2 0	8 6	300
3	75	28	24	42	33	27	33	28	24	3.9	3 11	2 3	8 10	350
With 8-in. Lift Sheave														
1	38	20	16	36	25	19	25	20	16	2.16	2 2	1 10	8 2	250
2	48	24	20	42	29	23	29	24	20	2.68	2 8	2 0	8 6	300
3	56	28	24	42	33	27	33	28	24	3.12	3 1	2 3	8 10	350
4	68	32	28	42	37	31	37	32	30	3.8	3 9	2 6	9 4	450
With 9-in. Lift Sheave														
1	31	20	16	36	25	19	25	20	16	1.74	1 9	1 10	8 2	250
2	38	24	20	42	29	23	29	24	20	2.16	2 2	2 0	8 6	300
3	45	28	24	42	33	27	33	28	24	2.51	2 6	2 3	8 10	350
4	55	32	28	42	37	31	37	32	30	3.06	3 0	2 6	9 4	450

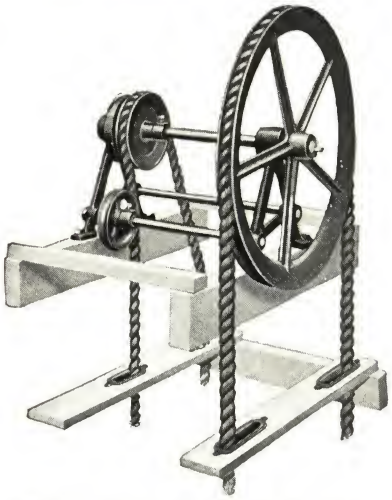
*Based on normal pull of 18 lb. on hand rope.



Matot Automatic Brake Dumb Waiter Erected
Enclosure removed to show mechanism

Automatic Brake Type

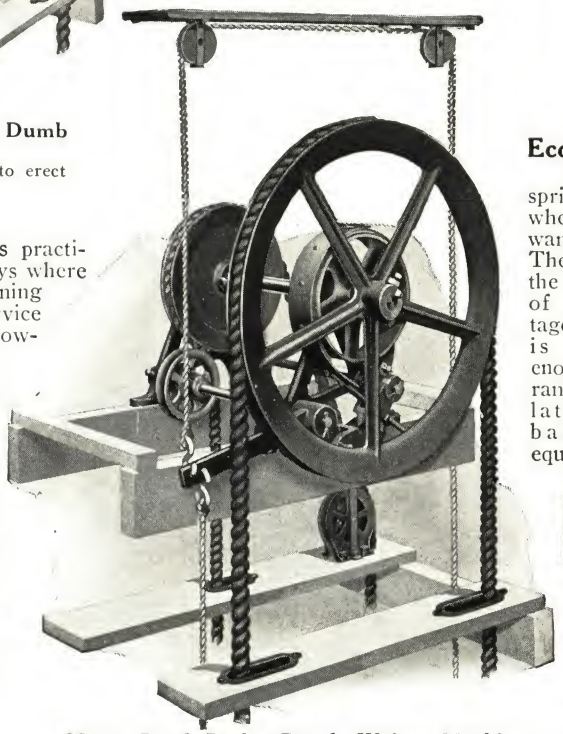
Full automatic, both up and down. The load is automatically held by the machine itself, without any check or brake lines, and is so arranged that when operator releases the pull on hand rope the car stops automatically, whether traveling up or down, loaded or empty. The brake does not lock fast, but is applied and regulated by the load, holding the car securely at any point. The heavier the load, the more positive the brake. Roller bearings are used throughout to assure a smooth, easy running, long life equipment. An automatic brake mechanism, having no adjustments of any kind; guaranteed for five years and will last a lifetime.



Matot Automatic Brake Dumb Waiter Machine
Mounted on platform ready to erect

Band Brake Type

This type equipment is practical for use in high hatchways where a strong, reliable, rapid running dumb waiter for hard service is required. The speed in lowering, or the positive stops, is regulated by a partial application or a final pull on the brake cord. The brake band is lined with vulcanized fiber to withstand hard usage. This equipment is practical for lowering loads as it does not require the operation of the hand rope, the speed being regulated by the brake cord. The machine is carefully assembled, and is fitted throughout with roller bearings.

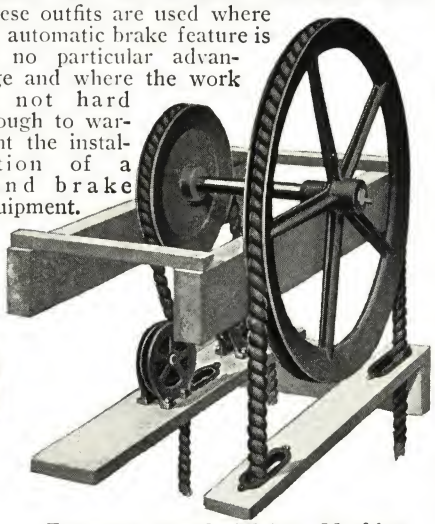


Matot Band Brake Dumb Waiter Machine
Mounted on platform ready to erect

(Specification Data, page 7)

Economy Type

An inexpensive dumb waiter having a spring check on the hand rope. Adaptable where a moderate cost dumb waiter is wanted and will receive reasonable care. These outfits are used where the automatic brake feature is of no particular advantage and where the work is not hard enough to warrant the installation of a band brake equipment.



Economy Dumb Waiter Machine
Mounted on platform ready to erect

Matot Geared Automatic Brake and Geared Band Brake Dumb Waiters

Full Diameter Lift Wheel, Hobbed Cut Gears H. C. Type

Geared Automatic Brake H. C. Type

Geared Band Brake H. C. Type

Capacities up to 250 lb. geared according to capacity to give greatest speed, plus ease of operation. Any outfit listed in the following table is strong enough to lift a much greater load, but to do so will require more energy. Special sizes made to order. Fitted with roller bearings throughout.

Geared Automatic Brake H. C. Type

This is a practical equipment combining an Automatic Brake feature with large lifting capacity. Smooth in action; positive in brake; requires no adjustments of any kind. The Automatic Brake does not lock fast, but is applied and regulated by the load, holding the car securely at any point. The heavier the load, the more positive the brake, designed to release when operating hand rope. Full automatic both up and down, loaded or empty.

Geared Band Brake Type

Practical for use in high hatchways where a strong, reliable, rapid running dumb waiter for hard service is required. The speed in lowering, or the positive stops, is regulated by a partial application or a final pull on the brake cord. Most practical for lowering loads, as it does not require the operation of the hand rope, the speed being regulated by the brake cord.

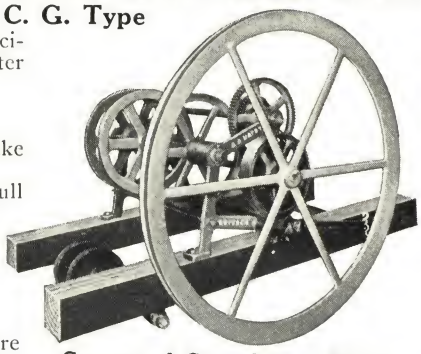
Capacity	No.	Car outside, in.			Space required, in. Single face		Space required, in. Double face or right angle		Hand wheel dia., in.	Hand rope ratio	Gear ratio	Feet pull on hand rope to raise car 1 ft. ft.	Feet pull on hand rope to raise car 1 ft. in.	* Pull, lb.	Machine space, ft.	Machine space, in.	Headroom, ft.	Headroom, in.	Approx. shipping wt., lbs.
		Wid.	Dep.	Ht.	Wid.	Dep.	Wid.	Dep.											
100 lb.	1	20	16	36	25	19	25	20	16	5.46	3.19	5	5	19	1	10	8	2	350
	2	24	20	42	29	23	29	24	20	5.70	2.83	5	5	19	2	0	8	6	400
	3	28	24	42	33	27	33	28	24	5.67	3.42	5	6	18	2	3	8	10	450
	4	32	28	42	37	31	37	32	30	5.33	2.64	5	4	19	2	9	9	4	500
	5	36	36	42	41	39	41	40	30	5.55	3.13	5	6	19	2	9	9	4	650
150 lb.	1	20	16	36	25	19	25	20	16	6.22	3.63	6	2	25	1	10	8	2	350
	2	24	20	42	29	23	29	24	20	6.40	3.19	6	4	25	2	0	8	6	400
	3	28	24	42	33	27	33	28	24	6.24	3.76	6	3	25	2	3	8	10	450
	4	32	28	42	37	31	37	32	30	6.32	3.13	6	3	24	2	9	9	4	500
	5	36	36	42	41	39	41	40	30	6.07	3.42	6	0	25	2	9	9	4	650
200 lb.	1	20	16	36	25	19	25	20	16	7.14	4.17	7	2	28	1	10	8	2	350
	2	24	20	42	29	23	29	24	20	7.40	3.88	7	4	28	2	0	8	6	400
	3	28	24	42	33	27	33	28	24	7.68	4.63	7	7	26	2	3	8	10	450
	4	32	28	42	37	31	37	32	30	7.60	2.76	7	6	27	2	9	9	4	500
	5	36	36	42	41	39	41	40	30	7.38	4.16	7	4	28	2	9	9	4	650
250 lb.	1	20	16	36	25	19	25	20	16	7.7	4.5	7	8	33	1	10	8	2	350
	2	24	20	42	29	23	29	24	20	8.0	4.5	8	0	32	2	0	8	6	400
	†3	28	24	42	33	27	33	28	24	8.62	5.2	8	7	30	2	3	8	10	450
	‡4	32	28	42	37	31	37	32	30	8.4	4.16	8	4	30	2	9	9	4	500
	§5	36	36	42	41	39	41	40	30	8.2	4.63	8	2	31	2	9	9	4	650

*Pounds pull on hand rope to lift capacity. ‡4 Capacity can be had up to 400 lb.
†3 Capacity can be had up to 350 lb. §5 Capacity can be had up to 400 lb.

Compound Geared Automatic Brake and Compound Geared Band Brake Dumb Waiter

Full Diameter Lift Wheel, Hobbed Cut Gears C. G. Type

Can be had in any capacity between 250 and 500 lb. Prices the same on all capacities. Any outfit listed in the following table is strong enough to lift a much greater load, but to do so will require more energy.



Compound Geared Band Brake C. G. Type

Compound Geared Automatic Brake Type

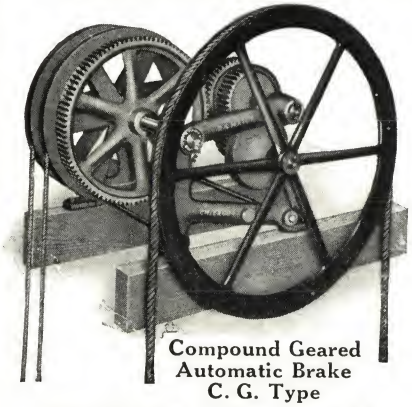
A most practical equipment for heavy loads combining the Automatic Brake feature with a large lifting capacity easy to operate.

Full automatic, both up and down, loaded or empty; when operator releases pull on hand rope the car stops automatically. Requires no adjustments. The automatic brake does not lock fast, but is applied and regulated by the load, holding car securely at any point. The heavier the load the more positive the brake. Roller bearings are used throughout.

Compound Geared Band Brake Type

A most practical equipment for heavy loads combining the Band Brake feature with a large lifting capacity easy to operate.

This type equipment is practical for use in high hatchways where a strong, reliable, rapid running dumb waiter for hard service is required. The speed in lowering or the positive stops are regulated by a partial application or a final pull on the brake cord. This equipment is practical for lowering loads as it does not require the operation of the hand rope, the speed being regulated by the brake cord.



Compound Geared Automatic Brake C. G. Type

(Specification Data, page 7)

No.	Car outside, in.			Space required, in. Single face		Space required, in. Double face or right angle		Hand wheel dia., in.	Hand rope ratio	Gear ratio	Feet pull on hand rope to raise car 1 ft. ft.	Feet pull on hand rope to raise car 1 ft. in.	* Pull, lb.	Machine space, ft.	Machine space, in.	Headroom, ft.	Headroom, in.	Approx. shipping wt., lbs.
	Wid.	Dep.	Ht.	Wid.	Dep.	Wid.	Dep.											
1	20	16	36	25	19	25	20	16	14.11	8.25	14	1	35	1	10	8	2	400
2	24	20	42	29	23	29	24	20	13.98	7.2	14	0	36	2	0	8	6	475
3	28	24	42	33	27	33	28	24	14.91	8.99	14	9	34	2	3	8	10	550
4	32	28	42	37	31	37	32	30	14.17	7.98	14	0	36	2	9	9	4	675
5	36	36	42	41	39	41	40	36	14.94	7.15	15	0	33	3	0	9	7	850

*Pounds pull required on hand rope to raise 500 lb.

Matot Two-speed Two-capacity Hand Power Dumb Waiters

Compound Geared Automatic Brake and Geared Band Brake Types

General—Made in any combination of light and heavy loads from 50 to 500 lb.

Constructed in two types—geared automatic brake, and geared band brake.

A great time and labor saver where both light and heavy loads are handled, and overcomes difficulties due to a slow traveling car that has machine geared for heavy loads, when in most cases light loads are used.

When a heavy load is handled on slow gear, the empty car can be brought back to loading point on the high gear, saving time.

A simple easy pull on the shifting rope changes capacity and speed, and it is so arranged that load cannot drop while shifting.

Two-speed Two-capacity Compound Geared Automatic Brake Type

Full automatic, both up and down, loaded or empty, and so arranged that when operator releases pull on hand rope the car stops automatically. This feature is guaranteed for five years against defects, and requires no adjustments of any kind. The automatic brake does not lock fast, but is applied and regulated by the load, holding the car securely at any point. The heavier the load, the more positive the brake. Hobbed cut gears assure smooth and noiseless operation.

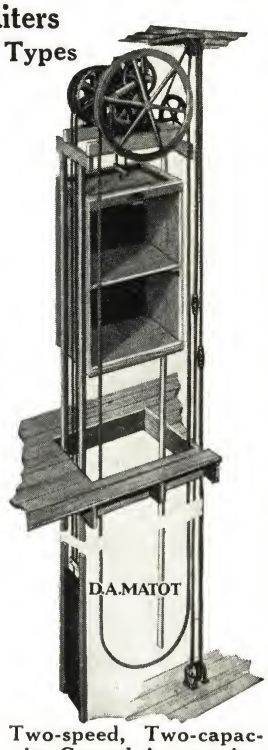
Two-speed Two-capacity Compound Geared Band Brake Type

This type equipment is most practical for use in high hatchways. The brake band is lined with vulcanized fibre to withstand hard usage. The speed in lowering, or the positive stops, is regulated by a partial application or a final pull on the brake cord. Most practical for lowering loads, as it does not require the operation of the hand rope, the speed being regulated by the brake cord. Roller bearings are used throughout.

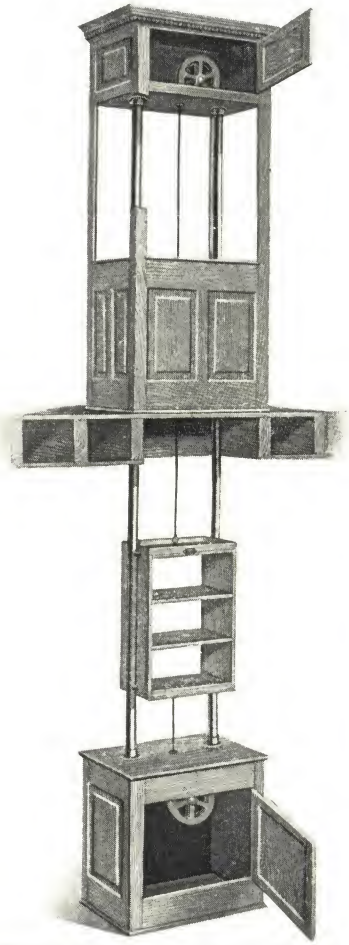
STOCK SIZES

No.	Car outside, in.			Space required, in.				Hand wheel dia., in.	Machine space ft. in.	Head room ft. in.	Approx. shipping weight, lbs.
				Single face		Double face or right angle					
	Width	Depth	Height	Width	Depth	Width	Depth				
3	28	24	42	34	27	34	28	24	2 6	9 0	735
4	32	28	42	38	31	38	32	30	2 9	9 4	785
5	36	36	42	42	39	42	40	36	3 0	9 7	835

Special sizes made to order.



Two-speed, Two-capacity Geared Automatic Brake Type



Matot Brass Tube Dumb Waiter

Matot High Speed and Brass Tube Dumb Waiters

Matot High Speed Dumb Waiters

A small, quick acting, rapid running outfit with wire guides. Adapted for light loads, such as copy work, messages and small articles usually passed from one department to another.

Regularly furnished with cars 1 ft. 6 in. high outside.

Special sizes made to order.

STOCK SIZES

No.	Car outside, in.		Space required, in.	
	Width	Depth	Width	Depth
1	10	6	18	8½
2	12	8	20	10½
3	14	10	22	12½

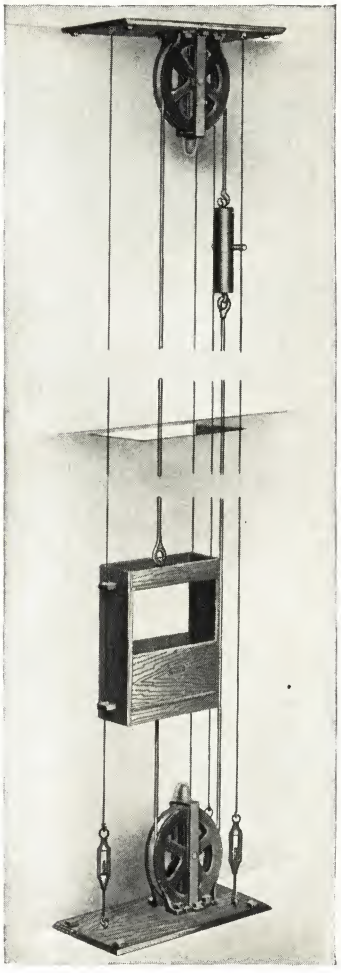
Matot Brass Tube Dumb Waiters

Designed for use where equipment is to be placed in the open, having no enclosure, as in a store or office, and where an exceptionally neat appearing outfit is desired.

These outfits are also made in the regular Matot Automatic Brake, Band Brake and Economy Dumb Waiter styles, with regular stock size cars, but in place of wood guides, as regularly used, brass tubes are substituted. Can also be made in the geared types.

Cars are furnished in wood, highly polished, and can be trimmed with brass fittings. Brass or steel cars furnished as desired.

(Specification Data, page 7)

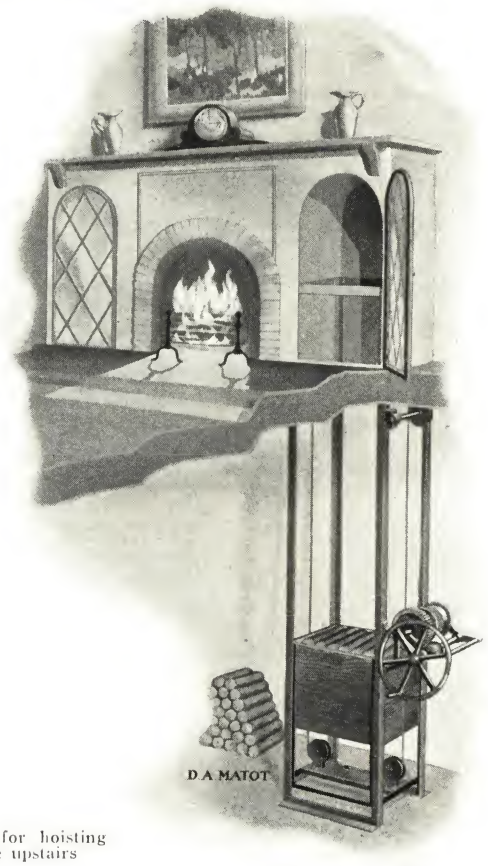


High Speed Type

Matot Under Counter Dumb Waiters

These under counter dumb waiters are designed to fit where lack of space precludes the placing of overhead machinery, which condition is sometimes encountered where space does not allow the highest part of equipment or dumb waiter car to come higher than 3 ft. 0 in. over the top floor, or in some cases counter height.

The automatic brake type is 25 lb. capacity and the automatic brake geared type is 50 lb. capacity and up. Type No. 6 is used where overhead space is limited or car is open on top, and can also be furnished with machine overhead. Special sizes made to order.



Right:

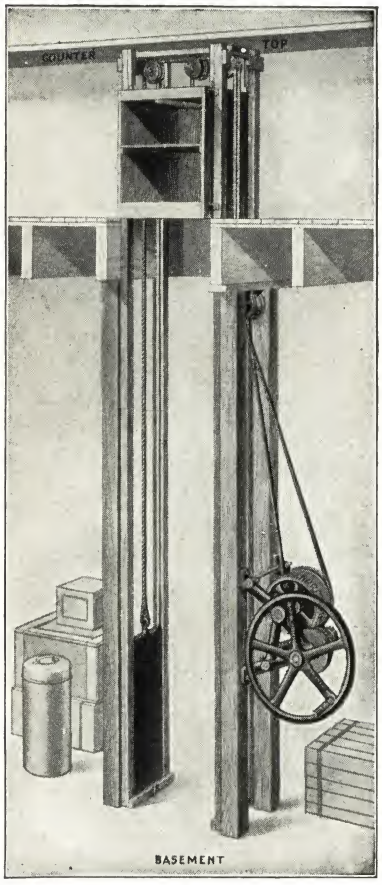
Fuel Lift

A most convenient arrangement for hoisting wood from basement to fireplace upstairs

STOCK SIZES

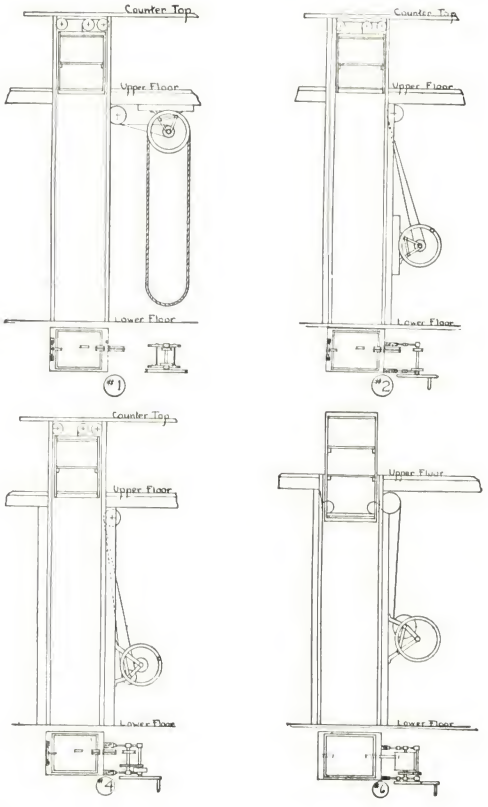
No.	Car outside, in.			*Wheel dia., in.	†Ratio	Space required, in.		Space between posts, in.	Overhead sheave space, in.	Car headroom, in.	Approx. shipping weight, lbs.
	Width	Depth	Height			Width	Depth				
Automatic Brake, 25-lb. Capacity, Types Nos. 1 and 2											
1	20	16	27	22	2.68	32	18	24	6	35	250
2	24	20	27	22	2.68	36	22	28	6	35	300
3	28	24	27	22	2.68	40	26	32	6	35	350
Geared Automatic Brake, 50-lb. Capacity, Types Nos. 3, 4 and 6											
1	20	16	27	22	4.17	32	18	24	6	35	350
2	24	20	27	22	4.17	36	22	28	6	35	400
3	28	24	27	22	4.17	40	26	32	6	35	450

*Crank wheel or hand wheel diameter.
†Crank wheel or hand wheel rope ratio.

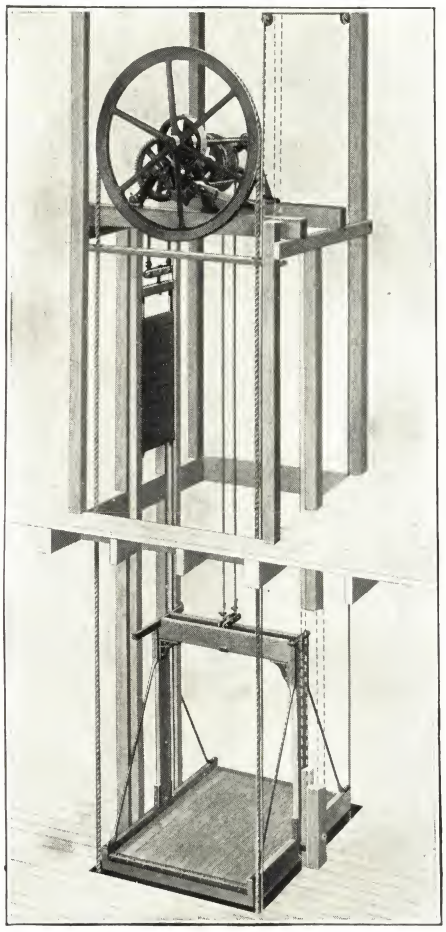


Matot Under Counter Dumb Waiter

Types of Layouts of Undercounter Dumb Waiters



(Specification Data, page 7)



Matot Hand Power Elevators

Capacities up to 2000 lb. geared according to capacity to give greatest speed plus ease of operation.

Matot elevators are also made in the Two-Speed Two-Capacity Type in any combination of light and heavy loads.

The smaller sizes are suitable for private residences as trunk lifts, larger sizes for all around use in industrial buildings, warehouses, etc.

Stock cars are regularly 6 ft. 3 in. high under beam. Can be made any special size required.

Cars are made of hardwood well braced with iron and will withstand hard usage. Can be equipped with safety catches.

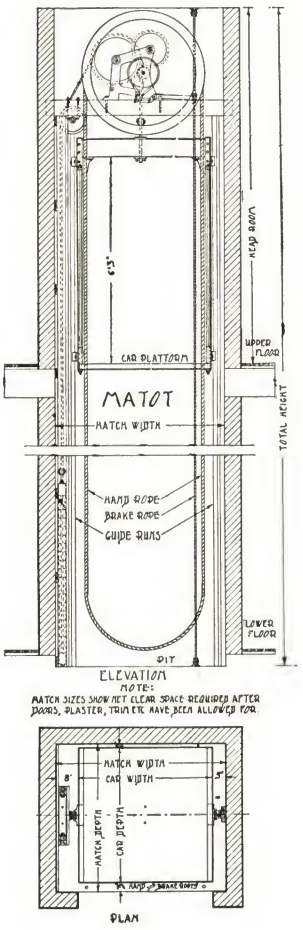
Machinery is fitted throughout with roller bearings, and as the gears are hobbed cut, they have teeth uniform in size and operate most quietly. The brake band is lined with vulcanized fibre and the speed in lowering, also the positive stop, is regulated by a partial application or a final pull on the brake cord. Machine is guaranteed for five years and will last a lifetime.

Blue prints on any elevator outfit submitted on request.

STOCK SIZES

No.	Car outside Width ft.	in.	Depth ft.	in.	Space required Width ft.	in.	Depth ft.	in.	Hand wheel dia., in.	Mach. space ft.	in.	Head room ft.	in.
1	3	0	3	0	3	8¾	3	5	36	3	9	10	9
2	3	0	4	0	3	8¾	4	5	36	3	9	10	9
3	4	0	4	0	4	8¾	4	5	42	4	7	11	7
4	4	0	4	6	4	8¾	4	11	42	4	7	11	7
5	4	0	5	0	4	8¾	5	5	42	4	7	11	7
6	5	0	6	0	5	8¾	6	5	48	5	1	12	1

If outfits are installed in brick or tile hatchways the space required is 2⅜ in. more in width.



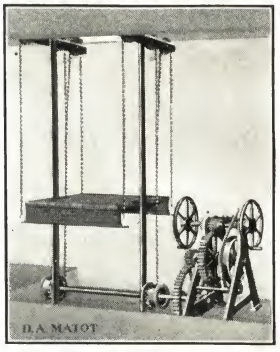
Matot Sidewalk Elevators

Mostly used for loads traveling from sidewalk to basement.

All types are substantially constructed and easy running, and are equipped with Matot Vulcanized Fibre Self-locking Band Brake.

When lowering loads, the crank shaft is thrown out of gear so it does not revolve, and a slight pressure on the brake lever controls the speed. For a positive stop at any point desired, a full application of the lever locks the brake and holds the car.

Made in capacities from 500 to 2000 lb.



STANDARD SIZES

No.	Capacity lbs.	Car size ft. in.	ft. in.	Shipping weight, lbs.
1	500	3 0 x	3 0	900
2	1000	3 6 x	3 6	1100
3	1500	4 0 x	4 0	1400
4	2000	5 0 x	5 0	1600
5	2500	5 0 x	5 0	1600

Special sizes made to order. Gearing can be brought forward if required.

Detail blue prints showing different layouts sent on request.

Matot Invalid Elevators

This equipment is designed to convey invalids from one floor to another and is exceptionally easy to operate, in fact a child can handle same, due to our system of compounding the gears.

The automatic brake feature is so arranged when operator releases pull on hand rope, the car automatically stops itself, loaded or empty, traveling up or down.

Besides the automatic brake feature mentioned above, additional safety devices are incorporated in the manufacture of this equipment to provide a most practical outfit for the purpose intended.

(Specification Data, Page 7.)

STANDARD SIZES

No.	Car outside Wid. ft.	in.	Dep. ft.	in.	Hgt. ft.	in.	Space required Wid. ft.	in.	Dep. ft.	in.	Approx. shipping weight, lbs.
1	3	0	3	0	7	0	3	6	3	3	1000
2	3	6	3	6	7	0	4	0	3	9	1050
3	4	0	4	0	7	0	4	6	4	3	1100
4	4	6	4	6	7	0	5	0	4	9	1150
5	5	0	5	0	7	0	5	6	5	3	1200

Detail blue prints gladly submitted.

Specification Data

The preceding pages cover the regular types and sizes of Matot Dumb Waiters and Elevators. Complete information, including drawings and estimates on these or other regular or special sizes, will gladly be sent on request.

The many designs that have been developed during more than forty years of dumb waiter experience cover a vast number of special installations.

To Specify

(1) State type of hatchway, whether A, B, C, D or E (as illustrated below).

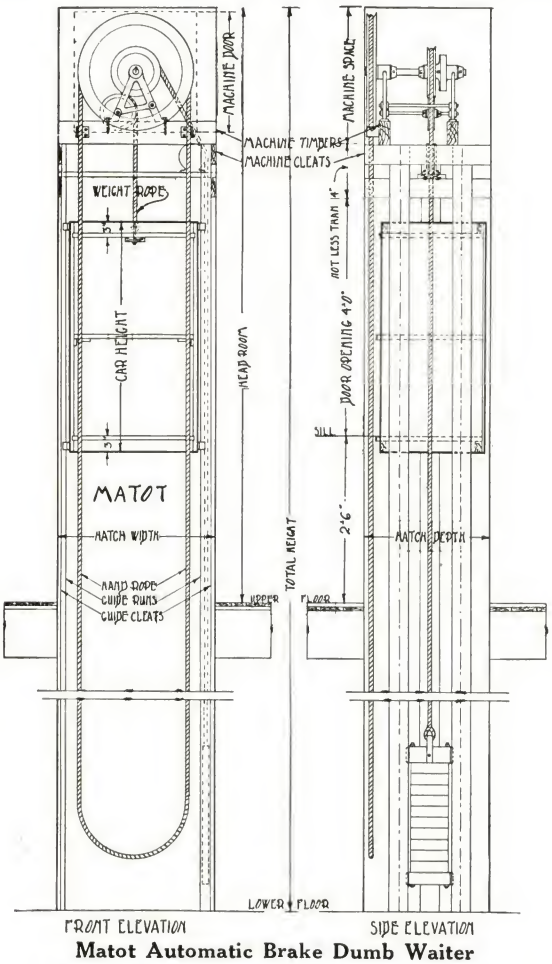
(2) Type of equipment, or whether for use in residence, hospital, factory, etc.; weight to be handled; also whether weight travels mostly up or down, or both ways.

(3) Size of car, and whether inside or outside dimensions; or give us the inside measurements of hatchway in the clear, and the width, depth and height. In stating the height give us the measurements from lower floor to ceiling of upper floor or highest point of hatchway in the clear.

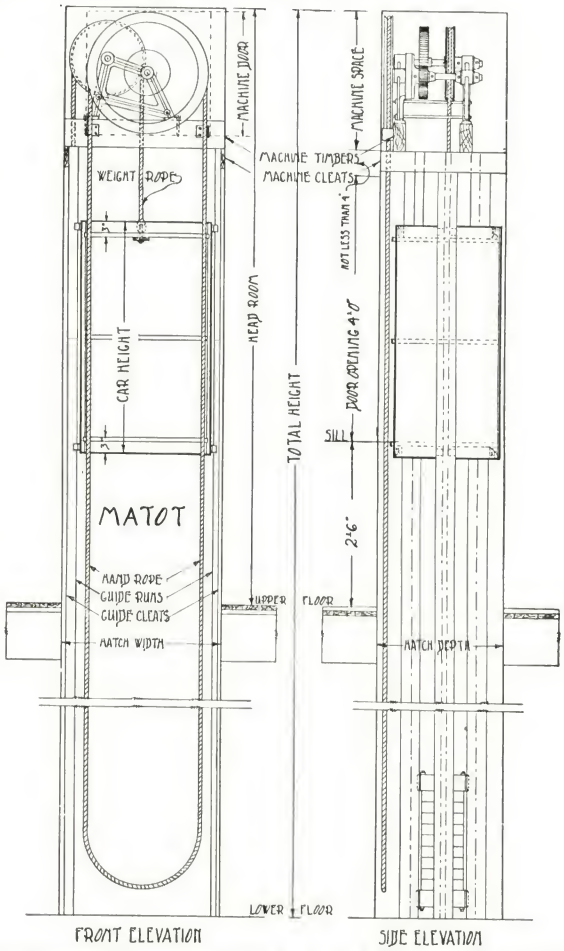
(4) How many shelves in car?

Complete Outfit—Includes the machine mounted on platform, car, guides, counterweight, ropes, rope guides and bumpers.

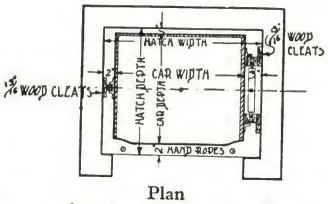
Machine Only—Includes the machine, leading sheaves for types requiring same, and hand wheel.



Matot Automatic Brake Dumb Waiter

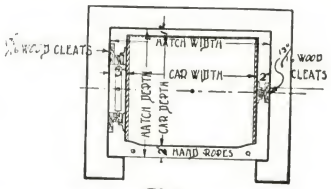


Matot Geared Automatic Brake Dumb Waiter, H. C. Type



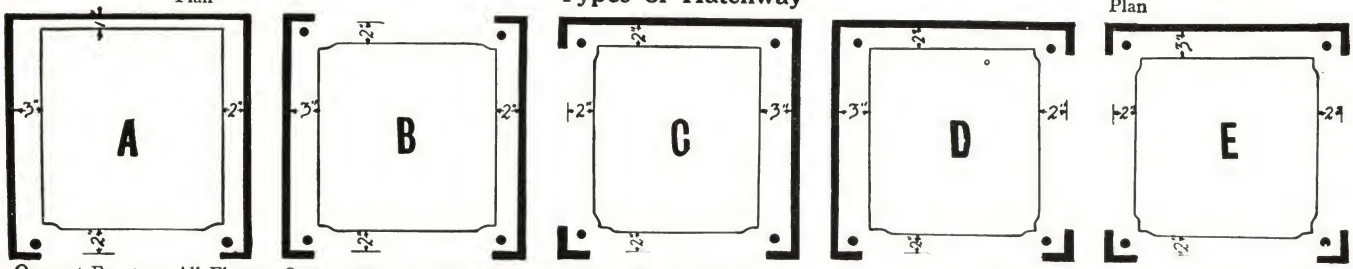
Plan

Note: Hatch sizes show net clear space required after doors, trim, plaster, etc. have been allowed for. Machine door sizes to be 3" wider and 3" higher than hand wheel.. For dimensions not shown see tables.



Plan

Types of Hatchway



A Open at Front on All Floors. Single Face Type

B Open at Front and Back, Requiring Double Face Outfit to Operate from Both Fronts

C Open Front and Left

D Open Front and Right

E Open Front, Right and Left

ESTABLISHED 1856 INCORPORATED 1912

MURTAUGH ELEVATOR COMPANY

TELEPHONE
STillwell 4-4960

45-11 Davis Street, LONG ISLAND CITY, N. Y.

Products

HAND POWER DUMB WAITERS
ELECTRIC DUMB WAITERS
HAND POWER ELEVATORS
HAND POWER SIDEWALK ELEVATORS
ELECTRIC SIDEWALK ELEVATORS
BRASS TUBE DUMB WAITERS
INVALID LIFTS
UNDER COUNTER DUMBWAITERS

MURTAUGH ELEVATORS AND DUMB WAITERS

The Murtaugh organization was established more than seventy-five years ago by James Murtaugh, and has continuously since then been building quality dumb waiters to withstand hard, continuous service. Some of the original installations are still in use.

All our machines are carefully made and are designed for hard, long usage. We have avoided some so called refinements which we consider in reality selling points but do not in any way add to efficiency, economy or service. Our machines are tools built to give satisfaction.

Stock Machines

We are prepared to make immediate shipment of stock machines and cars the sizes and capacities of which are listed below. Our complete and up-to-date shop facilities make it an easy matter for us to build machines and equipment to meet special requirements or to comply with architects' specifications.

Information Needed for Shipment

In ordering dumb waiter equipment be sure and specify load capacity, width, depth, height of shaft, and location of door openings.

Directions for Installation

We furnish with all orders for equipment such complete directions and plans that any mechanic can make the installation.

MURTAUGH CHAIN HUNG AUTOMATIC BRAKE DUMB WAITER

This machine is designed for long life and hard continuous service. As shown, car is hung on a welded steel chain which operates over a pocketed type of sheave wheel, the movement of the chain is therefore under the positive control of the machine and is not dependent on a friction hold. The small extra cost on an original installation is more than compensated by no maintenance bills and there is no dropping of car and contents due to wearing out, as the chain will last without renewal for 25 years under constant usage.

The chain hung dumb waiter is especially recommended for restaurants, lunch rooms, hotels, schools, hospitals, chain stores and other similar places where hard continuous service is demanded of the dumb waiter.

Sizes—This machine is made in capacities of from 50 to 500 lbs. Stock machines carried in stock for immediate shipment are as follows:

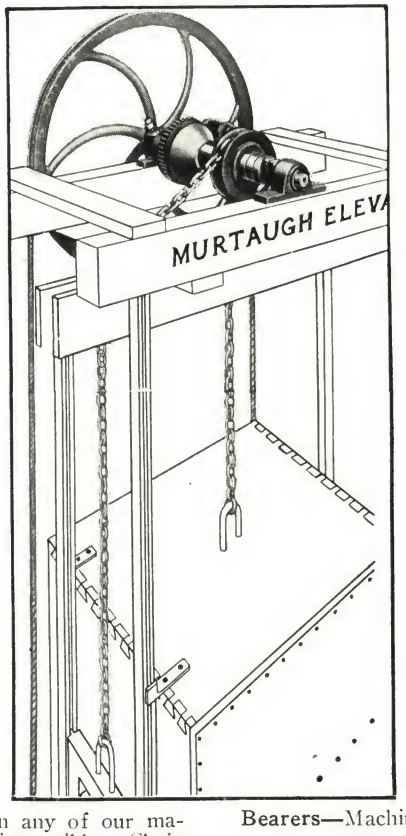
Machine No.	Capacity, lbs.	Machine No.	Capacity, lbs.
A	50	C	250
B	100	D	500

Machines having a capacity up to and including 100 lbs. are of the ball bearing type, larger machines are equipped with roller bearings. Machines over 150 lbs. capacity are provided with machine cut spur and pinion gearing.

Chain—We use a 9/32-in. bright finish tested chain. Every link has been pulled by the machine which makes it to a strain 500% greater than it is called upon to withstand in any of our machines. Breaking of a chain is practically impossible. Chain connection between car and counterweight was one of the greatest steps towards economy that has ever been made in hand power dumb waiters, as the chain seldom has to be renewed.

All pulleys and sheaves of our machine are locked to cold rolled steel shafting by means of channeled keyways and steel keys, and where possible keys are additionally secured by set-screws.

Ball and Roller Bearings—All Murtaugh chain hung dumb waiter machines are equipped with substantial ball or roller bearings throughout. These are set in hardened steel raceways and result in the material reduction of energy losses due to friction. Our substantial roller bearings are not to be confused with the small lightweight ball bearings often used.



Automatic Brake—Our automatic brake machines are absolutely self-retaining, automatically holding the car, loaded or unloaded at any point in shaft, ascending or descending, unless the hand rope is pulled, no friction brake or check rope being required.

Cars—Cars can be built of either wood, steel, monel metal, aluminum, brass or bronze. *All wood cars are double angle dovetailed throughout and strongly reinforced with corner irons. This is not only a much stronger type of construction but also much more sanitary because the top of the car is always flush and has no curbing.*

Cars made of hardwood are stocked in the following sizes:

Size No.	Width, in.	Depth, in.	Height, in.
1	20	16	30
2	24	20	36
3	28	24	42
4	32	28	42
5	36	36	42

Wood cars may on special order be lined with monel metal, aluminum, brass or copper.

Tracks and Guides—Cars and Counterweights may be guided on wood, cold drawn steel, brass tubes, steel tubes or wire.

Counterweight — Counterweights are of cast iron, sectional in form, and adjustable.

Ropes—All hand or driving ropes are of best quality imported Russian hemp with a brass swivel spliced into the rope in such manner that the swivel does not come in contact with the cast iron wheel. This ensures silent operation and freedom from wear on the hand-wheel groove.

Bearers—Machines are set on steel or wooden bearers.

NOISELESS DUMB WAITERS

Noise in the operation of a Dumb Waiter has often caused much trouble and dissatisfaction in an otherwise good installation. This is particularly true of Dumb Waiters that come up in or close to the dining room in a high class private residence. We make a special Dumb Waiter that by its construction, is, if carefully operated, noiseless.

RECENT INSTALLATIONS

R. H. Macy & Company,	New York, N. Y.
Mellon National Bank,	Pittsburgh, Pa.
New York Stock Exchange,	New York, N. Y.
Medical Center, 168th Street,	New York, N. Y.
U. S. Veterans Hospital,	Northport, L. I., N. Y.

LOCAL REPRESENTATIVES

We are represented in most of the larger cities by local representatives who will, in their communities, render the same services to architects and owners as we do directly in the New York District. Names will be furnished on request. We are interested in communicating with suitable applicants for unassigned territory.

ESTABLISHED 1847

GEO. T. McLAUTHLIN CO.

Manufacturers of Electric Elevators and Dumbwaiters

TELEPHONES
Richmond 3760

EASTERN NEW ENGLAND AGENTS FOR SEDGWICK HAND DUMBWAITERS

120 Fulton Street, BOSTON, MASS.

Products

McLauthlin "Universal" Electric Dumbwaiters.

McLauthlin Equibalanced Dumbwaiter Doors.

Also Passenger and Freight Elevators; Elevator Accessories; Metal Covered Doors.

McLauthlin "Universal" Electric Dumbwaiters

McLauthlin "Universal" Electric Dumbwaiter machines, developed by us, are extremely simple, compact, reliable and efficient. More than diminutive elevator machines, they are mechanisms designed to meet efficiently the special requirements of electric dumbwaiter service. Manufactured in five standard sizes, the correct equipment is available for any specific duty.

The machine is constructed with "built-in" motor, brake and worm gearing in one unit. This mounting preserves true alignment of motor, worm and gear and encloses the bearings and worm gearing in a dusttight casing in which they operate in an oil bath.

The motor is especially designed for electric dumbwaiter service. It has ball bearings, high starting torque, and uses no current when the car is not in motion. The motor shaft and worm shaft are one piece without coupling.

The worm gear is hobbed from a solid blank of special long life bronze gear metal. It is secured to the drum shaft by a large key and locked nut.

The drum shaft is supported on two double row ball bearings in the gear case, with an additional bearing in the outside stand.

The worm is accurately cut from special steel.

Bearings, including the thrust bearing, are ball or roller throughout.

The brake is unusually simple, effective and accessible. It is at the upper end of the motor shaft, of disc type, applied by adjustable spring tension, released by magnets. The brake disc is secured to the motor shaft by a key and locked nut. The braking surface is cork to cast iron and is of large area, insuring smooth stop and little wear.

The entire machine is mounted on a self-containing and oil-retaining subbase and may be arranged either with vertical or horizontal position of the motor, dependent on space conditions.

Types—*Traction*—This is the type most used. With automatic control the floor selector is operated by independent drive from the car.

Spiral Drum—For terminal landing service only; especially recommended because of the efficient method of operation. The car is started with the hoist cable on the small diameter of the winding drum so that the motor accelerates at a comparatively low torque. A second acceleration of car speed occurs when the cable climbs from the small to the large diameter of the drum. In stopping, the cable descends to the small diameter of drum reducing the speed to one-third immediately before stopping.

Winding Drum—Supplied when necessary to meet special requirements.

Location of Machines—The compactness of "Universal" electric dumbwaiter machines permits them to be usually installed directly over and within the area of the hoistway. This location reduces the cost both of original installation and of maintenance. The machines may be located elsewhere when conditions require.

Easy access to the machine should be provided by ample enclosure doors.

Control Systems—The usual controls are:

Control "A"—Terminal stops automatic. For two landing levels only, with "send" and "stop" buttons at landings. For dumbwaiters serving only terminal landings this control has many advantages of safety, convenience and speed of service, and it is the most simple and foolproof.

Control "B"—Terminal stops automatic. For two landing levels with "call," "send" and "stop" buttons at landings. Can be used for any number of floors with "up," "down" and "stop" buttons at landings.

Control "C-1"—For more than two landing levels—with all stops automatic. A gang button box containing button for each landing level and "stop" button at each landing opening.

Control "C-2"—For more than two landing levels—with all stops automatic. A gang button box containing button for each landing level and "stop" button at one landing opening. "Call" and "send" buttons at all other openings.

Control "C-3"—For more than two landing levels—with all stops automatic. A gang button box containing button for each landing level and re-set button in the car. "Call" buttons at each landing opening. Car is called by momentary pressure of a "call" button. Car is despatched by momentary pressure of a floor button in the car box and closing the landing door.

Note: This is our standard type full automatic control and we recommend it because of its simplicity.

Control "D"—Constant pressure "up" and "down" buttons.

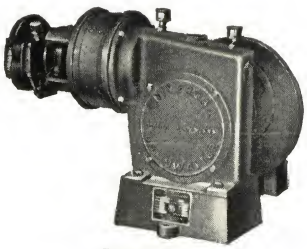
Various Combinations—We supply control systems other than the above, obtained with various combinations of our standard control accessories.

Signal Systems—Light in car. Lights at floors. Audible signals. Combinations can be provided as desired.

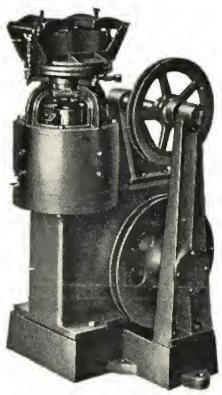
Engineering Service

"Universal" Electric Dumbwaiters are distributed throughout the country. Engineering service is available from us and our agents.

Traction



Spiral Drum



Basement Mounting

Types of "Universal" Dumbwaiter Machines

Where limited height prevents use of vertical machine, we supply horizontal machine as here illustrated

McLauthlin Equibalanced Dumbwaiter Doors

The McLauthlin equibalanced dumbwaiter door is a quiet, fast and easily operated door unit, which is readily installed.

On account of its quiet and easy operation it is particularly adapted for hospitals, residences, offices, etc., where noise is objectionable and ease of operation important.

In restaurants, and other locations where maximum service is essential, the speed of this unit is extremely advantageous.

Covered with metal, the treatment of the finish can be suited to the requirements of the installation.

In factories and similar commercial service the usual finish is plain galvanized sheet metal, smooth front, without seams on the room side. In hospitals and restaurants, the finish is preferably Monel, Allegheny or other corrosive resistant metal, polished and unpainted, as this surface is best maintained clean and sanitary.

The complete door assembly consists of the door sections, side guide support rails, sheave header, and opening frame. The two door sections slide vertically and equibalance each other. They are of fire resisting construction, built of two thicknesses of thoroughly seasoned dry, tongued and grooved white pine, free from large or loose knots, securely nailed and covered with metal. Each door section is guided at its four corners with bronze guide shoes running on finished steel guide rails.

The doors are hung with metal chain running over ball bearing sheaves. A self-locking latch is mounted at the bottom edge of the upper section. The stop at full opening is cushioned. The flat top edge of the bottom section stops even with the landing sill and is protected against wear by a galvanized steel bar. When closed the sections are held together by the latch and the joint is covered with an astragal.

The combination guide rails and supports are special finished steel section of great rigidity, and extend the full story height with fastenings to the building at each floor.

The opening frame is mounted on the guide rail, as part of the door unit. This frame is made of steel channel or angle to withstand the hard usage to which these openings are often subjected.

The finish of the frames may conform with that of the doors, and any desired decorative effect can be obtained. In hospitals and restaurants, the frames should be covered with the same corrosive resistant metal as the door sections, and left smooth, without trim. Where decorative effect is desired, trim can be applied to suit. Section cut shows five treatments of the opening frame. Types A and E without trim are recommended, with or without Monel, or other metal covering, depending on the use of the dumbwaiter. Types B and C show application of wood trim, and Type D of metal trim.

Optional—Electric contact to prevent operation of electric dumbwaiter if a landing door is open. Automatic door lock to prevent opening the door unless the car is at the landing. Self-closing attachment operated by fusible link.

McLauthlin equibalanced dumbwaiter door units are shipped completely assembled, ready to set in place, and fasten at the floors. *This should be done before the hoistway walls are built.* Installation is simple and can be done rapidly by competent mechanic. After the hoistway walls are completed the door units must be throughly cleaned and the guides oiled. The ball-bearing sheaves are held in protective frames and are grease packed before shipment.

STANDARD SIZES OF McLAUTHLIN "EQUIBALANCED" DOORS

For Electric Dumbwaiters			For Sedgwick Hand Dumbwaiters		
Door No.	Jamb opening, in.	Clear height through open door, in.	Door No.	Jamb opening, in.	Clear height through open door, in.
1	21 x 36	32	6	21 x 52	48
2	25 x 36	32	7	25 x 52	48
3	29 x 42	38	8	29 x 52	48
4	33 x 42	38	9	33 x 52	48
5	35 x 42	38	10	37 x 52	48

Other sizes are supplied as wanted.

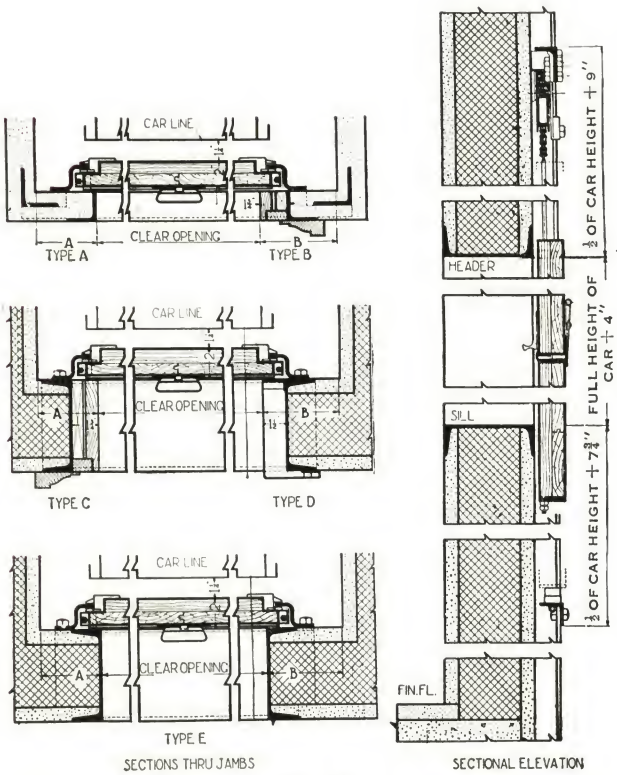
For electric dumbwaiters, sill should be 30 in. above the finished floor, door opening 2 in. higher than the clear height of the car, and the width of the opening the clear inside width of the car.

For hand dumbwaiters, sill should be 30 in. above the finished floor, door opening 4 ft. high to permit convenient pull of hand rope, and the width of the opening the clear width of the car.

In all cases one door should be 4 in. higher and 2 in. wider than the clear inside size of the car to allow installing the car in the shaftway.

Data Required for Quotation

(1) Number of door units and clear opening size.
(2) Position of larger door if wanted.
(3) Floor to floor heights.
(4) Material of door covering—galvanized iron, furniture steel, copper, Monel or Allegheny, etc., polished or plain.
(5) Are doors to be painted after erection.
(6) Construction of hoistway, plaster blocks, terra cotta, wire lath, brick, etc.; thickness of finished wall.
(7) Accessories wanted: vision panel, electric contacts, car operated mechanical door locks, fusible link attachment.



Equibalanced Dumbwaiter Doors Showing Clearance Dimensions Required

Phantom View of Equibalanced Door Showing Unit and Door Frame in Place

ESTABLISHED 1903

F. S. PAYNE CO.

Dumbwaiter Manufacturers
CAMBRIDGE, MASS.

BRANCH OFFICES
FRANKLIN, MASS. BOSTON, MASS. LOWELL, MASS. NEW HAVEN, CONN. PROVIDENCE, R. I.

Product

PAYNE ELECTRIC DUMBWAITERS.

For Payne Passenger and Freight Elevators, see Manufacturers' Index.

PAYNE

TRADE-MARK

Payne Electric Dumbwaiter Construction

The Payne electric machine represents the very latest in dumbwaiter machine construction, several distinctive features of which are new in the dumbwaiter field.

(1) Its design is such that it may be easily assembled for duty either as a *drum winding* or *traction machine.*

(2) By the use of universally mounted motors and brake magnets, the machine may be readily modified for either alternating or direct current service.

(3) The location of motor and brake combines to give a very compact unit.

Capacity and Speed

Payne electric dumbwaiter machines are constructed in various sizes with a wide range of capacities and speeds which will meet nearly every conceivable requirement.

Control Systems for Payne Electric Dumbwaiters

The following standard control systems for Payne electric dumbwaiters will be found to meet the usual requirements. Special forms of control furnished where required.

System "A," Hand Rope Control—Starting, stopping and reversing of machine controlled by means of hand rope in hatchway near landing doors.

System "B," Two-landing Push Button Control—*("B-1") "Call" and "Send" at Each Landing*—A two-button station at each landing marked "up" and "down." Momentary pressure of either the "up" or "down" button will send the car in corresponding direction.

("B-2") Single Button Control—A single button station at each landing, both being either "call" or "send."

System "C," Three-landing Push Button Control—*("C-1") "Call" and "Send" at Each Landing*—A three-button station at each landing marked "1—2—3" giving full selective control without a floor stop device.

("C-2") Call and Car Control—A gang of sending buttons marked "1—2—3—Stop" is located in car while calling buttons only are at landings. Momentary pressure of sending button pre-sets control and car will proceed to selected floor as soon as landing door is closed.

System "D," Semiselective Push Button Control—A three-button station marked "up," "down," "stop" is provided at each landing. Momentary pressure of either "up" or "down" button will send car in corresponding direction and it will continue to either terminal unless stopped at an intermediate landing. Landing doors should be provided with glass windows to permit seeing car as it approaches an intermediate landing.

System "E," Full Selective Push Button Control—*("E-1") Multistation Control*—A control station is provided at each landing with a button for each floor served by the car, thus allowing complete control from any landing.

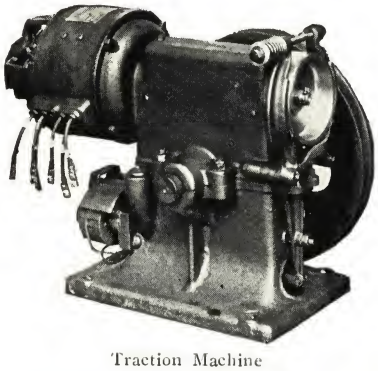
("E-2") Call and Car Control—A gang of sending buttons marked to correspond with the floors served by the car is located in the car. Calling buttons only are at landings. Momentary pressure of sending button pre-sets control and car will proceed to selected floor as soon as landing door is closed.

System "F," Single Station Full Selective Push Button Control—A gang of buttons marked to correspond to floors served by car is located at one floor, giving complete control of car from this floor. Single button stations only are provided at other floors for returning car to controlling station.

System "G," Single Station Full Selective Push Button Control with Call and Return—A gang of buttons marked to correspond to the floors served by the car is located at one floor, giving complete control of car from this floor. A two-button station is located at all of the other floors, permitting car to be called to different floors and then returned to controlling station.

References

Childs Restaurants (over 60 installations)
Federal Reserve Bank of Boston
First National Bank of Boston
Seth Thomas Clock Company
Vermont Marble Company
Cleveland Public Library
Providence Biltmore Hotel
Sterling Memorial Library, Yale University
Harvard University
Dartmouth College
Massachusetts Institute of Technology
Ritz Carlton Hotel
New England Mutual Life Insurance Co.
Rhode Island Insurance Company
Cadillac Automobile Company
Hotel Lincoln
Christian Science Pleasant View Home
Brown University
Numerous hospitals and restaurants.

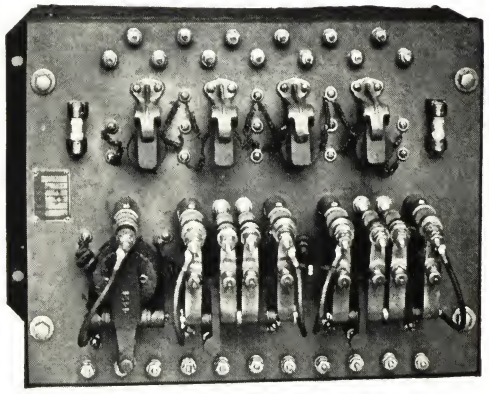


Traction Machine

Drum Winding Machine

Payne Electric Dumbwaiter Machine

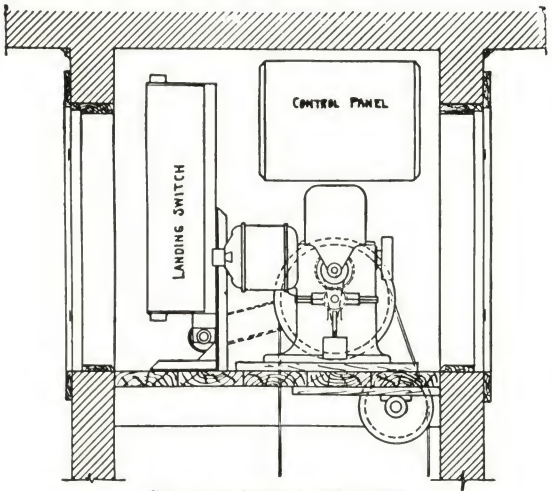
Furnished for 115 and 230 volts d-c. and for 220, 440 and 550 volts, 2- or 3-phase, 60-cycle a-c. as standard units. Special machines made for 500 volts d-c. and 25 or 40 cycles a-c.



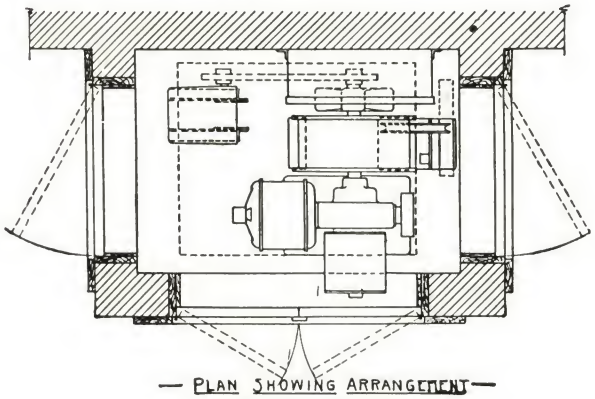
Bulletin 505 D.C. Control Panel
With relays for push button operation

Information Required for Estimates

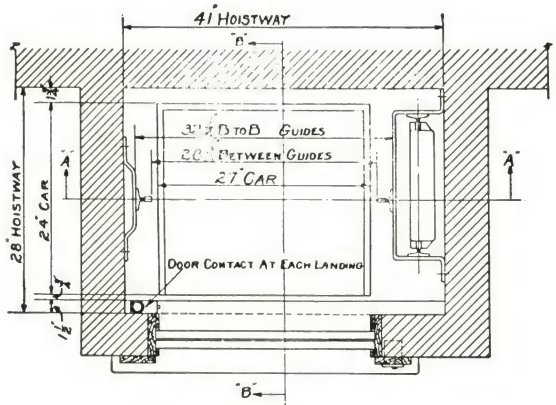
Location of building.
Type of machine, whether drum or traction.
Live load capacity; car speed per minute; car travel.
Outside dimensions of car; whether side or corner post, wood or metal; number of shelves and whether stationary, removable or hinged; whether single face or double face.
Give current characteristics (whether A. C. or D. C.), also phase, cycles and voltage.
Type of control system desired (specify by symbol).
How gang switches are to be marked.
Number of landings and landing doors.
Style of door, whether swinging or vertical slide.
Location of machine, whether directly overhead, in basement, on shelf on top floor or intermediate floor.
Kind of guides, whether steel or wood.
Number of door locks (if desired).



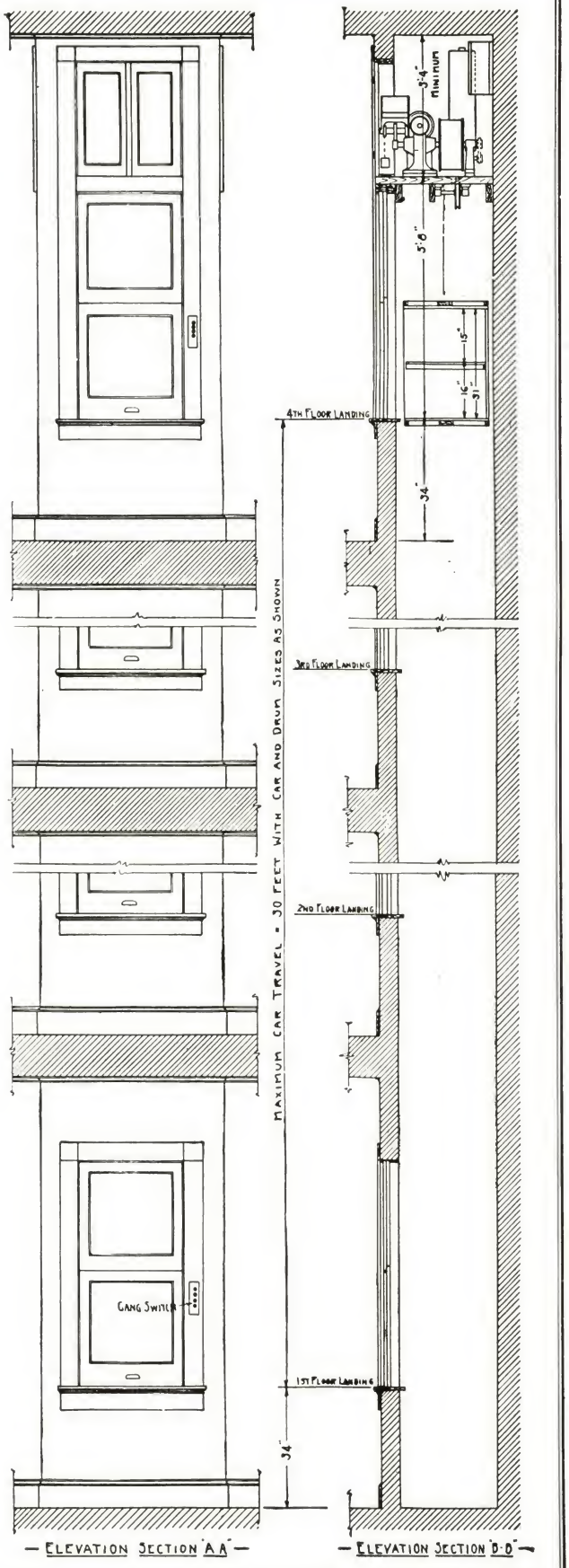
— ELEVATION SHOWING ARRANGEMENT — OF MACHINE ROOM —



— PLAN SHOWING ARRANGEMENT — OF MACHINE ROOM —



— PLAN OF HOISTWAY —



— ELEVATION SECTION A A — — ELEVATION SECTION D-D —

Note: Layout as shown is for four landings. Arrangement and dimensions can be modified to meet other conditions.

Payne Dumbwaiter Machine Layout with Full Automatic Push Button Control

SEDGWICK MACHINE WORKS

Manufacturers of Hand Power and Electric Dumb Waiters and Elevators

TELEPHONE
WAtkins 9-4034, 4035

152 West 15th Street
NEW YORK, N. Y.

FACTORY
POUGHKEEPSIE, N. Y.

REPRESENTATIVES

ATLANTA, GA., L. J. Bombardier, 889 Virginia Avenue, N. E.
BALTIMORE, MD., Walter S. Brauns, 509 North Charles Street
BIRMINGHAM, ALA., Bagby Elevator Co., 3115 Third Avenue, So.
BOSTON, MASS., George T. McLauthlin Co., 120 Fulton Street
BUFFALO, N. Y., Shults Engineering Co., Morgan Building
CHARLESTON, W. VA., Kanawha Equipment Co., 613 Summers Street
CHARLOTTE, N. C., W. Fred Casey Co., 507 North Tryon Street
CHICAGO, ILL., Standard Equipment Co., 400 West Madison Street
CLEVELAND, OHIO, Charles E. Lewis, 1737 East 18th Street
DALLAS, TEX., R. J. De Wees Co., 3015 Grand Avenue
DETROIT, MICH., The Rayl Co., 1233 Griswold Street
EL PASO, TEX., Neff-Stiles Co., 401 North Santa Fe Street
HOUSTON, TEX., Coastal Sales Agency, Inc., 3914 Main Street
JACKSONVILLE, FLA., Frederick A. Clawson, 2767 Lydia Street
KANSAS CITY, MO., Robert O. Smith, 2035 East 19th Street
LOS ANGELES, CAL., C. P. Helpman, 722 Story Building
LOUISVILLE, KY., Thomas L. Barrett, 112 South 2nd Street
MIAMI, FLA., Wm. J. Mulhall, 365 N. E. 55th Street
PITTSBURGH, PA., H. G. Sands Co., 437 Oliver Building
PORTLAND, ORE., McCraken-Ripley Co., 61 Albina Avenue
ROCHESTER, N. Y., Graves Elevator Co., 347 Blossom Road
SAN ANTONIO, TEX., J. A. Williamson Co., 804 Avenue A
SAN DIEGO, CAL., San Diego Bldg. Spec. Co., 629 West G Street
SAN FRANCISCO, CAL., Gates-Tatterson Co., Inc., 557 Market Street
SEATTLE, WASH., S. W. R. Dally, 332 Pioneer Building
WASHINGTON, D. C., Barber & Ross, 614 11th Street, N. W.
WICHITA, KAN., Lusco Brick & Stone Co., 201 W. Douglas
WINSTON-SALEM, N. C., Steel Service Co., 1204 Reynolds Building

Products

HAND POWER DUMB WAITERS and ELEVATORS; ELECTRIC DUMB WAITERS and SIDEWALK ELEVATORS; GRAVITY DROPS.

Residence Dumb Waiters; Apartment Dumb Waiters; Hotel and Restaurant Dumb Waiters; Hospital Dumb Waiters and Elevators; Book Lifts; Fuel Lifts; Tube Dumb Waiters; High Speed, Automatic Brake, Band Brake, and Geared Dumb Waiters; Compound Geared Dumb Waiters; Outdoor Dumb Waiters; Under Counter Dumb Waiters; Trunk Lifts; Individual (Invalid) Elevators; Freight Elevators; Sidewalk Elevators; Automobile Elevators; Ash Hoists; Mortuary Lifts; Hatchway Hoists; etc.

SEDGWICK
Dumb Waiters - Elevators
FOR ALL PURPOSES

Sedgwick Service

The Sedgwick Service Department offers architects the facilities of an engineering organization properly equipped for planning, constructing and installing vertical transportation outfits, and will assist architects in determining the selection of equipment to give best results under specific conditions.

Installation—Blue prints and full directions for installing are furnished with each outfit, from which local labor may install. Upon request we can supply experienced mechanics to make installations.

Guarantee—Sedgwick Dumb Waiter Machines are guaranteed for 5 years against defects in workmanship and material.

All-metal Equipment

Sedgwick Dumb Waiters and Elevators, both electric and hand power, can be supplied with steel or other metal cars, and with metal guide runs, as desired.

Sedgwick Dumb Waiters—General Information

In order to assure selection of the type most suitable, we suggest the following information be furnished us so we can make recommendations and supply complete data, specifications and blue prints:

(1) What is the outfit to be used for?
(2) How large a car is desired?
(3) How far does the car travel?
(4) Have you a place prepared for the outfit?
(5) What will be the weight of average loads?
(6) What will be the weight of heaviest load?
(7) Are the loads all up, all down, or both up and down?
(8) Who will operate: men, women, boys, or girls?
(9) Are all doors located in same front?

Note: Doors, cabinets and enclosures are usually supplied locally and are not included in our contract unless specifically called for.

Standard Sizes and Dimensions—The dimensions in the following table are for standard sizes of the Sedgwick "FDCG" Geared Automatic Brake Dumb Waiter. These sizes, with very slight variation, apply to all types of dumb waiters.

See typical dumb waiter layout (Fig. 4) on following page.

STANDARD DUMB WAITER SIZES

Dimension See Fig. 4	No. 1 Car Size: outside dimensions Width Depth 20″ x 16″	No. 2 Car Size: outside dimensions Width Depth 24″ x 20″	No. 3 Car Size: outside dimensions Width Depth 28″ x 24″	No. 4a Car Size: outside dimensions Width Depth 32″ x 28″	No. 5a Car Size: outside dimensions Width Depth 36″ x 36″
A	20″	24″	28″	32″	36″
B	16″	20″	24″	28″	36″
C	30″	36″	36″	36″	48″
D	25″	29″	33″	37″	42½″
E	19″	23″	27″	31″	39″
F	As required	As required	As required	As required	As required
G	7″	9″	11″	13″	16″
P	30″*	30″*	30″*	33″*	36″*
AA	9′0″*	9′0″*	9′0″*	9′3″*	9′6″*

*Secure if possible.

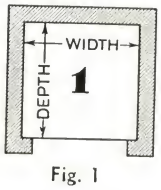


Fig. 1

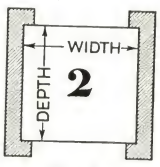


Fig. 2

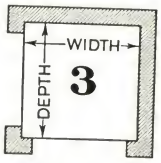


Fig. 3

Location of Doors—(1) Single face hoistway, as shown in the layout and in Fig. 1 above, with all doors located in same front, is always advisable.

(2) Double face hoistway (Fig. 2 above) with openings located in opposite fronts. For standard sizes, dimensions "E" in above table must be increased by 1 in. to allow for additional hand rope.

(3) Corner post hoistway (Fig. 3 above). The least desirable arrangement. Should be avoided when possible. When writing us, locate and identify each door and specify door chiefly used.

Door Openings—Door openings should be fully as wide as car. Height should be 4 ft. with sill located 30 ins. above floor.

Cleating—The cleating (or grounds) behind guide runs shown in the drawing is necessary where hoistway is of fireproof material, or is already plastered without provision for securing of guide runs.

In a wood-ceiled hoistway where guide runs may be screwed directly to the sidewalls, cleating is unnecessary and dimension "D" in above table may be reduced by 2 ins.

Hoistway Construction—Before constructing hoistway send for our detailed instruction sheet.

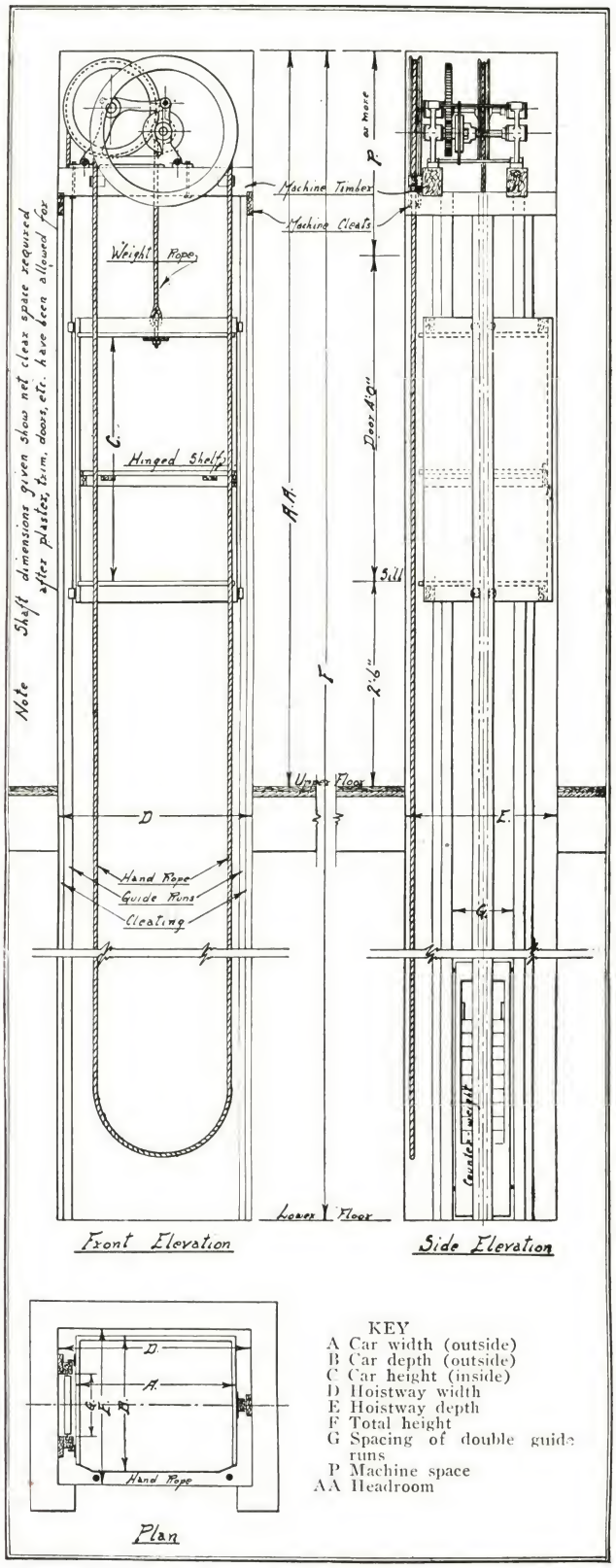


Fig. 4. Typical Dumb Waiter Layout
Dimensions tabulated in preceding column

Sedgwick Universal Electric Dumb Waiter

Capacity—5 standard series to meet every practical requirement.

In order to obtain highest operating efficiency, which means lowest possible current consumption, it is essential that maximum load capacity should be held as closely as possible to the *average* load. The machine used to furnish the motive power for the Sedgwick Universal Electric Dumb Waiter is made in 5 standard series, each for a definite load capacity. It is not a miniature elevator machine, but is designed throughout for the special requirements of dumb waiter use, and can be installed either at top or foot of shaft.

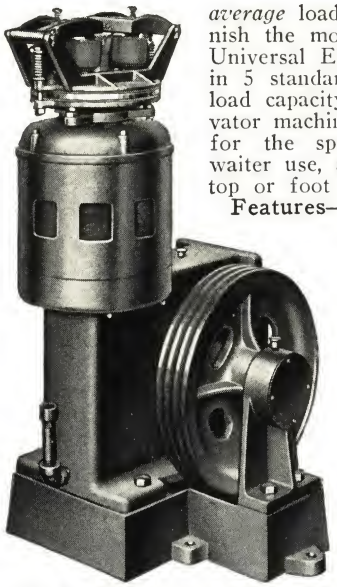


Fig. 5. Universal Electric Dumb Waiter Machine

Features—(a) Smooth and quiet operation. (b) Adequate speed to meet service conditions. (c) Dependable safety. (d) All parts ruggedly constructed for long service. (e) Complete call and send push button control.

Machine—Machine is built with extreme care and accuracy. New Departure noise-tested ball bearings and Hyatt roller bearings are used throughout. Drum or sheave wheel shaft is supported by an extra bearing stand, and entire mechanism rests on a special oil-retaining subbase as a complete unit. Brake is unusually simple, effective and accessible. General Electric contactors used on main panel and other accessories required are of equal quality. All controls are enclosed and arranged with removable panel for easy access.

Control—Push button is provided at each floor to call or send the car to or from any other floor, or send buttons may be on car itself.

Car—Available in either metal or wood, finished in any desired color, and in sizes to meet all dumb waiter needs. All non-essential weight has been eliminated as an aid to economical operation.

Guides—Steel or seasoned wood, with matched joints, providing for the passage of the car with least possible friction and without noise. These guides will not warp, nor bind the car in transit.

Cables—Special "Durable Wire" flexible cable that will wind smoothly and easily around sheave or drum, with adequate traction, render long service without drying out or rusting, and without jambs or broken strands.

Complete Equipment—Includes machine with motor and brake, idler wheels, shafts and bearings; push button controls; car; counterweight, cables and connections; guide runs.

Specifications

To avoid the confusion which might be caused by attempting to submit in this catalogue complete specifications covering the many types and arrangements of Sedgwick Dumb Waiters and Elevators, we recommend that where specifications are required immediately without opportunity to consult us, the following be used:

Furnish (and install) where shown on plans (one) Sedgwick (name type of equipment) Dumb Waiter [Elevator] in accordance with the manufacturer's blue prints and specification which shall be submitted to the architect for approval.

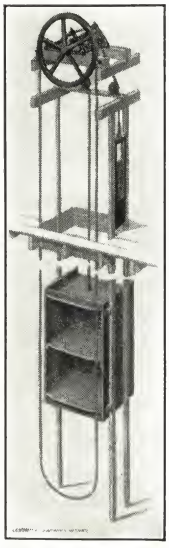


Fig. 6. Automatic Brake Dumb Waiter

Sedgwick Automatic Brake Dumb Waiters

(For average loads up to 25 lbs. and capacity loads of 75 lbs.)

Sedgwick Light Automatic Brake Dumb Waiters give easy, dependable, smooth and quiet service. Equipped with automatic brake of latest improved design, automatic in both directions with all brake surfaces accurately ground and adjustable for wear, antifriction steel roller bearings, steel shafting and other refinements in keeping with the class of residences in which these dumb waiters are installed. By means of the Sedgwick Automatic Brake, car is held stationary at any point as soon as operator ceases pulling on hand rope.

Note: Standard sizes Nos. 1, 2 and 3, as shown in chart on preceding page, can be shipped at once. Specification and blue prints on request.

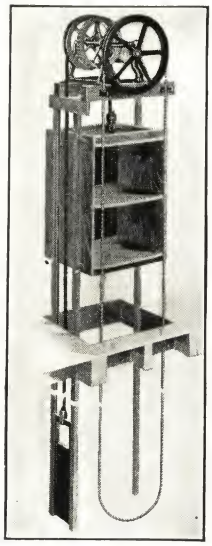


Fig. 7. Type "FDCG" Dumb Waiter

Type "FDCG" Geared Automatic Brake Dumb Waiter

(For average loads up to 75 lbs. and capacity loads of 200 lbs.)

A marked development in equipment of this type. The use of full diameter hoist wheel in overhead mechanism permits car cable to drop directly to the car and counterweight, eliminating use of intermediate or deflecting sheaves and increasing ease of operation and life of cable. Machine cut spur gears, accurately shaped in our plant, contribute further to smooth performance and elimination of friction. The automatic brake is positive in action, adjustable for wear, and self-regulating to load carried.

Note: Standard sizes Nos. 1, 2, 3, 4a and 5a, as shown in chart on second preceding page, can be shipped at once. Specification and blue prints on request.

"Sedg-Versal" Compound Geared Dumb Waiters

(For average loads up to 150 lbs. and capacity loads of 400 lbs.)

Especially designed for heavy loads or where requirements cannot be determined in advance. Machine is provided with two sets of machine cut spur gears, two full diameter hoist wheels, antifriction steel roller bearings and band brake or automatic brake as conditions demand, all contained in substantial iron frames as a complete unit. By rearrangement of gears and mechanism it is adaptable to universal conditions, embodying capacity features of five types of dumb waiters.

Note: Standard sizes Nos. 1, 2, 3, 4a and 5a, shown in chart on second preceding page, can be shipped at once. Specifications and blue prints on request.

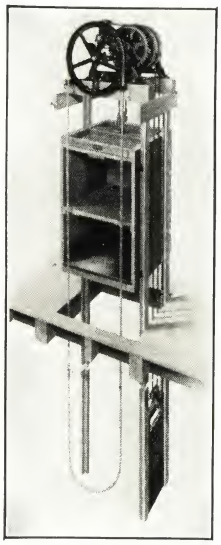


Fig. 8. "Sedg-Versal" Dumb Waiter

Under Counter Dumb Waiters

Designed for use where there is insufficient headroom above upper floor level for overhead machine. These outfits can be fitted with machine of any capacity desired. Four standard sizes are furnished in six standard arrangements. Sedgwick Under Counter Dumb Waiters are being used extensively in restaurants, cafeterias, soda fountains, stores and similar establishments where every inch of available room is utilized. We have hundreds of drawings showing special arrangements and recommend consultation when equipment of this type is required.

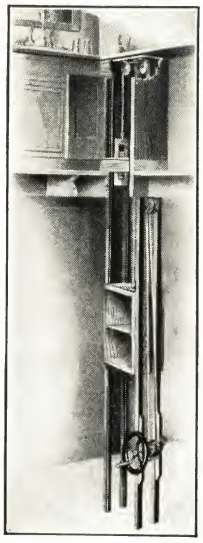


Fig. 9. Under Counter Dumb Waiter

Sedgwick Tube Dumb Waiters

Where enclosures are not desired or required and appearance is important, one of the types and arrangements of steel, brass or monel metal tube dumb waiters is usually selected. Outfits can be equipped with machines of any capacity desired and fitted with cars of wood, wire, steel, brass or monel metal as preferred. A special folder illustrating other arrangements will gladly be sent with blue prints and specifications.

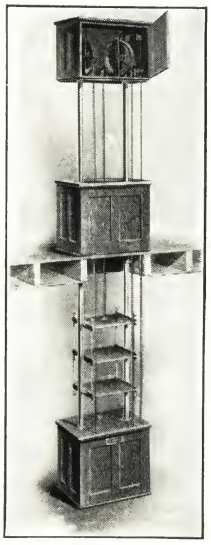


Fig. 10. Tube Dumb Waiter

High Speed Tube Dumb Waiters for Correspondence and Small Packages

Especially designed for rapid service between two or more floors, where letters, orders, prints, books, cartons and other light loads must be transmitted between departments. Is also used for quick handling of money between cashier's desk on one floor and sales stations on other floors.

This high speed lift is reasonably priced and surprisingly economical in operating costs. Two of these lifts, installed at Brentano's bookstore, New York, have been handling books and cash sales for five years without the expenditure of a single cent for maintenance.

This outfit is attractive in appearance, occupies little floor space, and requires no enclosure. It is equipped with steel tubes regularly finished in mahogany bronze and metal car to match. May be had in any other finish desired. The car itself is available in various styles to meet the specific purpose for which lift is to be used. Car is held at upper terminal by an automatic lock and self releasing catch. Blue prints and specifications upon request.

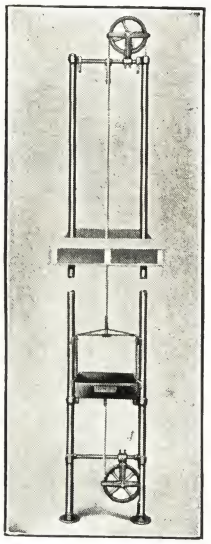


Fig. 11. High Speed Correspondence Lift

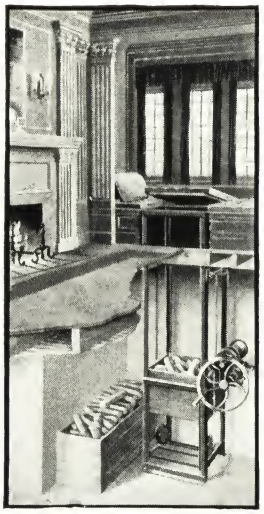


Fig. 12. Fuel Lift

Sedgwick Fuel and Log Lifts

A most modern convenience, eliminating necessity for carrying coal, wood and logs up stairways and through rooms, with attendant dirt and dust. Lift can also be employed for ash removal from fireplace to cellar.

Sedgwick Fuel Lift consists of a container traveling in vertical guides, raised and lowered by means of crank operated, geared automatic brake machine. Entire equipment is in basement, so located that container, at top of its lift, rests inside a fixed fuel box beside the fireplace, or in a convenient window seat, or in the bottom of nearby closet or bookcase. It is built in any size, of wood or metal, and is designed for quiet, easy operation.

Sedgwick Log Lift is of heavier construction than the Fuel Lift and is designed to transport several logs 3 or 4 ft. or more in length. It is made in various arrangements and sizes to meet individual requirements.

These Sedgwick outfits can be installed to serve fireplaces on one or more floors.

Sedgwick Individual (Invalid) Elevator

The automatic brake individual elevator is a most practical outfit for those who cannot or should not climb stairs.

It embodies essential features of ease of operation, absolute safety and simplicity of design, so that no interruption of service need be anticipated.

Installation can be quickly made in any residence without seriously disturbing interior arrangements.

For more than 20 years this elevator has won most favorable comment from its users and is being recommended by physicians.

Fig. 13. Invalid Elevator

Widespread installation makes it possible to inspect outfits in use in almost every part of the country.

Outfits are built in five standard sizes, listed below, which can be shipped immediately; special sizes built to meet requirements.

Car 3 ft. square is large enough to accommodate two persons standing, while car 4 ft. square is usually sufficient to provide for invalid in wheel chair and an attendant.

***STANDARD INVALID ELEVATOR SIZES**

Car size	Hoistway size	Car size	Hoistway size
3′0″ x 3′0″	3′7 ″ x 3′3″	4′6″ x 4′6″	5′2″ x 4′9″
3′6″ x 3′6″	4′1¼ ″ x 3′9″	5′0″ x 5′0″	5′8″ x 5′3″
4′0″ x 4′0″	4′7¼ ″ x 4′3″		

*Ready to ship. Special sizes built to order.

Sedgwick Freight Elevators

Sedgwick Improved Hand Power Freight Elevators are built for economical and dependable service and are extensively used in commercial, institutional and industrial buildings.

Outfit is equipped with self-contained, rigidly braced iron frame machine, having antifriction steel roller bearings, smooth running spur gears, steel shafting, traction sheaves or drum, and the improved Sedgwick Self-locking Fibre Lined Band Brake (by means of which loads may be safely and easily lowered by gravity). Counterweight is of the improved sectional type permitting easy and accurate adjustment. Car and counterweight are carried by two independently attached steel cables.

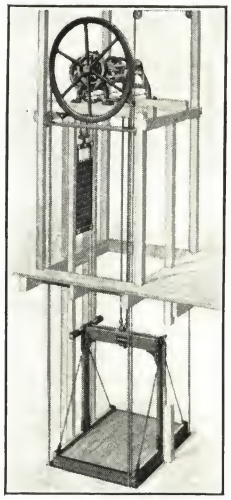


Fig. 14. Freight Elevator

Sedgwick outfits can be built to meet specific requirements of building and elevator codes in various cities. Such codes often include safety catch of instantaneous type; enclosed platform of hardwood slatwork with wire screen canopy top; self-closing gates; grating under overhead machine. In all instances we recommend consultation before final decision.

SIZES AND CAPACITIES FOR STANDARD FREIGHT ELEVATOR EQUIPMENT

Capacity, lbs.	Standard car size	Clear hoistway required		Headroom above upper floor	Weight of machine, lbs.	Weight of car, lbs.	Weight of counterweight, lbs.
		Width	Depth				
500	3′0″ x 3′0″	3′ 8½″	3′ 4″	11′0″	172	150	225
750	3′6″ x 3′6″	4′ 3¼″	3′10″	11′4″	336	205	355
1000	4′0″ x 4′0″	4′ 9¼″	4′ 4″	11′8″	388	230	380
1200	4′6″ x 4′6″	5′ 3¼″	4′10″	12′6″	644	333	483
1500	5′0″ x 5′0″	5′10½″	5′ 4″	13′0″	744	360	510
2000	6′0″ x 6′0″	6′11½″	6′ 4″	13′6″	961	488	638
2500	6′0″ x 6′0″	6′11½″	6′ 4″	14′6″	1211	488	638

SIZES AND CAPACITIES WHEN ARRANGED TO MEET CODE REQUIREMENTS

500	3′0″ x 3′0″	3′11¼″	3′7″	12′6″	172	310	385
750	3′6″ x 3′6″	4′ 7¾″	4′1″	13′0″	336	380	455
1000	4′0″ x 4′0″	5′ 1¾″	4′7″	13′4″	338	422	497
1200	4′6″ x 4′6″	5′ 7¾″	5′1″	14′2″	644	543	618
1500	5′0″ x 5′0″	6′ 1¾″	5′7″	14′8″	744	585	660
2000	6′0″ x 6′0″	7′ 1¾″	6′7″	15′4″	961	743	818
2500	6′0″ x 6′0″	7′ 2½″	6′7″	16′3″	1211	753	828

Sedgwick Trunk Lifts

Sedgwick Freight Elevators are extensively used as *trunk lifts* in residences, clubhouses, schools, institutions and small hotels for conveying luggage, furniture and other bulky loads, thereby eliminating damage to stairways, walls and woodwork of house. Car is usually 4 ft. square with slatwork on sides and back. Blue print and specifications sent on request.

Gravity Drops

These outfits are designed for use where the loads are uniformly down. In many plants power elevators carry heavy materials to top of building, and as work progresses, the materials are lowered from floor to floor by Sedgwick Gravity Drops at a saving of time and money. Such outfits have been installed for National Biscuit Co., American Sugar Refining Co., Tiffin Products Co., and many other firms. Owing to their durability, ease of operation and low maintenance costs, Sedgwick Gravity Drops have always been found to be a profitable investment.

Sedgwick Hospital Elevators

In many hospitals, sanitariums, infirmaries, clinics and similar institutions Sedgwick Hospital Elevators are well suited to service requirements and give satisfactory, dependable, and economical performance. We have made a special study of the problem involved in the design, manufacture and installation of this type equipment and welcome the opportunity to submit complete recommendations, specifications and blue prints for further consideration.

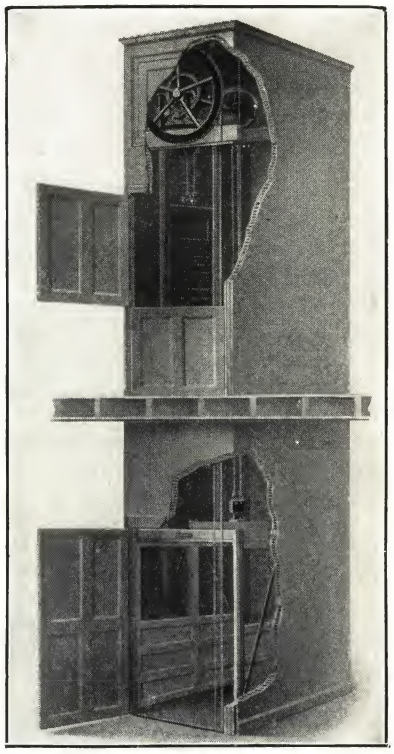


Fig. 15. Hand Power Hospital Elevator

Sedgwick Sidewalk Elevators

(Capacity 500 to 2500 lbs.)

Elevators are designed for transportation between basement and grade level and are available in electric or hand power. For light capacity or where space along side of platform is limited, Type "L" will secure satisfactory results. When machine must be brought inside building lines Type "M" should be used.

The sidewalk type elevator is often used inside the building when space at upper floor is limited and where operation from lower floor only is satisfactory.

Special study should be made of the local regulation regarding the installation of sidewalk elevators as these vary in different localities. Our Service Department will gladly make a thorough investigation of your requirements and submit complete recommendations, blue prints and specifications.

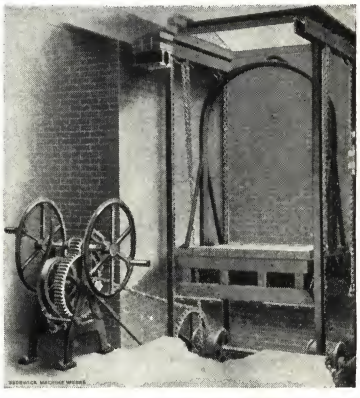


Fig. 16. Type "M"

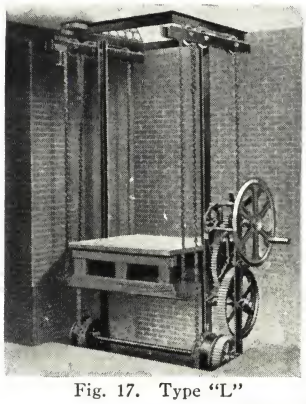


Fig. 17. Type "L"

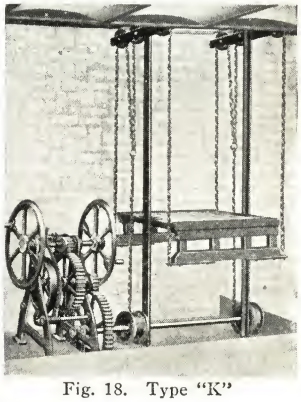


Fig. 18. Type "K"

Sidewalk Elevators

Other Sedgwick Equipment

Includes automobile elevators, ash hoists, etc. For complete data and detailed drawings write for our Architects' Catalogue.

SECURITY FIRE DOOR CO.

Counterbalanced Dumbwaiter Doors

3036-3048 Lambdin Avenue, ST. LOUIS, MO.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

For our Truckable and Other Fireproof Freight Elevator Doors, see Manufacturers' Index

Dumbwaiter Doors

"Seco" Dumbwaiter doors are made with insulated steel panels when of Underwriters' labeled construction, and when not labeled, the panels are made of 16-gauge steel plate or of metal clad or kalamein construction.

The panels are fastened into channel or angle frames. The doors thus formed slide easily in steel guides and are hung on steel cable chains operating over double race ball bearing sheaves. No counterweights are required, each section of door balancing the other.

"Seco" dumbwaiter doors have proven their adaptability and efficiency for hospitals, department stores, hotels, restaurants and factories.

"Seco" dumbwaiter doors are usually furnished with 16-gauge steel frames forming flush trim on roomside. These frames are reinforced with angles. See detail.

"Seco" Steel Plate Dumbwaiter Door with Glass Vision Panel Showing Flush Steel Trim

Ornamental trim can be attached to flush trim if desired. Projecting sills or shelves can also be furnished. Consult local representative.

For restaurants and hospitals, we recommend the use of Allegheny metal for doors and frames.

"Seco" dumbwaiter doors are furnished with vision panels when specified. Labeled doors have a 3-in. round vision panel. Other doors 6-in. vision panel.

"Seco" dumbwaiter doors are furnished with prime shop coat of paint, f.o.b. destination. They are assembled on frames, ready to be built into the wall of dumbwaiter shaft. They can be set by the general contractor.

For electric dumbwaiters, we furnish our Type "E" electric interlocks and latches operated by a stationary cam on car.

Suggested Specifications

For all dumbwaiter door openings shown on the plans and as noted, furnish "Seco" Dumbwaiter doors as manufactured by the Security Fire Door Co., 3036 Lambdin Avenue, St. Louis, Mo.

(A) The door sections shall have insulated steel panels interlocked with the metal frame at head and sills. Door to be labeled by the Underwriters' Laboratories, Inc. Provide 3-in. diameter vision panel.

(B) The door sections shall have 16-gauge steel panels riveted into angle frames.

Note: (6-in. diameter vision panel can be furnished for steel plate doors which are not labeled.)

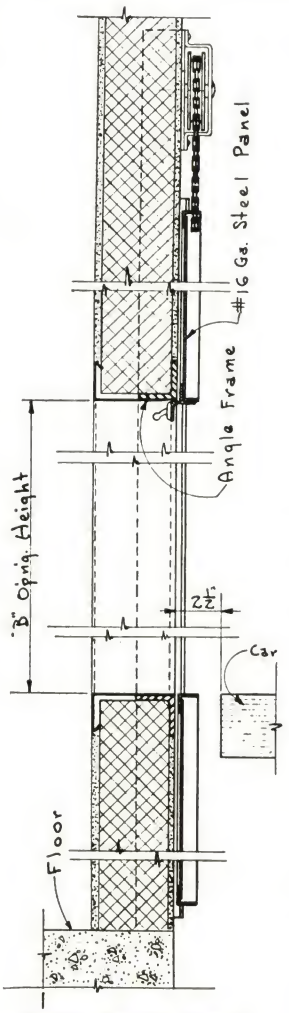
Provide the necessary steel guides, ball bearing sheaves, cable chains and other hardware. Doors to be attached to steel frames, ready for setting into the masonry wall. Doors and parts to receive prime coat of paint at the factory.

Both the labeled and unlabeled doors are usually furnished with sheet steel frames, forming flush trim on roomside. These frames are reinforced with angles that extend to floor and above opening to sheaves or beyond to beams as specified.

Special trim can be furnished for attaching to flush trim when desired. Consult our representative.

Channel frames can be furnished when desired and specified.

For electric dumbwaiters, specify Security Type "E" interlocks and latches. These are operated by stationary cam. The wiring for interlocks, also retiring cams, if required, should be installed by dumbwaiter contractor.

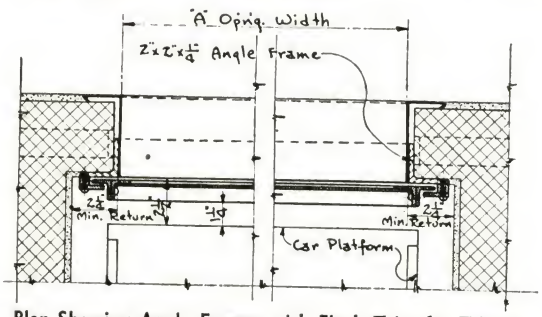


Section Showing Door in Open Position

STANDARD SIZES

Type	"A"	"B"	"C"	"D"
D-1	2′ 0″	3′ 0″	2′ 2″	8′ 2″
D-2	2′ 6″	3′ 6″	2′ 5″	8′ 11″
D-3	3′ 0″	4′ 0″	2′ 8″	9′ 8″

Note: Metal clad or kalamein dumbwaiter doors require 3 in. of space from car to wall.



Plan Showing Angle Frames with Flush Trim for Tile or Plastered Walls

Trim furnished only when specified

A. B. SEE ELEVATOR COMPANY, INC.

52 Vesey Street
NEW YORK, N. Y.

CABLE ADDRESS
"A B See, New York"

OFFICES

BALTIMORE, MD., 15 East Fayette Street
BOSTON, MASS., 168 Stuart Street
CLEVELAND, OHIO, 750 Prospect Avenue
DETROIT, MICH., 56 Henry Street
HARTFORD, CONN., 410 Asylum Street
NEWARK, N. J., 29 Fulton Street
NEW YORK, N. Y., 52 Vesey Street
PHILADELPHIA, PA., 1420 Walnut Street
WASHINGTON, D. C., 14th and H Streets, N. W.

FACTORY: JERSEY CITY, N. J.

FOREIGN REPRESENTATIVES

MONTREAL, QUE., Darling Brothers, Ltd.
HAVANA, CUBA, Daniel Inc.
TOKIO, JAPAN, Uchida Trading Company, Ltd.
SYDNEY, AUSTRALIA, Standard-Waygood, Ltd.
RIO DE JANEIRO, BRAZIL, Middletown Car Co.

Products

Manufacturers of all types of DIRECT CONNECTED ELECTRIC PASSENGER and FREIGHT ELEVATORS; PUSH BUTTON ELEVATORS; SIDEWALK TYPE ELEVATORS.

Design

The A. B. See electric elevators are designed and manufactured under the direction of the engineers of the A. B. SEE ELEVATOR COMPANY, INC. and every part is designed for its specific work and is in no way an assembled product.

Gearless Traction Elevator

The gearless traction elevator was developed for high speed service where speeds of 450 to 1000 f.p.m. are desirable.

The gearless traction machine consists of a large slow speed multipole shunt wound motor, having the armature, brake wheel and drive sheave mounted on one sleeve. This sleeve is mounted on two sets of roller bearings and rotates around a stationary shaft, which in turn is keyed to two cast iron hangers that bolt direct to a heavy ribbed cast iron base. This rigid patented self-aligning design used in connection with roller bearings is an exclusive feature of the A. B. See gearless traction machines.

Low operating cost and ease of control make this elevator desirable for high speed service.

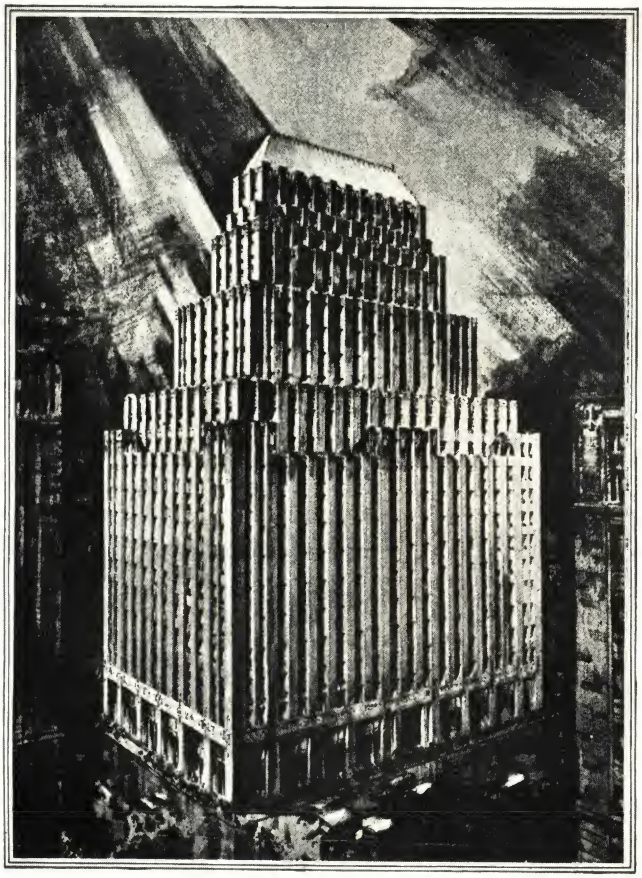
Geared Traction Elevator

The geared traction elevator is the standard machine for buildings of moderate height requiring speeds of 150 to 450 f.p.m.

This machine has a high speed interpole motor of special design for elevator work, and a gear reduction to the drive sheave through steel worm and bronze gear which is directly connected to the drive sheave. The roping of this type machine is exactly the same as the gearless one-to-one machine. This type is made for both direct and alternating current and is suitable for one or two-speed motors.

Freight Elevator

A. B. See freight machines are roped two-to-one with sheave on car crosshead and counterweight, or have a gear reduction obtained by driving the drum or traction sheave through internal gears, accurately cut. For extra heavy duty up to 30,000 lb. a combination of the two drives is used.



75 Federal Street, Boston, Mass.
THOMAS M. JAMES CO., Architects
THOMPSON-STARRETT CO., Builder
CROSS & CROSS, Agents
Equipped with eight A. B. See Auto-landing group control elevators

Push Button Elevator

The full-automatic push button control elevator has become very popular in the last few years, because this type eliminates the elevator operator. It is especially adapted for use in residences, hospitals and apartment houses.

This type of elevator can be operated on both direct and alternating current.

Sidewalk Machines

This company's sidewalk machines for both direct and alternating current are made in sizes 1000 to 6000 lb. and speeds 25 to 50 f.p.m.

Co-operation

Specifications, drawings and estimates for elevator installations will be furnished, without obligation, to those who will communicate with our nearest office.

INCORPORATED 1898

AMERICAN ELEVATOR & MACHINE COMPANY

INCORPORATED

LOUISVILLE, KY.

BRANCH OFFICES

DALLAS, TEX., 312 Construction Building
SAN ANTONIO, TEX., 706 Gunter Building
BIRMINGHAM, ALA., 308 Pioneer Building
HOUSTON, TEX., 312 Caroline Street
KANSAS CITY, MO., 326 Glover Building

REPRESENTATIVES

ATLANTA, GA., Burford, Hall & Smith, 140 Edgewood Avenue
NEW ORLEANS, LA., Service Elevator Co., 523 St. Joseph Street
NASHVILLE, TENN., John Bouchard & Sons Co.
KNOXVILLE, TENN., Warner Service Co., Clinch and Central Avenues
MEMPHIS, TENN., Memphis Elevator Co., 261 Court Avenue
TAMPA, FLA., Lev. G. Taylor, 2007 Bayshore Drive
WASHINGTON, D. C., Bradley J. Smith, 1829 G Street, N. W.

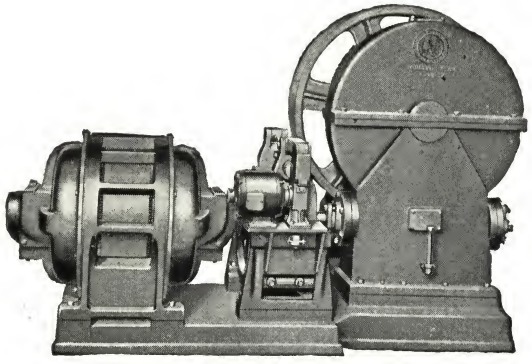
Products

A complete line of GEARLESS and GEARED ELECTRIC ELEVATORS for Direct and Alternating Current, including Variable Voltage Control, Automatic Self-leveling, and Automatic Pre-registering Signal Control.

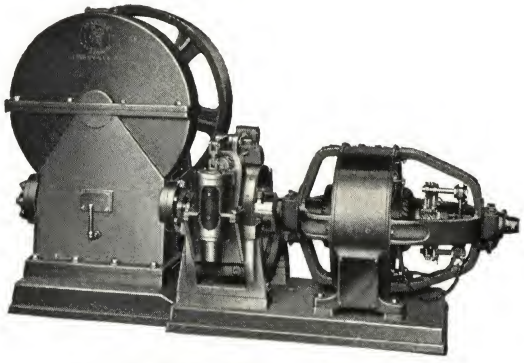
Also Automatic Push Button Passenger and Freight Elevators and Dumbwaiters: Automobile Elevators; Hand Elevators.

Facilities

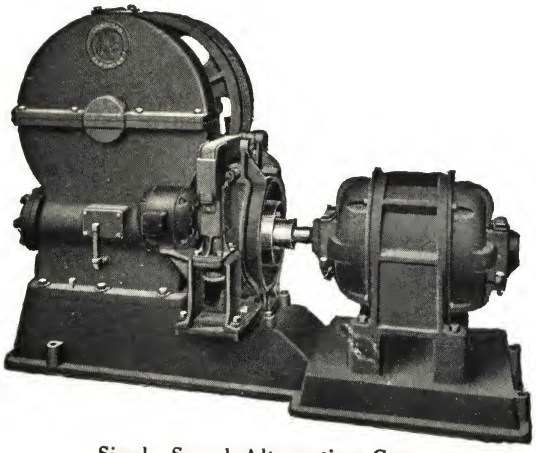
The company has one of the largest independent elevator plants in the United States, completely equipped for building elevators, elevator motors, controllers and other parts, thereby enabling it to execute orders promptly.



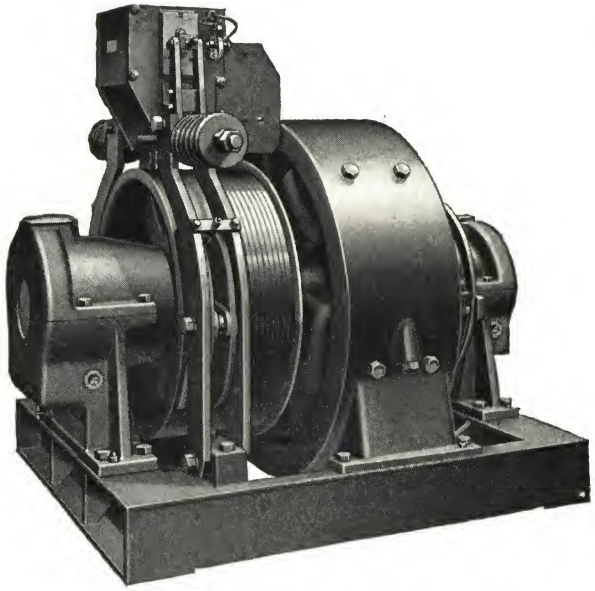
Two-speed Alternating Current



Variable Voltage Control



Single Speed Alternating Current



American-General Electric Gearless Variable Voltage Control

ESTABLISHED 1904

BURWAK ELEVATOR COMPANY

TELEPHONE
BArclay 7-9231, 9232

227 Fulton Street, NEW YORK, N. Y.

FACTORY: WARSAW, N. Y.

Member of New York Building Congress

Products

ELEVATORS and LIFTING EQUIPMENT of all capacities and speeds, including:

Electric Passenger and Freight Elevators
Hydraulic Passenger and Freight Elevators
Automobile Elevators
Electric Sidewalk Elevators
Belted Elevators
Hand Power Elevators
Hand Power Sidewalk Elevators
Electric and Hand Power Dumbwaiters
Store Window Display Elevators
Organ Lifts
Sprocket Chain Driven Sidewalk Elevators

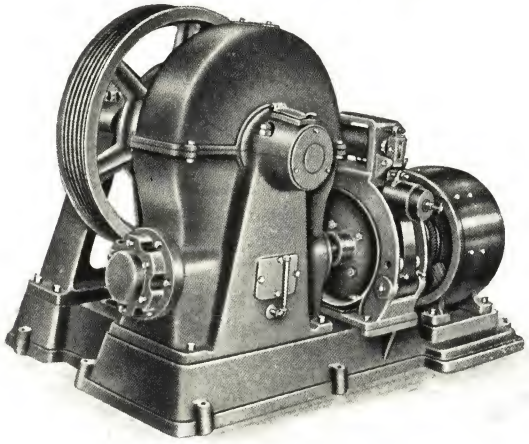
Service

We invite Architects and Engineers to consult with us on elevator projects of any kind of unusual field conditions or special equipment.

Experience

We have had over twenty-five years' experience in installing the above mentioned types of elevators, and we can furnish lists of installations made in many public and private buildings and institutions.

We specialize in full automatic push button elevators (eliminating the operator) and on which the gates are opened and closed automatically.



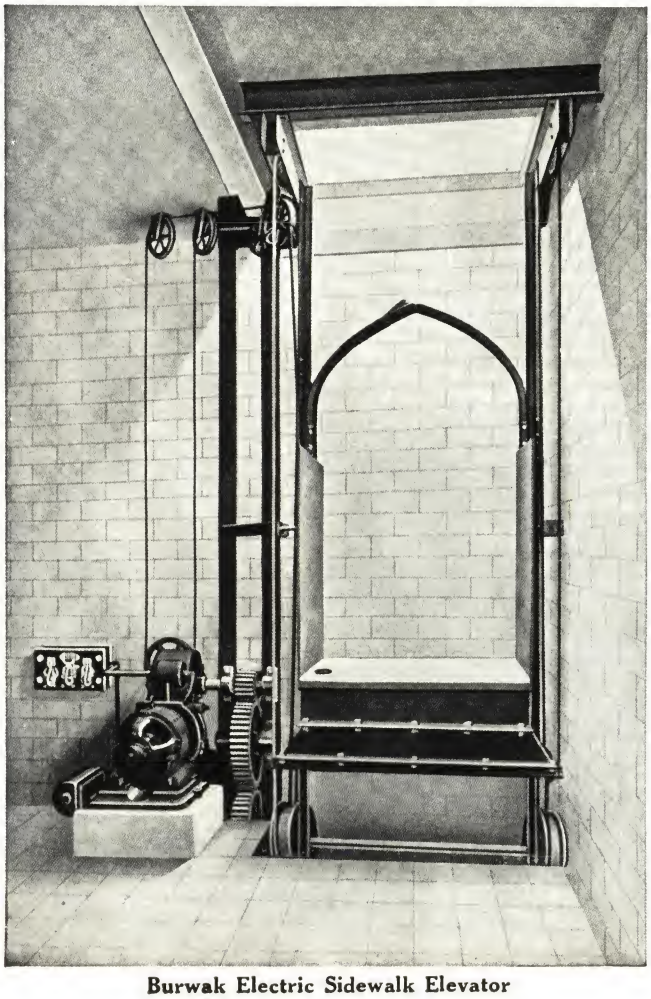
Burwak Electric Elevator Machine

Control

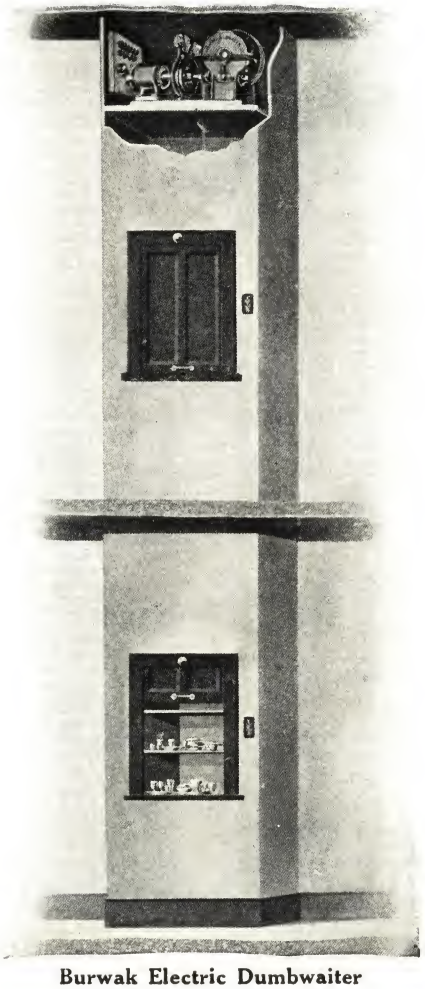
Full automatic push button—selective control—constant-pressure—car switch and hand cable control.

Operation

Our machines are especially designed for quiet operation especially on alternating current. This is a necessary requirement in hospitals, schools, hotels, apartment houses and private dwellings.



Burwak Electric Sidewalk Elevator



Burwak Electric Dumbwaiter

CAPITAL LIFT & MANUFACTURING CO.

Manufacturers of Freight and Passenger Elevators

Town and Lucas Streets, COLUMBUS, OHIO

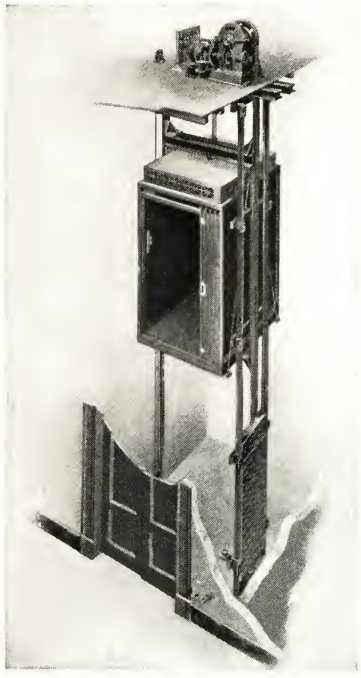
REPRESENTATIVES

AKRON, OHIO, C. M. Wilkinson Co., 1003 Central Depositors Bank Bldg.
CHARLESTON, W. VA., Kanawha Equipment Co.
CHICAGO, ILL., E. P. Haugen, First National Bank Bldg.
CINCINNATI, OHIO, Central Building Products Co., 622 Broadway
CLEVELAND, OHIO, C. M. Wilkinson Co., 819 Citizens Bldg.
DAVENPORT, IOWA, Herbert Hoefer, 2304 W. 3rd St.
INDIANAPOLIS, IND., Pierson Lewis Hardware Co., 115 E. Vermont St.
LANSING, MICH., Jas. E. Payne, 410 W. Saginaw St.
MILWAUKEE, WIS., Stanley Roth, 533 Farwell Ave.
MONTREAL, QUE., International Agency, Ltd., 309 St. Nicholas Bldg.
NEW YORK, N. Y., A. W. Berghoefer, 122 E. 42nd St.
PASADENA, CAL., F. G. Breidinger, 1000 E. Orange Grove
PHOENIX, ARIZ., Vernon L. Clark B. M. Co., 341 No. First Ave.
ST. LOUIS, MO., Atlas Machinery & Supply Co., 1407 Pine St.
ST. PAUL, MINN., John G. Pease, 296 Cecilia Place
SAN FRANCISCO, CAL., Walter E. Day, 16 California St.

For our pages on Electric and Hand Operated Dumbwaiters and on Ash Hoists, see Manufacturers' Index

ELECTRIC PASSENGER AND FREIGHT ELEVATORS

Electric Passenger Elevators



Our passenger installations are modern in design, safe and reliable in operation and are especially suitable for hotels, apartment houses, stores, hospitals, sanitariums, offices, schools and other public buildings. Capacities range up to 4000 lbs. Car speeds vary from 50 to 300 f.p.m. Control may be as follows:

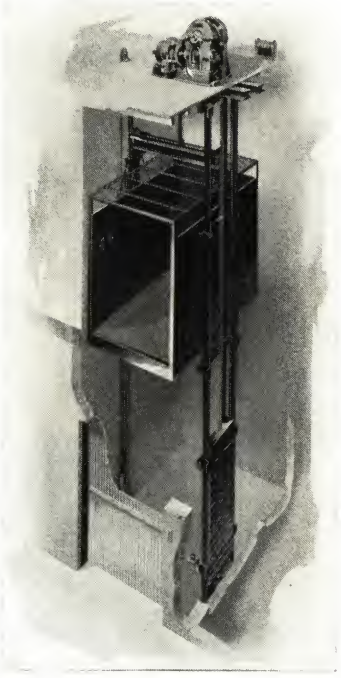
Control No. 1—Car switch, giving operator complete control of the elevator at all times. Such control is suitable for offices, stores, hotels and similar buildings.

Control No. 2—Constant pressure push button by means of up and down push buttons at each landing and in the car; the constant pressure of which will cause the car to ascend or descend and stop when the pressure on the button is released. Vision panels should be placed in the hatchway doors to enable the operator from the outside to properly land the car. Limit switches in the hatchway will stop the car at the terminal landings, regardless of the operator.

Control No. 3—Full automatic push button with call buttons at each floor for calling elevator and a bank of push buttons in the car, marked for the various floors.

Control No. 4—Semi-dual control, consisting of call buttons at each floor and a bank of push buttons in the car with a throw-over switch in the car, which will disconnect the floor buttons, placing the elevator in the control of the operator.

Control No. 5—Variable voltage by means of motor generator sets and suitable control panel. Operation is by means of car switch or push buttons. 3 or 4 speeds may be provided to meet car speed requirements.



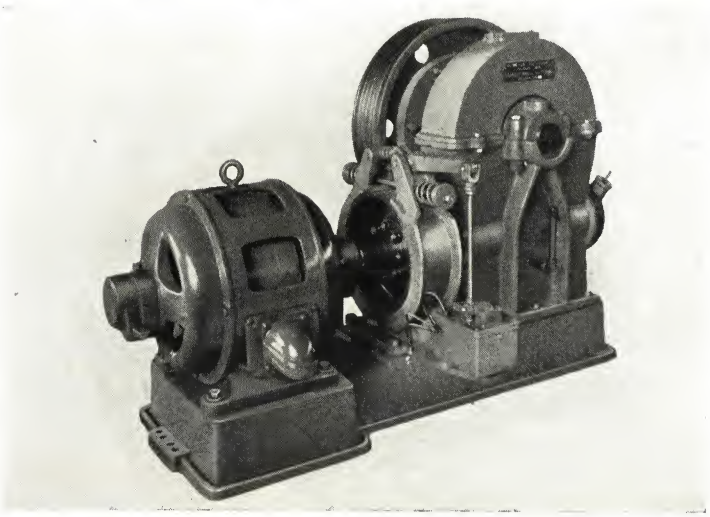
Hatchway Measurements

In general the hatchway should be 18 in. wider than the car postwise and 3 in. deeper than the car, front to back, plus 4½ in. at each side where doors occur. Pits should be of various depths depending upon speeds and local ordinances. The distance between the top floor and the supports for the machine beams will also vary according to the speed and local codes but in no case should be less than 12 ft. 6 in.

The penthouse should be not less than 7 ft. high above the floor.

Residence Elevators

We also manufacture small residence elevators carrying three to six passengers at 35 to 70 f.p.m. They are safe, dependable and easily operated.



Capital Freight Elevators

Are used for all purposes in all types of buildings. Cars may be of any size to suit individual requirements with entrance in one, two or three sides. Capacity and speed may vary to suit the requirements of the traffic and the height of the building. Control may be by means of shipper rope, hold-in or constant pressure bush buttons, full automatic push buttons or car switch.

These elevators are highly efficient, dependable and durable, and are suitable for the most exacting service.

SIDEWALK LIFTS

Model No. 20 Sterling Electric Sidewalk Lift

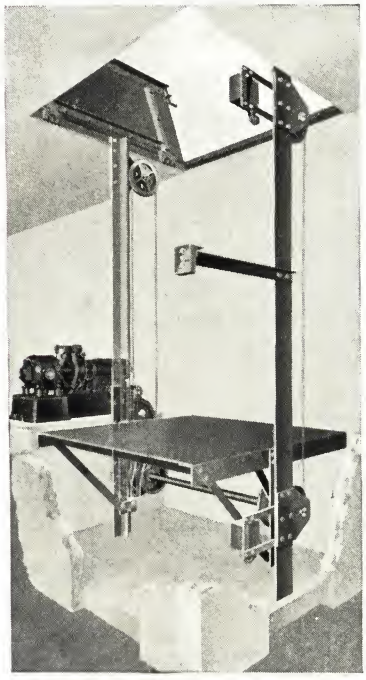
For stores, hotels, hospitals, restaurants, schools, libraries, railroad stations, warehouses, manufacturing plants, etc., where goods are to be handled from the basement to the sidewalk level or from one floor to another.

Capacities run from 500 to 5000 lbs.

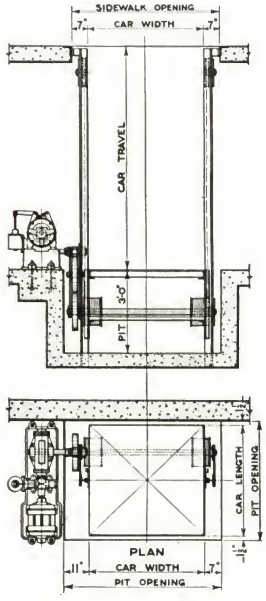
Standard speeds for sidewalk lifts are 20 to 25 f.p.m. When placed inside the building where it is not necessary to operate the doors with the car, the speed may be 40 to 50 f.p.m.

Control—Any standard elevator control may be used.

Gearing—The worm gear speed reducer is self-contained, mounted on single bed plate with automatic electric brake and motor. Power is transmitted to drum shaft by cut gears enclosed in steel plate housing with bearings equipped with grease cups.



Model No. 20 Sidewalk Lift



Installation Diagram, Model No. 20

Automatic Limit Stops—Automatic limit stops are used for stopping car automatically at terminals regardless of the operator.

Bows—Sidewalk lifts may be equipped with bows for operating sidewalk doors when desired, in which case the doors should be center opening.

Enclosures—Cars may be enclosed on two or three sides, the same as freight elevators.

Safety Devices—The Model 20 Sidewalk Lift may be equipped with instantaneous safety devices, which will automatically lock the car to the guides in case the cables break.

Warning Gongs — May be furnished with a bell placed at the sidewalk, which will ring during the up direction of the car.

Machines — May be placed on the right or left-hand side as desired.

Model No. 40 Heavy Duty Sidewalk Lift

This hoist is the same in most respects as the Model 20 described above. It has this difference: that four steel angle guides are used and the car is carried from each of the four corners by four cables.

This model is used where the platform is quite large or for heavy loads.

Model No. 12 Junior Platform Can Lift

This electrically operated hoist is suitable for handling ash cans, garbage cans, oil barrels or similar objects.

The platform should not exceed 6 or 7 sq. ft. in area and the live load may range from 200 to 700 lbs.

The platform speeds are 17 to 20 f.p.m. For very light loads, the speed may range to 35 f.p.m.

Control may be by shipper rope or constant pressure push button.

Automatic limit stops are used for stopping car automatically at terminals regardless of the operator.

Model No. 41 Chain Geared Sidewalk Lift

This model is designed for use when the loads are comparatively light but the cars are of greater size than is practical with Model 12.

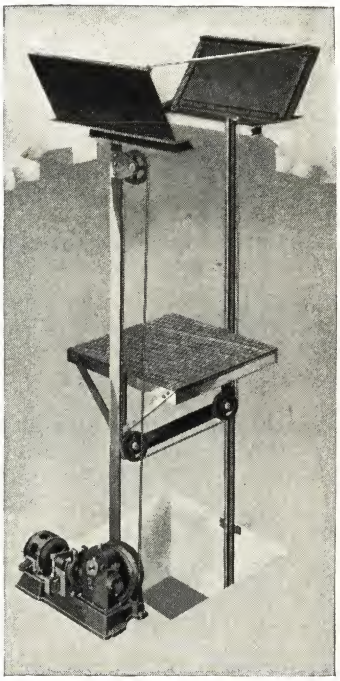
It has two drums, similar to Model 20, but the power is transmitted from the worm gear reducer by means of heavy steel sprocket chain. It has capacity of 1000 lbs. at 25 f.p.m. and the car may be 5 ft. square or less. Clearances for this model are the the same as for the Model 20.

Model No. 21 Hydraulic Plunger Sidewalk Lift

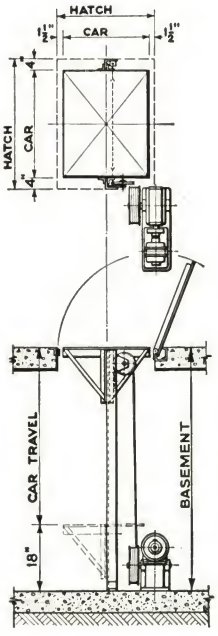
Made to operate from city water supply where the pressure at the valve exceeds 40 lbs. per sq. in. The lifting capacity depends on the size of the platform and the water pressure. Ordinarily it ranges from 500 lbs. to 3000 lbs. Car speed around 20 f.p.m., depending on the supply line. Control is by shipper rope.

Data Required for Estimate

Size of car or opening, length of travel, load desired, state if inside or outside of building, if inside give clearances above upper landing, type of control, electric current available or water pressure.



Model No. 12 Sidewalk Lift



Installation Diagram, Model No. 12

ESTABLISHED 1883

KIMBALL BROTHERS COMPANY

Electric Elevators

TELEPHONE, 149

1000 Ninth Street, COUNCIL BLUFFS, IOWA

BRANCH OFFICES

MINNEAPOLIS, MINN. DENVER, COLO. SALT LAKE CITY, UTAH TULSA, OKLA. LOS ANGELES, CAL.
KANSAS CITY, MO. DETROIT, MICH. ST. LOUIS, MO. DES MOINES, IOWA

Products

Manufacturers of a complete line of GEARLESS and GEARED ELECTRIC ELEVATORS for both passenger and freight service, including Variable Voltage Control, Automatic Operated Push Button Elevators, Dumbwaiters, Hand Elevators, Ash Hoists; and of the nationally advertised KIMBALL LIGHT ELECTRIC ELEVATORS.

Design

Kimball Elevators are designed under the supervision of our own Engineering Department and built complete in our own factory, by expert craftsmen.

Experience and Establishment

Forty-eight years as successful manufacturers and builders of hand power and electric elevators. KIMBALL BROTHERS CO. is an established firm of high financial standing and integrity. Kimball Elevators are backed by factory service of highest character.

Straight Line Drive Machine

The demand for conservation of space is met efficiently by the Kimball Straight Line Drive Machine.

All Kimball Geared Traction Elevators use it as a special Kimball feature.

Comparison Between Old Type and Kimball Straight Line Drive Machine—Old type machine assembled as three individual units—motor, brake and machine—each a separate unit aligned and bolted separately to bed plate.

Kimball "Straight Line Drive" machine is assembled with machine frame, brake base and motor mounting as one solid, compact unit, assuring positive and permanent alignment between the moving parts.

Old style, three-unit type, is not so compact, involves many parts, is more easily disaligned and is more expensive in upkeep.

Kimball "Straight Line Drive" machine, single unit type is compact (occupies about two-thirds the space required by old type), inexpensive and efficient in operation.

Gearless Traction Elevator

The gearless traction elevator has been developed for high speed service, ranging from 450 to 700 ft. per minute. The gearless traction machine is a slow speed multi-pole shunt wound direct-current motor, having armature brake wheel and drive sheave mounted on one continuous sleeve. The Kimball Gearless Traction Machine embodies the same rugged and liberal design as the geared type.

Low operating cost, and flexible means of control, make this elevator especially desirable for high speed installation.

Geared Traction Passenger Elevators

The geared traction elevator of the single wrap "V" groove type, has been generally adopted as the standard machine for buildings of moderate height requiring speeds of from 100 to 400 ft. per minute, for passenger service.

The Kimball Geared Traction Machines are equipped with motors specially designed for elevator service, and speed reduction is obtained through a worm and gear reduction to the "V" groove traction sheave.

In all Kimball Traction Geared Machines the gear is riveted direct to the web or sleeve, to which the traction sheave is attached, "web drive."

Hotel Utah, Salt Lake City, Utah

Salt Lake City's finest re-equipped with Kimball Ideal Gearless Traction Automatic Leveling Elevators

Freight Elevators

Kimball Straight Line Drive Freight Elevators are built very rugged in design and of heavy proportion, and embody the same fundamental-principle design as all other Kimball machines. Slow speed on heavy capacity freight elevators is obtained through two-to-one-hatch roping.

Push Button Elevator

The full automatic floor selective push button elevator has become a very popular type of control of late years, because it gives twenty-four hours daily service and eliminates its operator. Kimball Hatch Control Push Button Elevators are of the "straight line drive" type, are very simple in design and construction, easily operated and especially accurate at the floor stops. This machinery is especially practical for use in hospitals, apartment houses, residences, office buildings, factories, banks, and elsewhere.

The two-button, or "hold-in" type push button control is gaining rapid popularity for freight and passenger installations.

Safety

Kimball built is safely built. All Kimball elevators are equipped with recognized practical safety appliances as recommended by Federal, State, and municipal codes and casualty insurance requirements.

Recommendations

Passenger Elevators—For buildings 10 to 12 stories or more, we recommend car speed ranging from 250 to 400 ft. per minute. In smaller cities where the demands are not so great, we find a speed of 150 to 200 ft. per minute very satisfactory and especially economical and practical. In estimating capacities on passenger elevators, it is common practice to figure 75 lb. per sq. ft. of cab area. An allowance of 400 sq. in. per person is accepted as general practice.

Freight Elevators—These are made of any size to suit the particular industry in which they are to serve. It is considered good practice to keep the size of the platform as small as practical for the type of merchandise to be transported, inasmuch as floor space is exceedingly valuable. It is desirable to make platforms narrower postwise than front and back. This arrangement enables the manufacturer to more adequately brace and truss the platform and sling.

Catalogue

We publish a large quantity of valuable literature covering all types of elevators. This literature wil be sent free, postpaid, to any architect upon request.

Kimball "5A"-Light Electric Elevator

Some years ago, the Kimball Light Electric Elevator, a new idea, startled the builders in industry. It afforded a means of vertical transportation of the lighter capacities at a price of which other manufacturers said "impossible." Today Kimball Light Electric Elevators are in operation from coast to coast and gulf to border, and thousands of satisfied owners are enthusiastic boosters of this long desired achievement. Inexpensive, standard passenger or freight elevator service for your smaller type of office, industrial, retail and hospital buildings, regardless of height, puts the electric elevator within the reach of all owners. Standardization of design and size, and the tremendous demand for this machine, enable even the small town merchant to economically install and operate a Kimball Light Electric Elevator and realize a quick return on his investment.

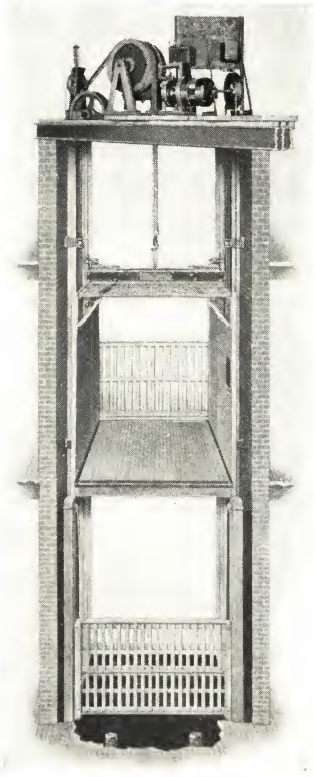
Range—Most any desired range of capacity and speed can be easily obtained with the Kimball "5A"-Light Electric, in general as follows:

Capacity 1000 lb., speed 65 to 100 ft. per min.
Capacity 1500 lb., speed 50 to 75 ft. per min.
Capacity 2000 lb., speed 30 to 60 ft. per min.

For special capacities and speeds, write the factory.

Adaptability—Kimball Light Electric Elevators are manufactured by us equipped with safety devices to comply with all Federal, State and city elevator laws and insurance recommendations, including the A.S.M.E. Code.

Machine—The Kimball "5A" Traction Machine is especially designed for the Kimball "5A" Elevator by our own engineers and manufactured in our own plant. This machine is of the Kimball Universal Straight Line Drive type, assembled as a single unit.



Kimball "5A"-Light Electric Elevator

Worm Gear—Cut on special hobbing machines from solid phosphor bronze and riveted direct to web, or sleeve to which the "V" groove traction sheave is bolted. (Sleeve drive.) No keys used.

Worm—Cut from solid stock carbon steel and ground to fit gear.

Brake—Kimball oil submerged electro-magnet release type, spring applied, operating Kimball flexible band (not a cast iron shoe). Brake lined all the way round with special composition brake lining.

Motor—Standard manufacture high torque type, ring-oiled, of ample horsepower, specially made for the Kimball "5A" Machine. The entire Kimball "5A" Machine unit mounted on single cast iron bed plate with raised oil rib.

Control—Kimball "5A" Elevator Controllers are made in the following popular designs.

Hand Rope—A mechanical control of the simplest type. Pulling the cable starts, stops or reverses the elevator, equipped with automatic platform locking device and final stop buttons.

Full Magnet—For faster freight or passenger installations, a full electrically operated mechanism with self-centering car switch, "dead man handle" type, in the car for starting, stopping and reversing elevator. Emergency or "hold elevator" switch attached to starter.

Floor Selective Push Button (Automatic)—The popular control for hotel, hospital, apartment house or general use. Requires no operator. Push the button and call the elevator, step in the car and push the button opposite the desired landing, and the elevator takes you to your destination, stops automatically and permits you to leave car without interference from any other landing.

Non-selective or "Hold-in" Push Button—A very desirable simplified control, largely supplanting the hand rope type; consists of two buttons at each landing and two buttons in car. Press and hold in the "Up" or "Down" button and you are carried to your destination. Remove pressure on button and elevator stops. Equipped with automatic top and bottom safety stops.

All controllers fitted with electric hatch limit safety switches, as standard equipment. Where city or State requirements demand, or where owner desires, controllers are fitted with phase failure and phase reversal, sequence relays and emergency release, and no-voltage features.

Details—***Guides***—Steel planed and matched T's are furnished as standard equipment (unless otherwise specified).

Bail, or Safety Sling—Built of steel angle uprights and steel channel crosshead with corner brace irons.

Cables—The Kimball "5A" Electric Freight Elevator is hoisted by three ½-in. Swedish iron cables, giving ample factor of safety.

Note: For passenger service four ½-in. cables are furnished.

Gates—Safety hatch gates are furnished as standard equipment, and where codes require they are equipped with electric contacts and locks.

Enclosure—Freight platforms are enclosed on two or three sides with wood wainscot enclosure, as standard equipment. Steel enclosure may be had at a nominal extra charge.

Canopy—On freight cars the top is fitted with a diamond wire mesh canopy.

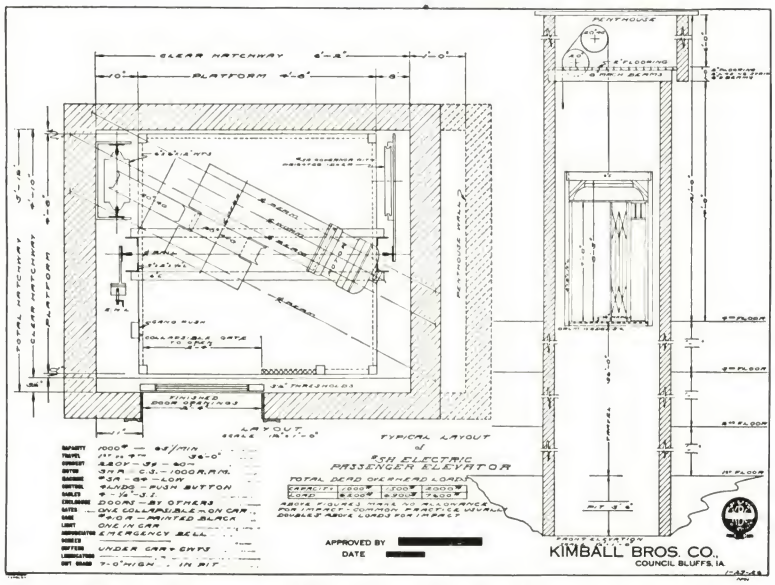
Bumpers—Spring bumpers are furnished for installation in the pit under the car, as standard equipment.

Light—A lighting fixture with control switch and conductor cable is furnished on all jobs as standard equipment.

Foundation—The machine, controller, governor, etc., rest on a foundation of three steel I-beams by KIMBALL BROTHERS COMPANY. The wood flooring is to be furnished by the owner.

Cabs—We can furnish any desired design of ornamental passenger cabs and will gladly furnish illustrations upon application.

Alternative Features—***Maple Guides***—While the Standard Kimball "5A" Elevator "5A" Elevator is designed for steel guides, in many cities the code does not demand this construction. In such an event, a considerable saving can be realized by the substitution of maple guides for steel. The equipment is the same as our standard machine, except for the guides themselves, the guide shoes and the wood post type safety catch.



Typical Layout of Kimball "5A"-Light Electric Elevator

Installation—The basic construction features of the Kimball "5A"-Light Electric Elevator make its installation a very simple operation. If the owner wishes to erect it himself we provide him with complete details, sketches, plans and descriptions, free of charge, showing clearly easiest and quickest way to make installation.

Guarantee—The guarantee on Kimball "5A"-Light Electric Elevator fulfills the requirements of the A.I.A.

Correspondence Invited—Your client will appreciate an investigation of the Kimball "5A"-Light Electric. Write us for a detailed descriptive folder on this equipment. The architect will find this machinery adaptable to a large field of practical uses. There is a Kimball elevator built for every requirement.

MARSHALL BROTHERS CO.

Passenger and Freight Elevators

21st and Mary Streets, South Side, PITTSBURGH, PA.

MARSHALL ELEVATORS
TRADE-NAME

Products

PASSENGER and FREIGHT ELEVATORS: Electric, Hydraulic, Belt and Hand Power; DUMBWAITERS.

Also, Sidewalk Lifts, Invalid Elevators and Telescopic Ash Hoists: Electric, Hydraulic and Hand Power.

Electric Elevators

Passenger Elevators—Controlled by car switch or push button. Designed for office buildings, residences, factories, apartments, etc. Geared and gearless types.

Freight Elevators—Built in all sizes and capacities. Operated by car switch, push button or hand cable.

Our automobile electric elevators are specially designed for extra heavy duty.

Dumbwaiters—Electric dumbwaiters, operated by push button, made to suit any size hatchway.

Note: All of the above types of elevators are for alternating or direct current. Variable voltage control can be supplied for all types of equipment.

Hydraulic Plunger Elevators

For all water pressures and for freight purposes, as well as for dumbwaiter service.

Belt Power Elevators

Made for freight service where it is more desirable to use belts from main shaft or countershaft for driving power.

Hand Power Elevators

These are for use in stores, factories, residences, etc., where no electric or other power is available.

Special Types of Elevators

We also manufacture sidewalk lifts, invalid elevators and ash hoists, operated by electric, hydraulic or hand power.

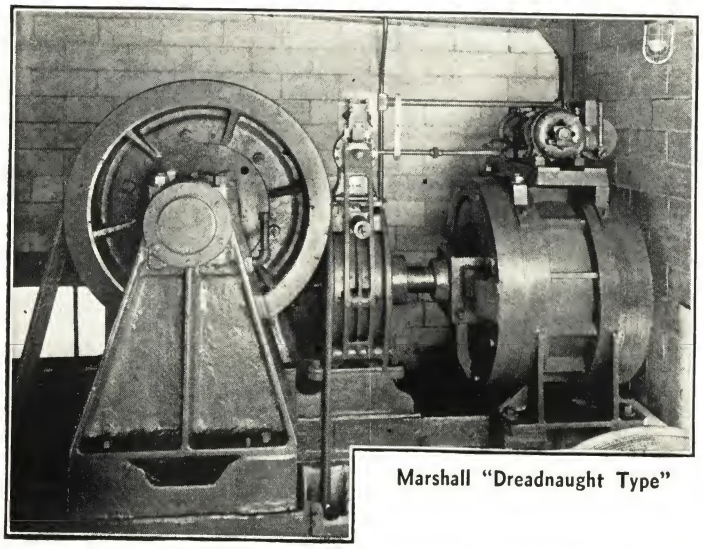
Data Required for Estimates

We will furnish on application, data sheets showing information required for making estimates.

Over a Century in the Engineering Field

We have been in business for many years and maintain a service department, enabling us to supply repair parts promptly.

We will gladly give engineers, architects and owners the benefit of our experience in connection with the installation of all types of elevators.



Marshall "Dreadnaught Type"

Marshall "Dreadnaught Type" 24-in. worm geared elevator machine equipped with flange driven, removable V-groove drive sheave; powerful electro-hydraulic brake; two-speed, 8-to-1 speed ratio, high torque, squirrel cage, induction type motor. Self-lubricating throughout. Ball or roller bearing optional.

Control, automatic push button, floor leveling type.

Installation for Byllesby Engineering & Management Corporation, capacity 5000 lbs., 200 ft. per minute

Partial List of Marshall Elevator Installations

COMPANY	NUMBER
*Aluminum Company of America, Pittsburgh, Pa.	2
*American Sheet & Tin Plate Co., Pittsburgh, Pa.	8
*Carnegie Steel Co., Pittsburgh, Pa.	6
*Follansbee Brothers Company, Pittsburgh, Pa.	4
*Harbison-Walker Refractories Co., Pittsburgh, Pa.	24
*Hazel-Atlas Glass Co., Pittsburgh, Pa.	12
*Jones & Laughlin Steel Corp., Pittsburgh, Pa.	2
*Locomotive Stoker Company, Pittsburgh, Pa.	3
*Mesta Machine Company, Pittsburgh, Pa.	4
*National Lead & Oil Company, Pittsburgh, Pa.	2
*Oil Well Supply Company, Pittsburgh, Pa.	3
*Parcel Post Terminal, Pittsburgh, Pa.	3
*Pennsylvania Railroad Co., Pittsburgh, Pa.	11
*Pittsburgh Plate Glass Co., Pittsburgh, Pa.	25
*Pressed Steel Car Co., Pittsburgh, Pa.	3

*We have installed elevators in various plants of these companies.

COMPANY	NUMBER
*Standard Sanitary Mfg. Co., Pittsburgh, Pa.	15
*Standard Underground Cable Co., Pittsburgh, Pa.	6
*Union Supply Company, Pittsburgh, Pa.	9
Auto Body Company, Lansing, Mich.	2
Carborundum Company, Niagara Falls, N. Y.	19
W. S. George Pottery Co., East Palestine, Ohio	6
Ford Motor Car Company, Glassmere, Pa.	1
Homeopathic Hospital, Pittsburgh, Pa.	3
Keystone Driller Company, Beaver Falls, Pa.	2
Motroup Steel Products Co., Beaver Falls, Pa.	2
Mahoning Foundry & Machine Co., Youngstown, Ohio	6
New York & Pennsylvania Co., Johnsonburg, Pa.	4
Peoples Institute, Pittsburgh, Pa.	2
Phoenix Glass Company, Monaca, Pa.	9
Physicians Office Building, Pittsburgh, Pa.	1
U. S. Government Hospital, Dawson Springs, Ky.	2

MONTGOMERY ELEVATOR COMPANY

MOLINE, ILL.

BRANCH OFFICES, SALES AGENCIES AND SERVICE STATIONS

CHICAGO, ILL.
PEORIA, ILL.
ROCKFORD, ILL.
SPRINGFIELD, ILL.
DETROIT, MICH.
KANSAS CITY, MO.
ST. LOUIS, MO.
WICHITA, KAN.
DENVER, COLO.
DES MOINES, IOWA
SIOUX CITY, IOWA
CEDAR RAPIDS, IOWA
BURLINGTON, IOWA
OMAHA, NEB.
SCRANTON, PA.
TULSA, OKLA.
HOUSTON, TEX.
SALT LAKE CITY, UTAH
SEATTLE, WASH.
TACOMA, WASH.
SPOKANE, WASH.
PORTLAND, ORE.
LOS ANGELES, CAL.

Products

PASSENGER and FREIGHT ELEVATORS: Gearless Traction Type; Geared Traction Type; Variable Voltage Control; Pre-registering Signal Control; Self-leveling Elevators; Push Button Full Automatic; Cumulative Push Button Automatic; Simplified Push Button Freight Elevators; Electric Dumbwaiters.

Heavy Duty Freight Elevators

Our combination of ball bearing construction, with simplification of control, has resulted in a popular, dependable freight elevator, requiring the minimum amount of care or expert attention for maintenance.

Cumulative Button Control for Passenger Elevators

For automatic passenger elevators in apartment houses, hospitals, and similar buildings, the MONTGOMERY ELEVATOR COMPANY has developed and perfected a system of control whereby every signal from every floor is registered and accumulated, so that the car will answer every call in proper sequence automatically. The passengers will not be left waiting at their landings indefinitely, or passed up by the car while it is in use by someone else.

This Montgomery cumulative control makes the service of an automatic elevator much more effective and pleasing to the occupant of the building. It saves car mileage in handling the passengers between their respective floors, and consequently reduces wear and tear on the machine and cuts down current consumption. It eliminates the necessity of dual control or the use of an operator, even during rush periods in apartment houses or hospitals. The cost of this cumulative feature is very little in excess of the cost of the ordinary push button automatic type.

This control can also be arranged to return the car automatically, and park it at the main floor after it has been used by any passenger.

Electric Passenger Elevators

Smooth, quiet operation and accurate control, combined with every modern safety feature, are characteristic of Montgomery passenger elevators. Our variable voltage control gives the ultimate refinement for high-speed service.

Self-leveling Elevators

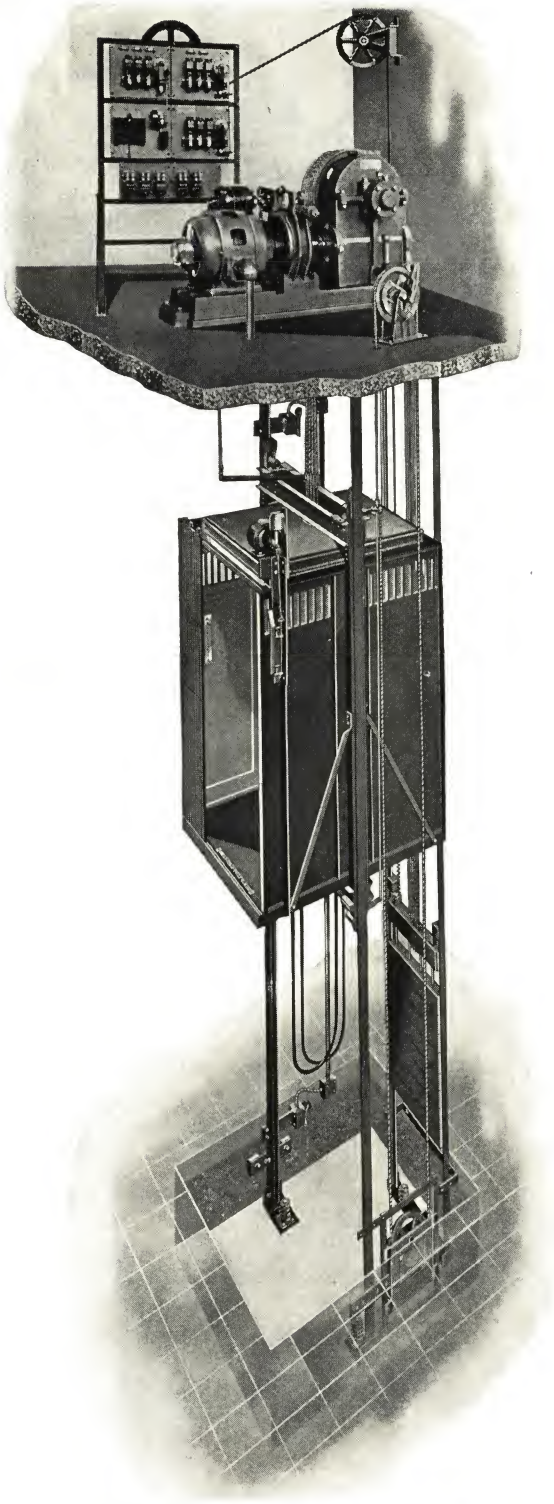
Where precision is desired at the landings, Montgomery self-leveling elevators are used, for either freight or passenger service.

Facilities

A completely equipped plant enables this company to execute orders without delay and at reasonable prices.

Co-operative Services

Our engineering department is at the service of architects and engineers. Any required information concerning construction data relative to elevators and dumbwaiters, preliminary layout showing loading stresses, etc., also estimates, will be sent on request.



Cumulative Control Passenger Elevator

OTIS ELEVATOR COMPANY

GENERAL OFFICES
Otis Building, 260 Eleventh Avenue
NEW YORK, N. Y.

OFFICES IN ALL PRINCIPAL CITIES OF THE WORLD

FACTORIES

BUFFALO, N. Y. HARRISON, N. J. QUINCY, ILL. YONKERS, N. Y.

AND IN FOREIGN COUNTRIES

Member of The Producers' Council, Inc.

Products

ELEVATORS: Electric, of all kinds, including Automatic Signal Control; Automatic Collective Control; Automatic Department Store Signal Control; Micro-Leveling; Multi-Voltage Control; Car Switch; Operatorless; Automatic Push Button; and Double Button Control.

ELEVATOR ACCESSORIES of all kinds.

ELEVATOR SIGNAL SYSTEMS and DISPATCHERS.

ELEVATOR CARS, CAR DOORS and GATES and OPERATING MECHANISMS; OTIS SAFETY CAR GATES.

ELEVATOR DOORS, and DOOR CLOSING AND LOCKING MECHANISMS; DOOR HANGERS.

DUMBWAITERS: Electric.

ELEVATORS: Hydraulic, Steam, Belt and Hand Power.

ESCALATORS or MOVING STAIRWAYS.

CONVEYORS: Gravity, Spiral.

HOISTS: Vertical Screw; Automatic Skip; Blast Furnace; Mine. Stock Line Recorders.

INCLINED ELEVATORS and DOCK ELEVATORS.

INCLINE RAILWAYS.

COMMERCIAL STEEL CASTINGS.

Planning Service

Elevator service, particularly in the larger class of buildings with thousands of tenants, is an engineering transportation problem. The number, type and control of elevators can only be properly determined from extensive experience and records covering thousands of installations of all types.

The OTIS ELEVATOR COMPANY, with 79 years of experience in the elevator industry and maintaining 178 offices in this country, will gladly co-operate with architects, owners and tenants in supplying proper elevator installations for any building. Drawings showing hatchway sizes, clearances, overhead supports, loads on beams and all other details will be gladly furnished by any of its offices as a means of assistance in preparing building plans.

Design and Manufacture

Otis Elevators provide any type of service from the simplest to the highest speed automatic control for intensive service.

They are not an assembly of non-related manufactured articles, but are complete equipment designed in their entirety by Otis Engineers with their years of experience, entirely fabricated in Otis factories, and especially designed for the work they are called upon to perform.

All parts are standardized and can readily be obtained in stock at any of the offices.

TRADE-MARK

Electric Elevators

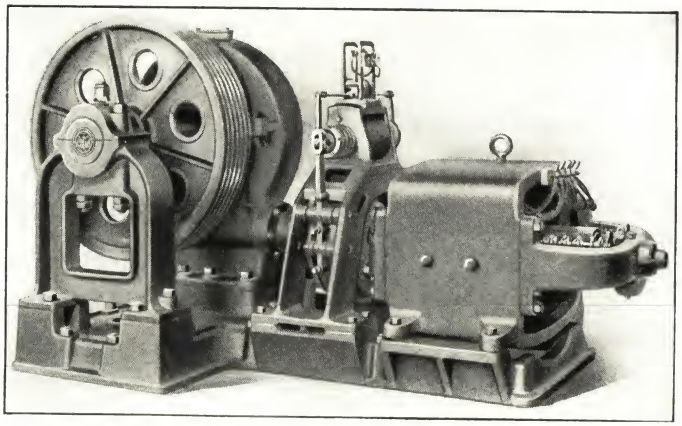
Electric elevators have practically superseded all other types of elevator equipment, except for a few special purposes. The electric elevator is the most efficient and reliable type; requires less space than other types; is more easily operated and costs less to install and maintain.

There are two types of electric elevators, the single wrap or geared traction, and the gearless traction. Both types have the inherent safety feature of the traction drive which prevents any possibility of the car or counterweight being drawn into the overhead work. Both geared and gearless machines may be furnished with Otis Micro-Leveling and also may be equipped with the latest development in unit-multi-voltage control.

Single Wrap Geared Traction Elevators—On this type of elevator the car is driven through a driving sheave on the machine operated through worm gearing by a motor of 700 to 900 revolutions per minute. Car speeds range up to 400 ft. per minute. This type of machine is generally used for ordinary freight work and for moderate passenger requirements where conditions of rise, load, speed and service required would not warrant the use of the higher grade gearless elevator.

Gearless Traction Elevators—The gearless traction elevator is the highest development of the electric type and provides speeds up to 1200 ft. per minute, with the possibility of still greater speeds whenever building requirements warrant.

This type of elevator employs a slow speed high torque motor, with a driving sheave mounted on a spider which is integral with the armature shaft. All intermediate gearing is thus eliminated, as the slow speed



Otis Single Wrap Geared Traction Elevator Machine

motor enables the car to be driven directly from the sheave, by means of ropes which pass around the sheave, and then to the car and the counterweight.

Easy and smooth operation, starting and stopping, and very high efficiency are features of this machine.

In cases where larger capacities at more moderate car speeds are required, this type of machine can still be utilized by roping the car and counterweight on a 2:1 arrangement.

Current Characteristics—Single wrap traction elevators can be operated on direct or alternating current of commercial current characteristics. Alternating-current passenger elevators of the single wrap type are available at car speeds of 400 ft. per minute with two speed motors and Car Switch Control. All gearless traction machines are operated by direct current motors. However, with unit-multi-voltage operation, using alternating-current source of supply, it is possible to use gearless traction, direct-current, high speed elevators in any location.

Micro-Leveling Elevators

The increasing demand for high efficiency in elevator service has been met by Otis Micro-Leveling Elevators for both high speed passenger and heavy duty freight elevator service. With this distinctive Otis feature, the elevator is automatically leveled with the floor landing, regardless of whether it has over or under run the landing. This level is automatically maintained regardless of stretch of ropes or change of load on the platform. This saves time by eliminating false stops, speeds up the service, reduces current consumption, saves wear and tear on the machinery and prolongs its life.

It is available wtih Car Switch or automatic forms of control and for either geared or gearless machines.

Otis Gearless Traction Micro-Leveling Elevator Machine

Multi-Voltage Control

Unit-Multi-Voltage Control, with a separate motor generator set for each elevator, provides the smoothest possible rate of acceleration and retardation without discomfort to the passengers. This results in the highest quality of operation and, in connection with the gearless traction Micro-Leveling elevators, meets the most exacting demands of modern elevator service. It permits higher car speeds and smoother operation than has heretofore been possible; handles more passengers per hour and is very economical in power consumption. It also makes it possible to use direct-current gearless machines where alternating-current source of supply only is available.

Control Systems for Electric Elevators

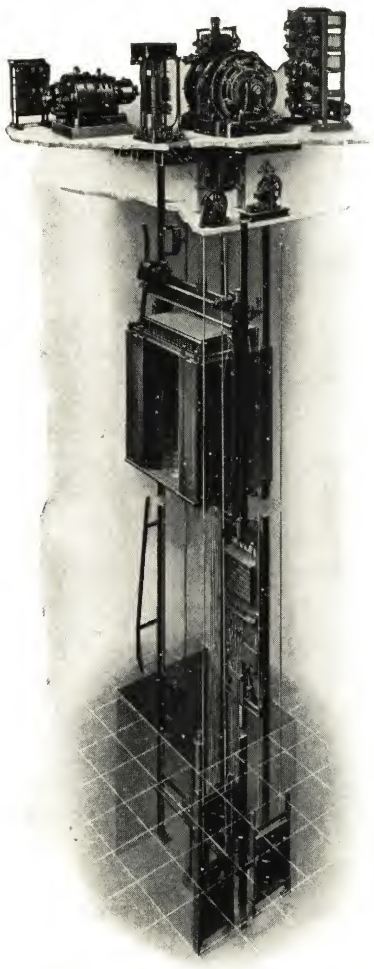
Signal Control—The finest type of elevator service is now provided by Otis Automatic Signal Control, designed primarily for the most intensive service in the highest class of buildings. This type of elevator, combined with Micro-Leveling and Multi-Voltage Control, is entirely automatic in operation and provides car speeds up to 1200 ft. per minute.

These elevators are operated by means of a bank of buttons in the car to correspond with the floors served, and by up and down buttons on the floors. The attendant in the car presses the proper button as each passenger, upon entering the car, announces the floor at which he wishes to alight. When the car is signaled to start from the first floor the operator releases the hatchway doors which close automatically; the car starts automatically and runs to the first landing for which a button has been pressed where it stops automatically and the doors open automatically. As soon as the transfer of passengers is completed the attendant releases the doors and the cycle of operation is repeated for each floor for which a button has been pressed. Intending passengers on the floors press the button indicating the direction in which they wish to travel, and this call is then registered directly upon the controller of the first car traveling in the desired direction. Signal lanterns are provided in front of each elevator entrance to indicate to waiting passengers which car will serve their call.

Hatchway doors are power operated to insure the minimum time at landings.

Department Store Signal Control—This is an adaptation of Signal Control, used primarily for department stores, and is available for several conditions of service—uniform, intensive service necessitating stops at all floors; service with variable intensity, requiring stops only at floors at which passengers have indicated their desire to enter or leave the car; or it might be a combination of the two types. This latter condition might be such that for certain floors of the building, it would be desirable to have the elevator automatically stop at every floor and then arranged so that stops at other (usually higher) floors would be made only on signal from the hall

buttons, or by pressing buttons in the car. However, any of these other floors could also be arranged for automatic stopping on every trip. When the car is stopping automatically in answer to hall buttons, or by intention of the operator at any particular floor, the doors open automatically as the car stops, and when the operator releases them they close automatically and the car starts automatically. Variations in automatic stopping arrangements are available. This type of elevator is also provided with Micro-Leveling and Unit Multi-Voltage Control. Car speeds up to 500 ft. per minute are available, depending upon the service requirements.



Typical Otis Signal Control Installation

Collective Automatic Control—This is a development of the automatic push button control along the lines of Signal Control. This operation overcomes the disadvantages of the ordinary push button operation, which are comparatively slow speeds necessary to make landings automatically, and the necessity of having the car serve only one floor at a time.

With Collective Control the elevator stops at every floor for which a button has been pressed in the direction in which the car is traveling, thus picking up all waiting passengers in that direction. This type may be combined with Micro-Leveling and Multi-Voltage operation and car speeds of 600 ft. per minute are available. This control, therefore, considerably enlarges the field of automatic operation without operators so that they may now be used in large apartments and small hotels. Two or more elevators may be inter-connected to furnish automatic service when one elevator is insufficient during rush hours. Full details of varying conditions of service which can be met with the different types of automatic operation are available at any of our offices.

Hand Rope—This type of operation for electric elevators is practically obsolete and has been superseded by double button operation.

Double Button—This control consists of call buttons at each floor and up and down buttons in the car. Constant pressure on any hall button will call the car to that floor if the gates are closed and the elevator is not already in use. Pressure upon a button in the car will cause the car to travel in the corresponding direction. This control is only used for freight service and supersedes the hand rope control, having the advantage of operation without the necessity for having an operator constantly on the platform.

Automatic Push Button—This type of control meets, with full safety, the requirements of infrequent service without a regular operator. Call buttons are provided at each floor and a full set of operating buttons in the car. Safety and non-interference devices, together with gate and door locks and contacts, provide safety for the passengers and general public using the building.

This form of control is usually limited to use in private residences, private office buildings and the smaller apartment houses. It may also be used for heavy duty Micro-Leveling freight elevators as later described.

Another form of automatic push button control without an operator and for more severe traffic conditions is described under Collective Control.

Car Switch Control—This is the most generally used form of control for high class freight work and, heretofore, for nearly all passenger work. The car switch is arranged to return to stop position if released by the operator and the entire control system is fitted with every safeguard to prevent accidents. The higher speed passenger elevators are now, however, usually equipped with some form of automatic control.

Operatorless Elevators

In large warehouses or plants requiring a number of elevators capable of carrying industrial trucks, it has been found advantageous in some cases to group the elevators into banks of six to ten. These are then equipped with push button operation and Micro-Leveling, and the control of all those in each bank is in the hands of a central dispatcher working with an automatic telephone system and a conveniently located push button control board. Automatic door operating machines facilitate the service.

Car Safety Devices

All Otis power elevators are provided with steel car frames or slings in which the platform is securely fastened and braced, and with safety devices mounted underneath the car platform. These safety devices are operated by means of a centrifugal speed governor at the top of the hatchway.

In case of excessive descending speed of the car the safety device is operated by the governor and grips the car guides and prevents further descent of the car. On high speed elevators a governor switch first slows down the motor if the car speed should become excessive. If this does not suffice, the car safety device is then called into operation to stop the car.

Other Elevator Types

Hydraulic—Direct lift plunger elevators are still used advantageously for sidewalk and other short rise service, but geared hydraulic elevators are no longer installed except where electric power is not available.

Belt Driven—This type is driven from a line shaft with car speeds not exceeding 50 ft. per minute and is very seldom used.

Steam—Used only under exceptional circumstances.

Hand Power—Used only where service requirements are light and infrequent and do not justify the expense of power driven elevators.

Escalators or Moving Stairways

Used wherever it is desired to move people in large numbers continuously and rapidly, such as department stores, subways, elevated railways, railroad terminals, and even in industrial buildings.

They operate continuously with no waiting intervals and carry large numbers of people conveniently, quickly and without exertion. As they are constantly running they require only small motors and do not require operators, hence the operating cost is very small. They are available in 2, 3 and 4-ft. widths, with passenger capacities of 4000, 6000 and 8000 people per hour, respectively.

Gravity Spiral Conveyors

This equipment facilitates the delivery of packages from upper floors, saves manual labor and relieves the elevator system. They are principally used in department stores and warehouses, are very efficient and require no operating expense. They are built of steel, of the open or closed type and the diameter of the conveyor and the pitch of the blades depend upon the size and character of the packages to be handled. Several blades may be installed in one shell and with other features, afford a selective service of considerable range.

Automatic Skip Hoists

Otis Automatic Push Button Control Skip Hoists raise and deliver bulk material, such as coal, ashes, etc., and automatically return to loading position.

The form of control may be varied to suit conditions. This apparatus permits of a reduction in manual labor required for this class of work, and thus effects a considerable saving in operating expense. They are rugged in design and built to withstand the heaviest character of service.

Blast Furnace and Mine Hoists

Otis equipment for these purposes fulfills every condition of this nature and is designed from broad experience in meeting severe requirements for such equipment. Each installation is an individual engineering problem and carefully studied and worked out as such. Many Otis installations of this nature attest the superior quality of the service provided.

Inclined Elevators

These are used for carrying trucks of merchandise from floor to floor in department stores, railroad and steamship terminals and warehouses, also for unloading freight from steamships to docks by means of trucks.

Vertical Screw Elevators

Otis Vertical Screw Elevators are now available for use as console, orchestra and stage lifts, as well as for other types of short rise elevator work where conditions warrant.

Incline Railways

These are used for a variety of purposes, such as handling passengers for sightseeing purposes, such as the ascent of Lookout Mountain near Chattanooga, or for ordinary business transportation of traffic between separate levels, such as the Weehawken Incline.

Installations of this character are also matters for individual study in order to select apparatus to meet the varying conditions of each case.

Commercial Steel Castings

We are now prepared to furnish the highest class commercial steel castings from customers' patterns or drawings. These are made by the electric processes in our steel foundry at Buffalo.

Latest Otis Developments

Electric Dumbwaiters — Otis Electric Dumbwaiters, of the same high class as elevator equipment, are now available. They are made entirely in our own factories, of an entirely new and very efficient design, based upon long experience.

These dumbwaiters are supplied in several types of push button control to suit varying conditions and service requirements.

Elevator Accessories—Under the new Otis policy of manufacturing and supplying all elevator accessories the purchaser has the advantage of buying a complete operating unit, manufactured under the same high class standards as elevators; serviced by Otis, and covered by the Otis guarantee which warrants the construction and operation of every part of the entire installation.

Cars—Cars, of new and attractive Otis design and manufacture, are now available for elevator work. These are new and modern designs following the trend of entrance hall and corridor decorations in the buildings of today.

Entrances—Otis hatchway entrances or fronts are now available in many pleasing designs and finishes to match the surrounding treatment in hallways.

Door Closers—Otis Manual Door Closers and Interlocks of the latest improved designs are available for all types of service. These are strong and rugged in character to meet the severe conditions of this type of service.

Door Operating Devices—Otis Power Operated Door Devices of either the pneumatic or electric type are now available. The use of either type materially reduces the time required at landings and so speeds up the service.

Door Hangers—We are prepared to supply for general use Otis Reliance Door Hangers, Otis Diamond Ball Bearing Hangers and Otis Two-point Suspension Hangers.

Signal Systems—Otis Signal Systems are now available for all service requirements. These systems are designed and built as an integral part of the elevator installation and not as a separate system merely assembled with the elevator. They contain a number of improvements which eliminate false stops of the elevator; save waiting time and speed up the service. Otis Elevator Dispatching Systems are also availabe. Signal fixtures of many modern and pleasing designs are available in many finishes to match the surroundings.

Otis Modernization Service

Special consultation service is furnished, without cost, to enable building owners and managers to increase their rentals and earnings by means of modernization of existing elevator equipment, including cars, signals and other accessories.

Otis Maintenance Service

A highly developed service of this nature is supplied to lengthen the life of the apparatus, increase safety and reduce maintenance costs to a scientific minimum. This service is available in the 178 offices of the company throughout the country. It covers several types of service for varying conditions.

OILDRAULIC LIFT CO.

Industrial Elevators and Automobile Revolving Lifts

EXECUTIVE OFFICES AND FACTORIES
MEMPHIS, TENN.

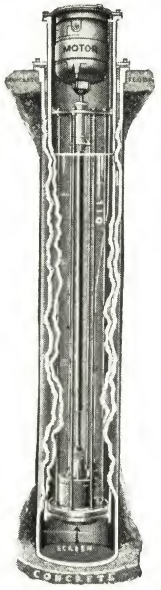
REPRESENTATIVES IN ALL PRINCIPAL CITIES

Products

Manufacturers of a varied line of HYDRAULIC LIFTS and ELEVATORS, in which oil is the hydraulic medium. Elevators are of varying capacities and speeds, both single and multiple ram, most of which are of special design to suit the needs of the customer. The units are practical for use in lifts of three stories or less for relatively slow speed equipment, either passenger or industrial. *And moderately priced.*

Uses

Oildraulic Elevators are built from specifications for each type of service, including special designs for sidewalks, machineshops, manufacturers, chemical plants, dairies, laundries, lumber kilns, incinerator plants, quarries, loading docks, warehouses, freight terminals, mortuaries, mausoleums, organ consoles, theatrical sets, hospitals, assembly room platforms, marble works, aerodromes, for all types of transfer systems, baggage and freight conveyors; for overcoming any inequalities in floor level in straight line production problems in every phase of industry.



Oildraulic Principle Automobile Lift

Features

Oildraulic Industrial Elevators embody the application of the Oildraulic Principle, which has proved so successful in automobile revolving lifts. Each is a unit within itself. Either horizontal or vertical power units available. Motors are supplied for all standard hookups. Since oil is used as the hydraulic medium, no difficulty is encountered from freezing. They are strictly one-man operated and subject to remote control if desired. Equipped with safety controls, and all types of approved safety control switches, according to specifications.

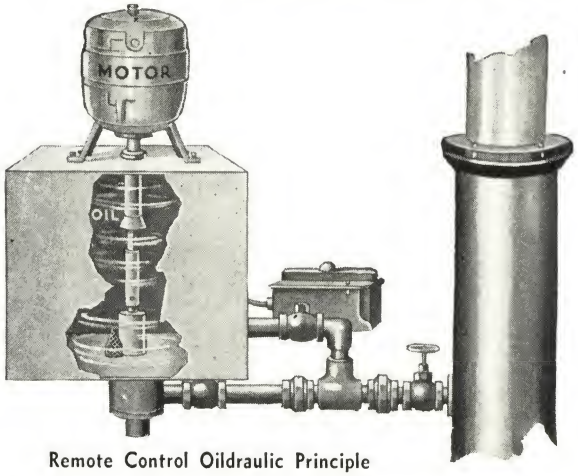
There are no overhead penthouses, cables, pulleys, racks, gears, windlasses. The design of the Oildraulic is a particular advantage in preparing old buildings for reconstruction as the elimination of overhanging structure ends the risk of weakening building structure incidental to elevator well. The Oildraulic is approved by elevator commissions, accident and industrial commissions.

Installation

Oildraulic Industrial Elevators are designed to be installed and put into operation by the ordinary mechanic. Complete details and wiring diagrams are furnished with each design.

Guarantee

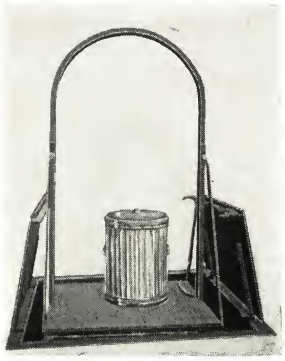
Oildraulic Industrial Elevators are guaranteed to be of high class construction, free from all operating defects. They are designed to be as distinctively satisfying and economical in service as the Oildraulic principle of operation is distinctive, sound, safe and economical in engineering principle.



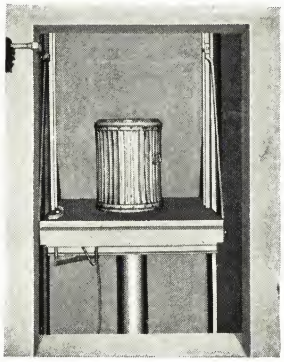
Remote Control Oildraulic Principle

Service Staff

Our staff of consulting engineers is maintained for the benefit of architects and construction engineers, and renders advisory service without extra charge. This is due to the fact that each Oildraulic Industrial Elevator is a custom built job made to ideally fit the specific service needs. Address inquiries to Service Staff, OILDRAULIC LIFT CO., Memphis, Tenn. Quotations willingly furnished without obligation.

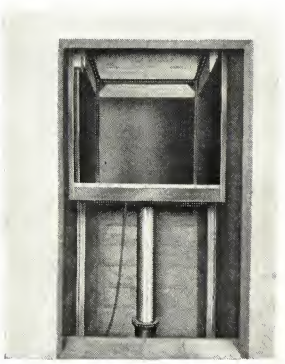


Oildraulic Sidewalk Elevator in Loading Position



Oildraulic Sidewalk Elevator in Lifting Position

Oildraulic Single Story Freight Elevator in Loading Position



Oildraulic Single Story Freight Elevator in Lifting Position

FOUNDED 1860

ASSETS OVER $1,000,000.00

THE WARNER ELEVATOR MFG. CO.

GENERAL OFFICES AND FACTORY

CINCINNATI, OHIO

BRANCH OFFICES AND SERVICE STATIONS IN MORE THAN FORTY CITIES

Products

A complete line of ELECTRIC PASSENGER and FREIGHT ELEVATORS for every service, including Warner-General Electric Gearless Equipment; Warner Elevator Cars and Enclosures. Work of the highest quality and finish.

WARNER ELECTRIC and HYDRAULIC CELLAR HOISTS; WARNER ELECTRIC DUMBWAITERS.

Also Warner Hand Power Elevators and Dumbwaiters; Warner Motors, Controllers and Motor Generator Sets and Levelers; Warner Enclosure and Car Door Operators and Interlocks.

Engineering Service

This company maintains a competent staff of engineers to make surveys, layouts and specifications for any class of elevator work. Because of the rapid advance being made in this field such advice is necessary to architects and quite generally used by them.

Send us copies of your preliminary building sketches with notes about the nature of the service wanted and you will get a prompt response suggesting the proper equipment and approximate cost.

Manufacturing Facilities

A modern factory with 250,000 sq. ft. of well arranged and well lighted floor space, filled with the best machinery that money will buy, enables us to produce a large volume of exceptionally high grade equipment.

A consistently followed policy of making improvements adaptable to existing machines has saved our customers considerable money. The use of accurate jigs and fixtures and a uniformly high standard of workmanship through many years, makes Warner Elevator Service valuable because repair parts or improvements will fit.

Warner-General Electric Gearless Elevators

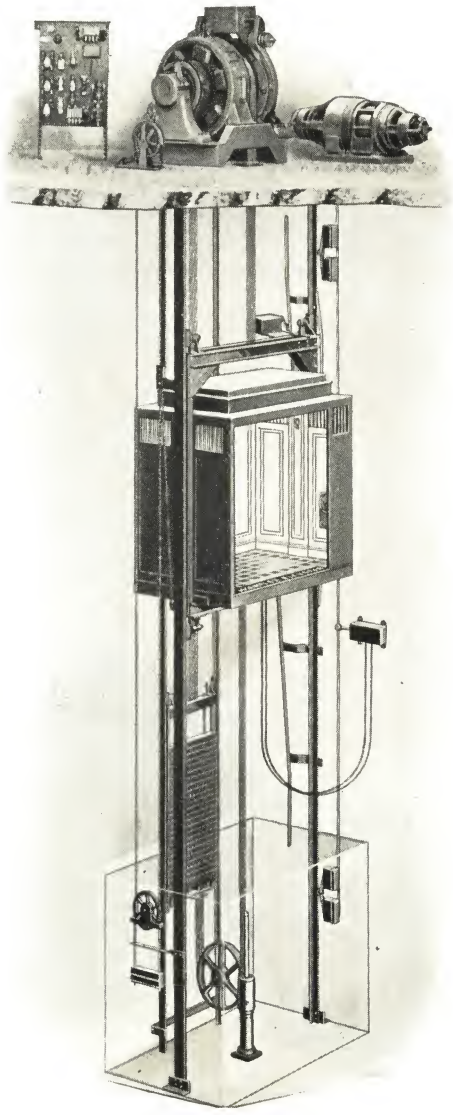
We manufacture a complete line of electric elevator equipment based on seventeen standard sizes of engines. These are manufactured on a production basis which permits the most accurate manufacturing practices.

Variations in the control and other features extend this line so we are usually able to bid on complete elevator equipment for any building that you may be planning.

We have had very successful experience with a new type of selective full automatic control known as Warner Multiple Call Control. This control enables the automatic elevator to handle successfully a large volume of traffic.

Our motor generator sets are of the highest quality—of moderate speed—run quietly and commutate successfully with considerable overloads.

Our variable voltage control systems are most dependable and require very little attention and upkeep. We advise such control when really fine passenger service is required, and on freight elevators where accurate floor level adjustments are necessary. With the variable voltage control a minimum for stop speed is about one-sixteenth of the full speed so that the brake becomes a holding, rather than a stopping means, and the factors causing variation in stopping are eliminated and extreme accuracy secured for car speed up to 500 ft. per minute.



Warner Electric and Hydraulic Cellar Hoists

These, as well as the regular passenger and freight elevators, are manufactured and installed. They are made to fit any conditions of building construction and in capacities to meet all requirements.

Warner Electric Dumbwaiters

The same careful design, rugged construction, exhaustive tests and many years' experience in building Warner Elevators are also applied in the Warner Electric Dumbwaiter. For all kinds of control.

ESTABLISHED 1903

F. S. PAYNE CO.

Elevator Manufacturers

GENERAL OFFICE AND WORKS

CAMBRIDGE, MASS.

BRANCH OFFICES

FRANKLIN, MASS. BOSTON, MASS. LOWELL, MASS. NEW HAVEN, CONN. PROVIDENCE, R. I.

Products

ELECTRIC and HYDRAULIC ELEVATORS: Passenger, Freight and Sidewalk Elevators; Multivoltage; Automatic Collective Control; all types of Manual Control.

Also manufacturers of Ash Hoists.

For Payne Dumbwaiters, see Manufacturers' Index.

PAYNE

TRADE-MARK

Experience and Services

This company was organized in 1903 under the present name and although its progress has been almost unparalleled, there have been few changes in personnel or policy.

During this period the expansion in equipment and facilities has anticipated the requirements of customers for new elevators, and repairs or remodeling of old apparatus.

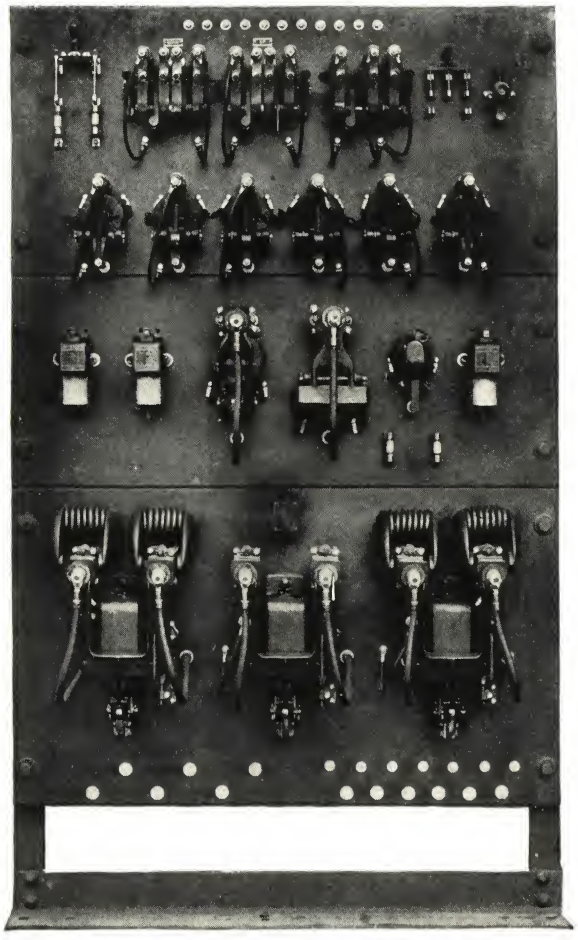
Payne Elevator Machines

Payne Elevator Machines represent the most modern development in refinement without sacrificing that ruggedness and stability which long experience has proved so essential in any equipment classified as a permanent capital investment.

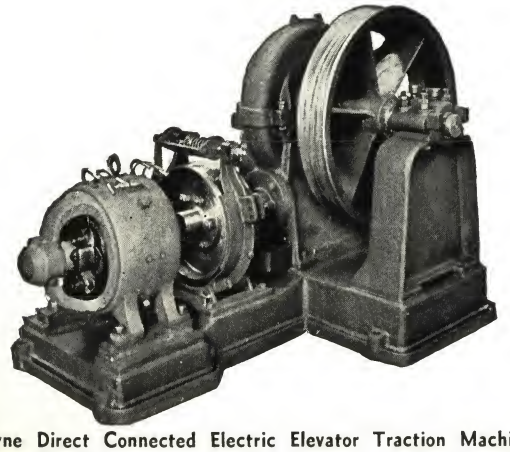
The trend toward higher elevator car speeds has necessitated continual improvements in the design of every part of our product.

Safety and smoothness of operation, the outstanding characteristics of "Payne Elevators," have attained a greater degree of perfection than was dreamed possible a few years ago.

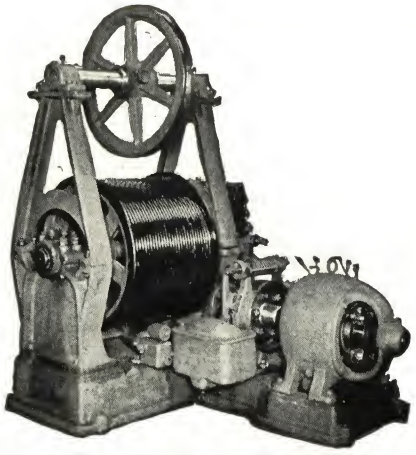
Economical maintenance and continuous service, the indicators of elevator values, are assured to all users of "Payne Elevators" as is attested by the character of our references.



Payne Variable Voltage Elevator Controller



Payne Direct Connected Electric Elevator Traction Machine



Payne Direct Connected Electric Elevator Drum Machine

Payne Elevator Controllers

Payne controllers are the product of an engineering corps who have designed elevator controllers for over 25 years. These controllers are manufactured for every service and method of operation and embody no mechanical or electrical compromise. (See illustration on previous page.)

Automatic Push Button Control—Particular attention is directed to automatically operated elevators as they can be adapted to every service and effect a great economy by eliminating the cost of an operator's services, reducing electric current consumption and lengthening the life of the entire apparatus as it is not subjected to carelessness and abuse as are manually operated elevators.

Payne push button control systems are a model of simplicity in design, which is the greatest assurance of continuous service.

Collective Push Button Control—This system permits any number people on the car to register on the push buttons their individual destinations and the car will automatically stop at each floor registered. The car will also stop at all landings for passengers at which a call has been registered.

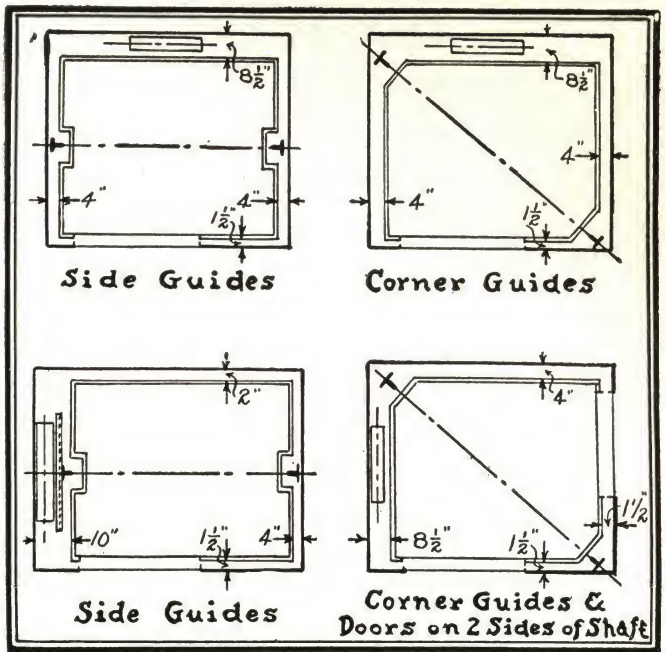
Information Required for Estimates

Building (type) .....
Address .....
Service (passenger or freight) .....
Water pressure available (for plunger elevator) .... lbs.
Size of car desired (.... ft. .... in. by .... ft. .... in.).
Location of machine (in penthouse over hoistway or on basement floor adjacent to hoistway) .....
Construction of hoistway (brick, concrete, steel, tile or wood. If tile or wood, also advise floor construction) .....
.....
Control desired (hand rope, car switch or automatic push button) .....
Load to be lifted ..... lbs.
Electric current—
Direct: ..... volts.
Alternating: .... phase; .... cycles; .... volts.
Travel: Number of floors to be served .....
Actual distance elevator is to travel, i. e.:
Floor heights from lowest to top landing ..... ft. ..... in.
Distance from top floor level to underside of roof over hoistway .... ft. .... in.
Gates required, number and type preferred (semiautomatic or full automatic) .....
Number of openings to elevator hoistway on each floor.....
Are all openings on one side or adjacent or opposite sides of hoistway? .....

General Information Regarding Elevators

In deciding upon the most advisable capacity, car size and car speed and number of elevators for a building, there are many questions which arise in regard to the number of people or weight and area of freight to be carried in a given time. All these questions are usually disposed of by specifying a high car speed, due to the false impression that increased speed necessarily expedites service proportionately.

High speed means high initial, operating and maintenance costs and not infrequently there is little or no return for these charges.



TYPICAL ELEVATOR CAR LAYOUTS.

All elevators are stopped at various landings, more particularly freight elevators, the greater part of the time; and the actual time elevators are in motion is very small.

More consideration should be given to increasing the width of the entrance to the car and having liberal sized corridors or loading areas at each floor, as delays at landings, due to congestion, are the principal cause of unsatisfactory service.

As the speed of a manually operated car increases, greater premium is placed on the human element—that is, the operator—which is contrary to the general practice of the day. An operator loses more time, and does untold damage to the apparatus in endeavoring to make accurate stops, than can be gained by having the car operate at a high speed.

The engineering facilities and experience of this company are at the service of all without any obligation being entailed.

References

Aberthaw Construction Co.
Marc Eidlitz & Son, Inc.
Swift & Company
Stone & Webster Engineering Corporation
Turner Construction Co.
Standard Oil Company
United States Rubber Co.
American Woolen Company
Colts Patent Fire Arms & Ammunition Co.
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THE SHEPARD ELEVATOR COMPANY

Pioneer Manufacturers of Ball Bearing Electric Elevators

2413-2431 Colerain Avenue, CINCINNATI, OHIO

REPRESENTATIVES AT

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SHEPARD

Products

A complete line of BALL and ROLLER BEARING EQUIPPED GEARED and GEARLESS ELECTRIC PASSENGER and FREIGHT ELEVATORS with all types of control, including Car Switch, Automatic, Dual, Collective and Signal; Rectifier and Unit Multi Voltage type controllers a specialty.

An extensive line of Shepard Built Elevator Accessories for distribution to elevator dealers, such as complete Hoisting Machines, Ball Bearing Motors and Motor-generators; Electric Brakes, Controllers, Contactors, Control Accessories; Reverse Phase Relays, Overload Relays, Limit Switches, Car Safeties and Governors, Car Door Operators, Interlocks, etc.

Shepard Service

THE SHEPARD ELEVATOR COMPANY is one of the few elevator manufacturers who build the complete equipment in their own shops. The advantage of this unique position is reflected in their reputation as producers of quality equipment.

Gearless Traction Elevator Machine
Shepard Built

Distinctive Features of Construction

Shepard elevator apparatus is scientifically designed and accurately manufactured by recognized elevator experts.

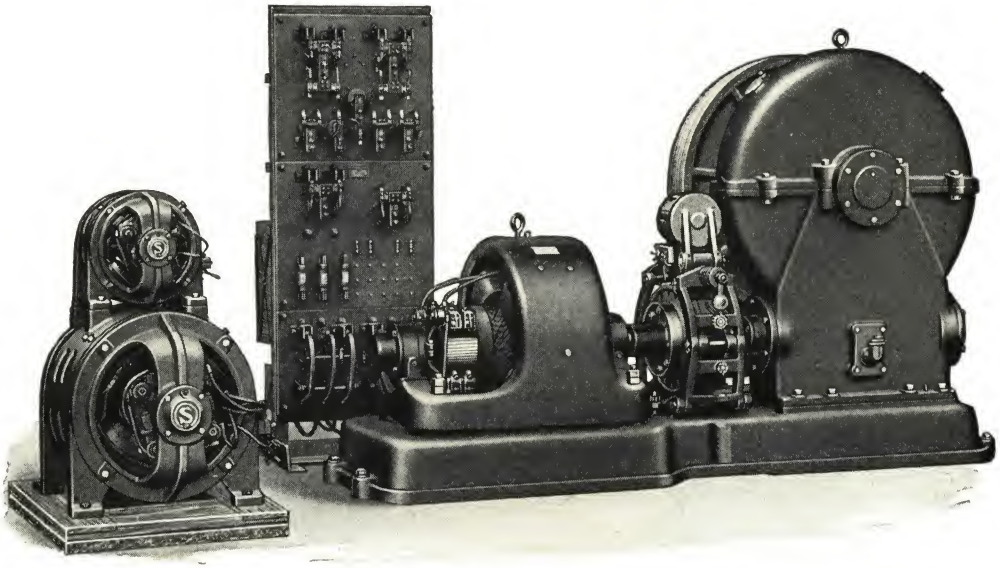
The liberal use of ball or roller bearings not only means durability with low operating and maintenance cost but illustrates the efforts of THE SHEPARD ELEVATOR COMPANY to produce equipment of the highest possible quality.

Skillful designing is reflected in the Shepard hoisting machine, brake, controller and floor selector.

Dynamically balanced parts and flexible couplings eliminate noise and vibration.

The brake, a simple mechanism, completely adjustable by hand, meets the exacting requirements of elevator service.

Simplified control and contactors of snappy action all contribute to the superiority of Shepard equipment.



A Complete Variable Voltage Unit for Operation on Alternating-current Power Supply, Used on Speeds Up to 550 Ft. per Minute

ELEVATOR PLANNING

Hatchway Planning

The hatchway layouts given below are typical of best planned elevator installations.

The apartment elevator layout may be used for either swinging or sliding hatchway doors.

In case oil buffers and compensating chains or cables are required for the passenger elevator, the space shown on the layout for the counterweight provides room for this equipment, otherwise the hatchway depth may be reduced 2 ins.

Passenger elevators should be proportioned so as to allow 2 sq. ft. per passenger or 75 lbs. per sq. ft. for lifting capacity.

Freight elevators must be planned for the service they are to perform. The layout below gives hatchway clearances and allowances for fireproof doors of two types.

Penthouse Planning

The proper setting or mounting of the elevator machine overhead is shown in the sketches below.

The machinery should not be set upon the concrete penthouse floor slab even with cork or lead isolation unless a secondary soundproofing slab is installed underneath as shown.

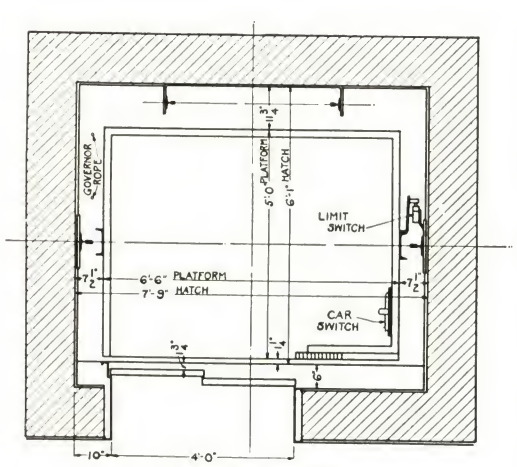
Arrangement No. 1 is recommended for hospitals, hotels and apartments.

Arrangement No. 2 is more economical than arrangement No. 1 and is very satisfactory for the smaller outfits. In this case the machine sets directly upon steel beams which are supported at the ends only and clear of the penthouse slab.

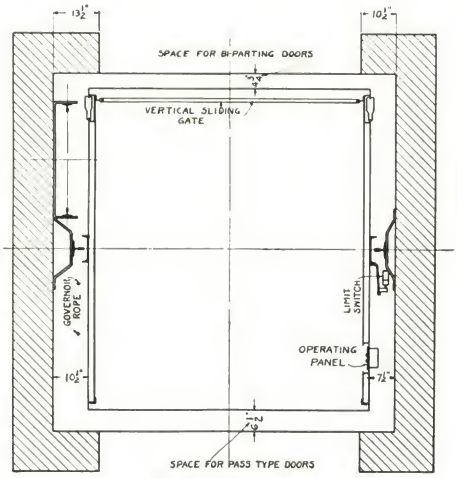
These mountings, Shepard developments, are very effective in eliminating the sound of the running machinery.

Rated speed, ft. per min.	Top floor to underside at penthouse slab, ft.	Pit depth, ft.		
		With spring buffers	With oil buffers	With oil buffers and compensating cables
0 = 150	14	4½	.....	.....
150 = 350	15	5½	6	8½
350 = 500	16	6½	7½	10
500 = 600	16½	.....	9½	10
600 = 800	17	.....	10½	11

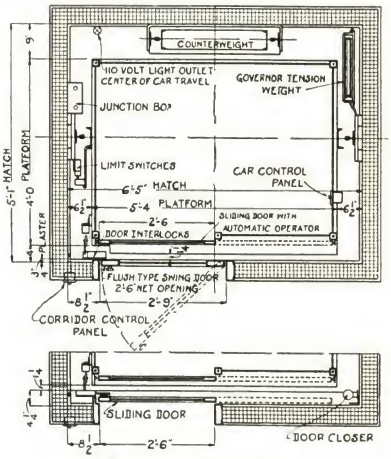
The table gives distance from top floor to underside of the overhead slab and depth of pits required for Shepard passenger elevators. These dimensions are in accordance with the Bureau of Standards Code which is becoming generally adopted.



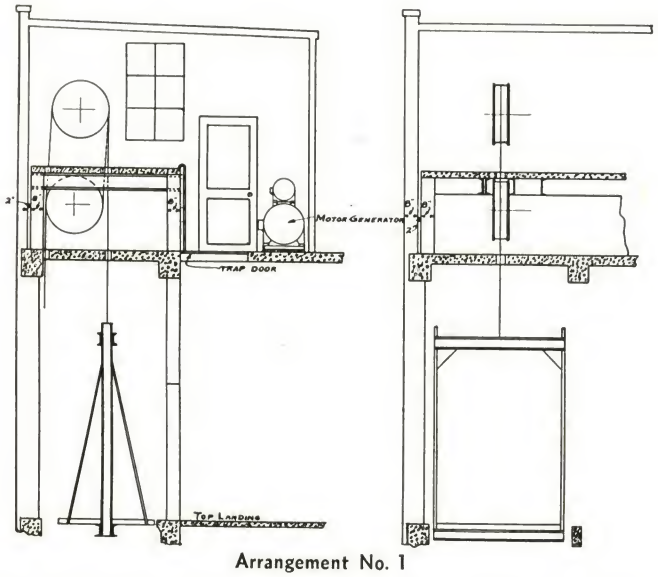
Passenger Elevator



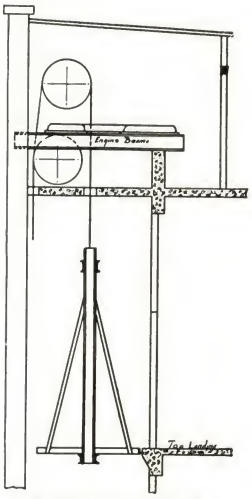
Freight Elevator



Apartment Elevator



Arrangement No. 1



Arrangement No. 2

Send for Pamphlet Giving Complete Data for Elevator Planning and the Handling of Elevator Traffic

WATSON ELEVATOR COMPANY

INCORPORATED

407 West 36th Street
NEW YORK, N. Y.

FACTORY
HOBOKEN, N. J.

Products

ELECTRIC ELEVATORS:

Passenger and Freight Elevators.

Combination Passenger and Freight Elevators.

Sidewalk Elevators.

Elevator Controllers.

Description

Products of highest quality materials—combined with precision of workmanship—assuring perfect operation and efficiency.

Machine (Illustrated)

Worm gear drive. Capacities range from 1000 to 20,000 lb. Speeds range from 25 ft. to 500 ft. per minute. Horsepower of motors, 5 to 100.

Brake

Electric brake equipment of modern design. Oil immersed—spring applied.

Controller

(The principal element of the elevator equipment.)

Watson Control Boards, both alternating and direct current, are manufactured in various sizes and fabricated to insure accuracy and efficiency.

Built in various designs with three modes of operation.

(a) Car Switch Operation—Services of operator required.

(b) Push Button Operation (or Self-service)—Operated by passenger.

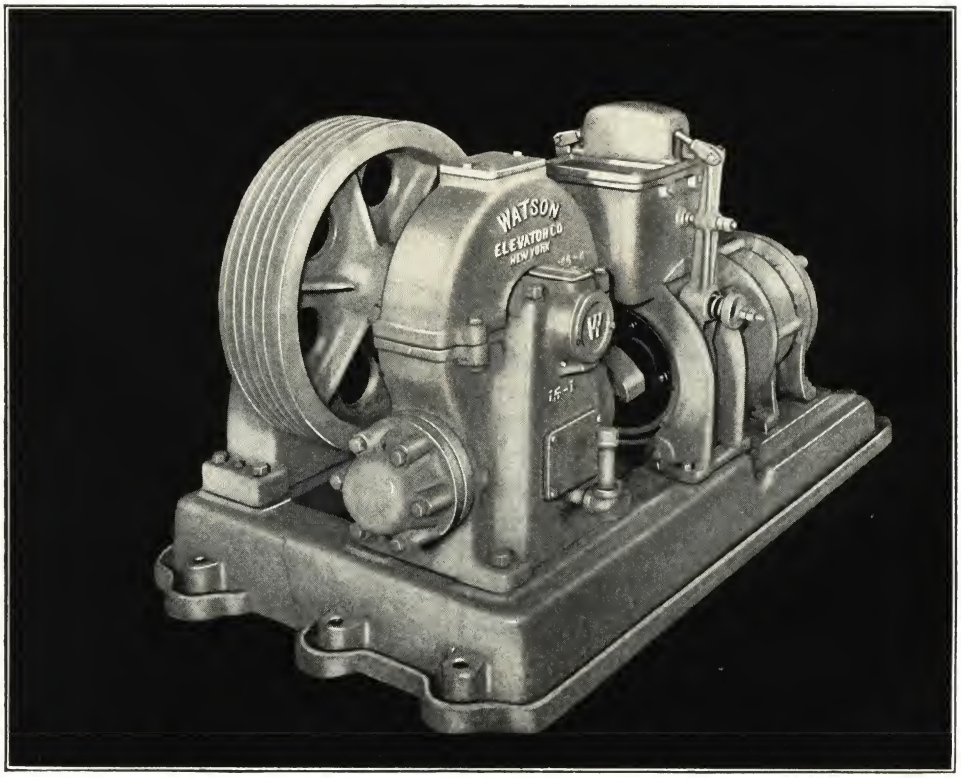
(c) Dual Operation—May be used with or without an operator.

Electric Car Gate

Watson Electric Gate insures maximum safety and comfort to passengers. An electric motor controls its functions—obviating the necessity of opening and closing the gate by hand.

Service

The expert engineering advice of the WATSON ELEVATOR COMPANY is at the disposal of architects and engineers requiring preliminary layouts, drawings or specifications—without cost or obligation.



Watson Electric Elevator Machine

ELEVATOR SUPPLIES COMPANY, INC.

Manufacturers of ES Products of Quality
HOBOKEN, N. J.

DISTRICT OFFICES

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CHICAGO, ILL., 165 West Wacker Drive
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LOS ANGELES, CAL., 1120 South Hope Street
PHILADELPHIA, PA., 1720 Ludlow Street
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SAN FRANCISCO, CAL., 186 Fifth Street
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CANADIAN REPRESENTATIVE: Canadian Elevator Equipment Co., Ltd., TORONTO, ONT.

Products

ELECTRIC DOOR OPERATORS; ELECTRIC GATE OPERATORS; PNEUMATIC DOOR OPERATORS; ELEVATOR DOOR CLOSERS; ELECTRIC and ELECTRO-MECHANICAL INTERLOCKS; ELEVATOR DOOR HANGERS; ELEVATOR CAR GATES; AUTOMATIC RELEASE GATE CLOSERS; SAFETY CURTAINS FOR CAR GATES; GUIDE RAIL LUBRICATORS; PRE-REGISTERING SIGNAL SYSTEMS; ELEVATOR SIGNAL SYSTEMS; ELEVATOR DISPATCHING SYSTEMS; ELECTRIC DUMBWAITERS; TELEVATORS and TELEVEYORS; FIREPROOF THEATRE CURTAINS; ORCHESTRA PLATFORM LIFT; ORGAN CONSOLE LIFT; and the "ROTOSCOPE".

Also Electric Operators for Bi-parting Freight Elevator Doors and all Standard and Special Elevator Signal Fixtures.

Experience

ELEVATOR SUPPLIES COMPANY, INC., has specialized for more than 40 years in the design, manufacture and installation of equipment for elevators. It has been the privilege of ES engineers to work with architects, contractors, engineers, elevator manufacturers and building owners in devising practical apparatus for the betterment of elevator operation, service and maintenance.

Obviously, a wealth of experience is behind ELEVATOR SUPPLIES COMPANY, INC.—experience that is unmistakably reflected in the quality and reputation of ES Products. This experience is ever available to those seeking a solution to the problems that constantly arise in the modernization of vertical traffic. It is available for the asking.

TYPE "W" ELECTRIC DOOR OPERATOR

(For Passenger Elevators)

Description

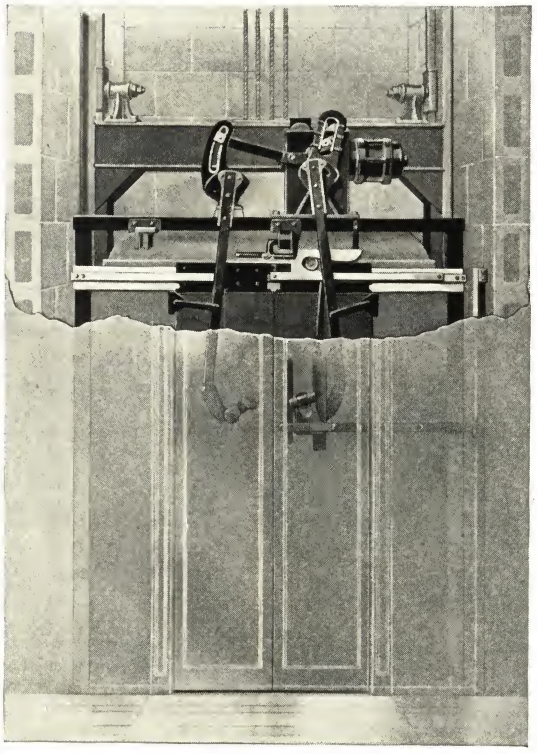
The Type "W" Electric Door Operator is used on passenger elevators for opening and closing car and hatchway doors. It is a unit mechanism located above the elevator car at the front of the car (see illustration).

Operation

Motor—A standard motor, operating through double reduction gears, transmits the power through an operating lever (or levers) to the car door or (doors).

Clutch Mechanism—On the car doors is mounted a clutch mechanism so arranged as to transmit properly the opening and closing motion to the operating lever of the hatchway doors so that the car and hatchway door panels will open and close simultaneously.

Oil Check Units—Two oil check units are assembled and arranged to provide cushioning action as the hatchway door and car doors near the limit of travel in either the opening or closing movement. Units are of ample capacity and readily adjustable to give desired cushioning effect.



Type "W" Electric Door Operator Applied to Two-speed Center-Opening Car Doors and Single Center Opening Enclosure Doors

Mounting

The entire operating device, consisting of motor, reduction gears and oil check units, is mounted on a base plate and is firmly fastened in place to an angle-iron supporting structure attached to the car platform and frame. The heavy duty ball-bearing hanger for the car door panels is also attached to the front of the angle-iron supporting structure.

Car and Hatchway Door Operation

Motion of the car and hatchway doors is controlled simultaneously by a switch located in the car. Power is applied only to the motor to move the doors through their limit of travel in either direction. Full power is applied to start the doors moving and is quickly reduced to a point where only sufficient power is applied to keep doors operating at uniform speed to the point where checking action begins. Should the doors be stopped in mid-travel, the reduced power application is removed and they are under control for reversal of motion. Should power fail, the doors may be opened or closed simultaneously by hand.

Near the front end of the hatchway door operating arm is mounted a large rawhide roller. Projecting slightly beyond the sill line, it is engaged by the clutch on the car doors when they are in either opening or closing motion, thus causing the simultaneous action of the car and hatchway doors. There is no contact between the roller and the clutch while the car is moving through the hatchway.

In this system, the doors operate smoothly in both directions, cushion silently at end of travel, and, engaged, both the car doors and the adjacent hatchway doors operate in absolute synchronism of motion; they are instantly reversible in either direction at full speed *without shock* and can be set to operate at any rate of speed desired, up to 3 ft. per second in either direction (timed from beginning of motion to within 2 inches of completed motion).

Interlock Switch

This is connected to the operating unit on top of the car and is so arranged that the car cannot be moved unless doors are completely closed.

Emergency Release Switch

A push button emergency release switch, requiring continuous pressure of the button, is furnished for temporarily short circuiting the interlock equipment.

Control Panel

Automatically controlling the power cycle of the door operator, the control panel is usually installed in the elevator machine room.

Car Door Hangers

Car doors are carried by heavy duty hangers, the sheaves of which are provided with large ball-bearings, and the vertical thrust sheaves with large roller bearings. Both sheaves are pivoted upon adjustable eccentric spindles. The housing thereof is bolted directly and rigidly to the top of the doors. The hanger track is made of alloy steel to our standard double radius design, which permits very close adjustment of sheaves.

Hatchway Doors

These, self-closing, are equipped with our standard straight-line self-locking door operating arms, one end of which is secured to a substantial abutment at the rear of the doors. These arms are provided with phosphor bronze pivot bushings, pivots for which are of hardened steel and arranged for Alemite lubrication.

NOTES

(1) If car doors are furnished by this company, guide shoes at bottom of car doors are self-aligning, silent, durable and may be replaced without removing doors.

(2) An outstanding feature of this system is the use of only two oil check units on the car door operating mechanism; there are no oil check units used with the hatchway door operating arms, thus eliminating maintenance expense.

(3) The car door clutch, which is mounted on the outside of the car doors, may be arranged to meet Safety Code requirements that prohibit opening of the hatchway doors until an arriving car is within a specified distance of the landing. (In the State of Pennsylvania, it is required that the car must be within 3 inches of a landing before the hatchway doors can be opened).

SPECIFICATIONS

The door operator contractor, unless otherwise specified, shall equip each of the following elevators and hatchway doors with a Type "W" Electric Elevator Door Operating System, for operation on 110 or 220 volts d-c., or 110 or 220 volts a-c., 3-phase, 60-cycle circuit (state which) as hereinafter described.

(Insert list of elevators and number of hatchway openings to be equipped for door operation.)

The operating device shall consist of a standard motor, double reduction gears and two oil check units and shall be mounted above the elevator car at the front of the car and shall be fastened firmly in place to an angle-iron supporting structure attached to car platform and car frame. The heavy duty ball-bearing hanger for the cab door panels shall also be attached to the front of the angle-iron supporting structure.

The standard motor shall operate through double reduction gears and shall transmit the power through an operating lever (or levers) to the cab door (or doors).

A clutch mechanism shall be mounted on the cab door (or doors) to properly transmit the opening and closing motion of the operating lever (or levers) to the hatchway doors so that the cab and hatchway doors shall be opened and closed simultaneously.

All doors shall operate smoothly in both directions, and cushion silently at the end of travel by means of oil check units of ample capacity and connected to the top portion of the power operated lever (or levers). Car doors and adjacent hatchway doors shall synchronize in motion and shall be instantly reversible at full speed in either direction without shock and operate at a speed of not greater than 3 feet per second in either direction, (timed from the beginning of motion on to within 2 in. of completed motion).

Motion of the car doors and hatchway doors shall be simultaneously controlled by a switch located in the car, the movement of which in one direction shall open the doors, and movement in the reverse direction shall close them, or a second reversal of the switch shall cause simultaneous reversal of the doors; in addition (if desired) the doors shall open automatically when the elevator car is leveling, and close automatically in response to the initial movement of the elevator controller when starting the car.

Means shall be provided for holding the car and hatchway doors in the closed position while the car is moving through the hatchway and in the full open position when the car is standing at a landing.

Each hatchway door shall be protected with an electric interlock of an approved rotary type and the car doors with an electric current making and breaking device, which may be adjusted to comply with the Safety Code requirement prevailing in the locality.

A push button emergency release switch, which shall require continuous pressure of the button, shall be furnished in each car for temporarily short-circuiting the interlock equipment.

In the event of failure of the electric service, the doors shall be capable of manual operation, and the hatchway doors shall be self-closing and self-locking independently of the electric operator.

Elevator contractor shall provide and install suitable steel supports at each opening, to which the door operator contractor shall connect straight-line self-locking door operating arms. These arms shall be bronze bushed, supported on hardened steel pivots and be arranged for Alemite lubrication.

Hatchway doors shall be carried by heavy duty hangers capable of withstanding an upthrust and door load of 100% in excess of the weight of the doors, and shall be freely movable longitudinally from a position of rest by a force not exceeding 2½% of the total weight of the doors.

All material and workmanship shall be first class and the door operator contractor will be required to make good any defects in workmanship or material that may develop within one year from the date this equipment is ready for operation, provided these defects are not due to ordinary wear and tear, lack of lubrication, or lack of reasonable care.

Note: Clearance required for Type "W" Electric Door Operators, and reinforcements required in hollow metal doors, will be furnished on request.

For Hangers for Power Operated Doors, see pages 12 to 16. For Rotary Electric Interlocks, see page 9.

TYPE "PB" ELECTRIC GATE OPERATOR

(For Collapsible Gates or Light Weight Sliding Car Doors)

Description

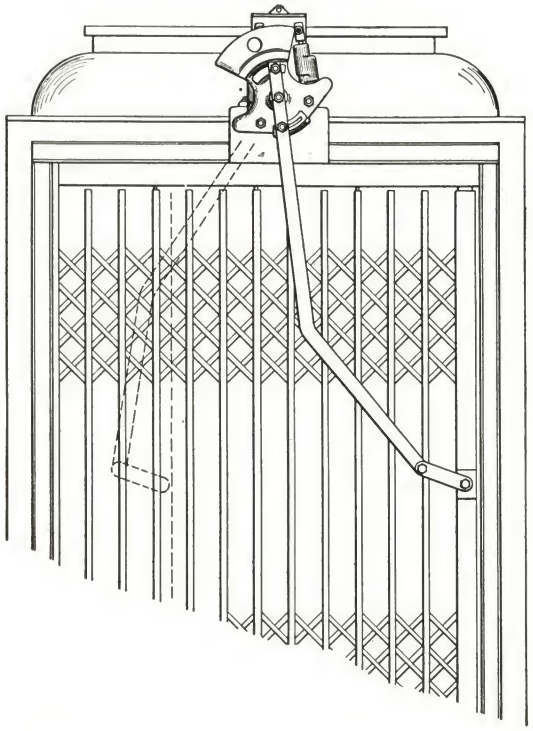
Type "PB" Electric Gate Operator is a small, compact unit which is mounted on top of the car at the front and, by power operation, opens and closes collapsible car gates (or light weight sliding car doors).

Operation

May be used for automatic operation and arranged so gate will open as car stops at landing and, after a pre-determined interval, will close. May be operated by push buttons in car (or at landing) to close gate before car leaves landing. Gate is held in fully closed position by the operating unit as car moves through hatch. Gate may be quickly opened or closed by hand without undue effort.

Construction

Operating Unit—The "PB" Operator Unit consists of a double spur gear reduction enclosed in an aluminum housing. Back of the housing, a torque motor of proper capacity is mounted in place. In front of the housing, a pivoted sector plate is mounted and a hooded internal section of spur gearing is employed. This is driven by a pinion.



Type "PB" Electric Gate Operator Applied to Collapsible Gates

Motor—Torque motors of the continuous duty type can be provided for operation on 220-volt, 3-phase, 60, 50, or 25-cycle current. Motors with such current characteristics are furnished as standard equipment only.

Gate Operation Arm—Is arranged for fastening to sector plate. Arm is proportioned to give proper gate travel (maximum gate travel is 4 ft. for a single gate).

Link Attachment—Conventional link attachment is provided at lower part of operating arm and may be readily secured to front part of gate.

Mounting Lugs—Type "PB" Operating Unit is provided with mounting lugs for direct attachment to structural or car supports.

Oil Check Units—Provided and arranged to cushion movement of car gate (or light weight sliding car doors) as it nears limit of travel in either the opening or closing movement. Check units are adjustable for proper cushioning action and convenient opening is provided for renewing liquid should it be necessary after long period of operation.

Lubrication

Operator Unit is provided with ample means for lubrication, both by pressure grease gun on the pivot and bearing shafts, and by oil cups on the motor. Housing containing gears is packed with non-flowing grease lubricant that will last indefinitely.

Durability

Type "PB" Operating Unit is very ruggedly built and under normal operating conditions will give satisfactory service for a great many years.

Standard Equipment

For Collapsible Gates—The following is furnished for operation of a collapsible gate:

(a) One Type "PB" Electric Gate Operator complete with torque motor and two oil check units.

(b) One Operating Arm with swivel link and mounting plate (for maximum gate travel of 4 ft.).

(c) One Control Panel with "open" and "close" relays.

(d) One Circuit Opening Switch Unit with roller and arm.

No time relays, wire conduit, fittings or car cables included. Total weight of operating unit, approximately 85 lbs. Total weight of operating arm and mounting plate varies with each job. Operating arms given painted finish or standard ES electroplate finish.

For Light Weight Sliding Car Doors—The following is furnished for operation of light weight sliding car doors:

(a) One Type "PB" Electric Gate Operator complete with torque motor and two oil check units.

(b) One Operating Arm with link connections for single or two-speed car doors. (For maximum opening of 4 ft.).

(c) One Control Panel with "open" and "close" relays.

(d) One Circuit Opening Switch Unit with roller and arm.

No time relays, wire, conduit, fittings or car cables, included.

Total weight of operating unit, approximately 85 lbs.

Total weight of operating arm and mounting plate varies with each job. Operating arms given painted finish only.

Specifications

Specifications will be gladly sent on request.

PNEUMATIC DOOR OPERATORS

TYPE "B"—SIDE ARM TYPE

Description

The Type "B" Pneumatic Door Operator consists briefly, of a single-acting air-operated cylinder by means of which the door is opened, and within which is a helical spring for closing the door and locking the door in the closed position. To prevent the door from slamming, a double-acting oil check unit is coupled to the door operator arm which silently stops the door at each end of its travel.

Type "B"—Side Arm Type—Pneumatic Door Operator Applied to Two-speed Doors

Pneumatic Unit

This consists of a hard drawn brass cylinder containing a sliding piston, the rod of which is directly connected at its upper end to the door closer arm, and, by a single heavy link, to the double-acting oil check unit below it. Piston is provided with phosphor bronze cross-rolled expander to insure uniform contact between piston cup and walls of cylinder. This arrangement saves much of the usual maintenance attention required of apparatus of this description. All bearings arranged for Alemite-Zerk lubrication.

Cylinder is sufficiently large to permit use of springs of a size that give required service without fatigue, yet capable of operating doors weighing up to 250 lbs. per panel. This materially reduces cost of maintenance, as it seldom becomes necessary to replace springs.

In operation, helical spring above referred to is compressed by pneumatic piston during opening stroke. Power stored therein supplies necessary energy required to close door when air pressure is released. Spring is conical in form at one end which prevents buckling and is made of cold drawn Swedish steel wire, the stresses of which are equalized by heat treatment after winding. A smaller auxiliary or kick-off spring is employed to assist main spring to overcome inertia of doors at beginning of closing stroke.

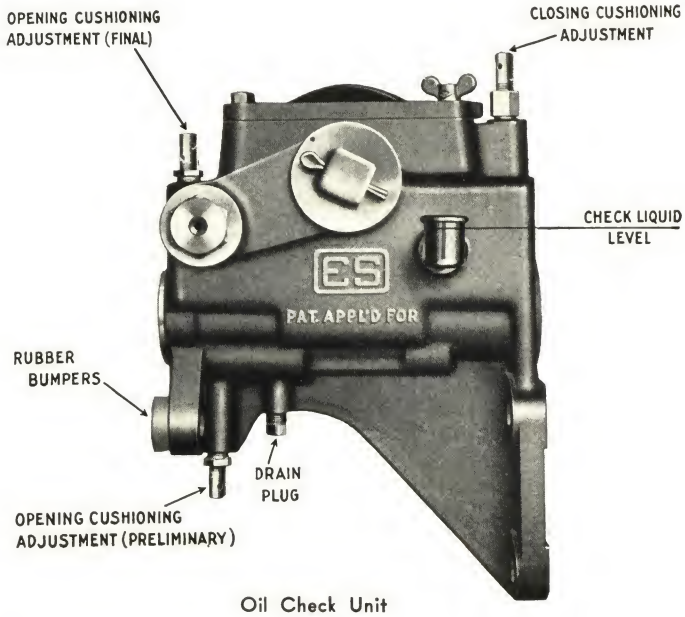
Oil Check Unit

Consists of semi-steel housing, having smooth broached cylinder-bore in which is a close fitting steel plunger. This construction obviates necessity for using packing, flexible or otherwise, in checking compartment of dashpot. Piston rod stuffing boxes are unnecessary.

Rotary motion of door operating arms is transmitted to oil check unit plunger by means of drop-forged steel segment gear with large pitch machine-cut teeth which mesh with a rack cut on the plunger. This gear operates immersed in check liquid which also serves to lubricate all moving parts of dashpot mechanism.

Checking Fluid

Oil check unit is filled with ES Non-Foaming Check Fluid, a specially prepared lubricating liquid which is practically non-evaporable, and will not foam under charming action of the plunger. Exclusive use of this fluid is important to the success of the apparatus described as any liquid that will foam or change in density will not operate satisfactorily.



Oil Check Unit

Function of Oil Check Unit

The purpose of the oil check unit as previously stated is to prevent slamming of doors in either opening or closing movement. This is accomplished in the following manner: When doors are moved in either direction, plunger of oil check unit is moved forward in cylinder by means of segment gear which is directly connected to operating arms; for approximately two-thirds of the stroke, plunger movement is unimpeded, but from this point on, check fluid is trapped by plunger and its only means of egress is through a needle valve, the size of the opening in which is variable and is regulated by means of a set screw. On the door opening side of stroke, check has two such needle valves, one for initial and one for final adjustment. On door closing side of stroke, only one adjustment is required as door speed automatically decelerates as closing spring expands.

Pneumatic Door Operator Valve

The ES Ball Poppet Valve has a dropped forged steel body in which are drilled necessary passages for transmission of air pressure which operates door engine; balls and poppet stems are made of hardened non-corrosive steel, and ball pockets are fitted with bronze caps.

Pneumatic Door Operator Valve

This valve will not wear, rust or clog in its essential working parts and is not affected by dirt in air line or hatch.

Self-Locking Door Levers

The straight-line type of self-locking operating levers which render the use of an independent lock for the door unnecessary, are used with all side arm ES Door Closers. These levers are made from flat cold rolled steel bars of ample size and stiffness, are provided with removable bronze bushings at all bearing points, and all pivots are provided with grease holes for Alemite-Zerk lubrication.

Door Closer Supports

The units above described, which constitute the ES Type "B" Pneumatic Door Operator, are furnished completely assembled on a common channel iron support. It is provided with coupling knee at each end, by means of which it is secured to hanger support plate at top and to door sill at bottom. No other support is required.

Double-Acting Pneumatic Door Operator As Assembled Before Shipment

Double Acting Type "B" Pneumatic Door Operator

For doors in excess of 450 pounds total weight the Double Acting Type "B" Pneumatic Door Operator is recommended. Employing compressed air to close as well as to open doors, only a comparatively small return spring is necessary, this spring being required to lock doors in closed position in event of failure of air supply. Same oil check unit as furnished with the single acting unit is used, but on account of increased stresses imposed by doors of more than 450 pounds weight, two adjustable check connecting links are provided instead of one, in order that the stresses of operation may be equally divided between them. Otherwise this operator is the same in construction and dimensions as the single acting unit.

SPECIFICATIONS FOR TYPE "B" PNEUMATIC DOOR OPERATORS

For Doors Up to a Total Weight of 450 lbs.—

Each elevator corridor door shall be equipped with a pneumatic door operator which shall consist of a single-acting pneumatic cylinder with spring return, direct connected to straight-line self-locking door-operating levers. All pivoted joints subject to wear shall be provided with renewable bronze bushings, and all pivots shall be drilled with suitable grease holes for Alemite-Zerk pressure lubrication. To prevent slamming of the doors in either direction there shall be provided a separate oil check unit, direct connected by means of a rigid link to the door-operating arms. This oil check unit shall have an all metal plunger, free from flexible packing of any kind, and shall be designed to retain the check liquid without the use of stuffing boxes. These units to be mounted on a common steel support of sufficient size and rigidity to render other support unnecessary.

For Doors of a Total Weight of More Than 450 lbs., or Where Doors of Less Than 450 lbs. but More Speed Than 3 Feet Per Second Are Desired—

Each elevator corridor door shall be equipped with a pneumatic door operator which shall consist of a double-acting pneumatic cylinder, employing pneumatic pressure for both the opening and the closing stroke. The cylinder shall also be provided with an auxiliary spring of sufficient size to bring the doors to a fully closed position, in the event of failure of the air supply. (Remainder of specification same as above, starting with "All pivoted joints . . .")

Notes: Hanger supports and door sills must be extended 10 in. in back of doors, when doors are in full open position, except when door closers are mounted in front of doors, when this dimension need only be 5 in.

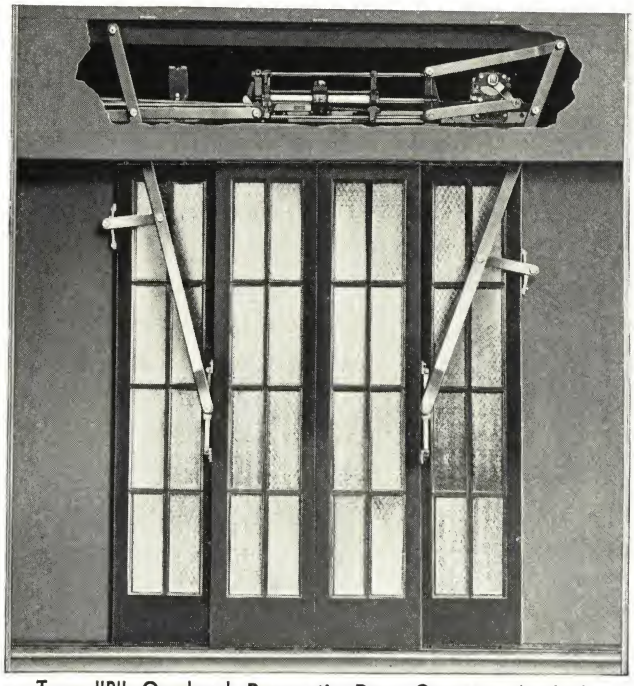
Clearance required for Type "B" Pneumatic Door Operators, and reinforcements required in hollow metal doors, will be furnished on request.

For Hangers for Power Operated Doors, see pages 12 to 16. For Rotary Electric Interlocks, see page 9.

TYPE "B" OVERHEAD PNEUMATIC DOOR OPERATOR

Description

This operator consists, briefly, of two opposed pneumatic cylinders connected to a common valve chest which alternately turns air pressure into one cylinder for opening stroke and into the other cylinder for closing stroke. To prevent door from slamming, a single double acting oil check unit is provided. This silently stops door without rebound at each end of its travel. Check unit lever is directly connected to door operator crosshead by means of rigid link. A pneumatic valve and a mechanical lock that is part of the valve-operating mechanism, together with a standard ES Type "C" Interlock Switch, constitute the principal parts of this operator.



Type "B" Overhead Pneumatic Door Operator Applied to Two-speed Center-opening Doors
Doors in closed position.

Pneumatic Unit

This double-acting unit, furnishing power required to operate doors, consists of two opposed cylinders screwed into a central valve chest. Cylinders are made from hard drawn brass tubing and, after being screwed into place, are securely soldered to prevent any possibility of air leakage. Semi-steel valve chest, uniting the two cylinders, contains necessary inlet and exhaust ports for feeding and exhausting pneumatic pressure alternately to the opposed cylinders. Each cylinder contains a cast iron piston provided with special high-pressure leather cup packing. To insure even contact all around the inside of the cylinder, packings are provided with cross-rolled phosphor bronze internal expander. Each piston rod directly connected to a crosshead; crossheads are connected to each other by two tie rods that slide through guide bearings in cylinder brackets. Crossheads are also connected to oil check unit and door-operating arms by rigid links. Piston rod stuffing boxes not required with this design as piston rod end of cylinders contains air under atmospheric pressure only. Operating valve is mounted on valve chest and forms integral part of unit.

Oil Check Unit

Consists of semi-steel housing, having smooth broached cylinder bore containing close-fitting steel plunger. This construction obviates necessity for using packing, flexible or otherwise, in checking compartment. Piston rod stuffing boxes not required.

Rotary motion of door-operating arms is transmitted to oil check unit plunger by drop-forged steel segment gear with large machine-cut teeth. These mesh with rack cut on plunger; gear operates immersed in check liquid, which also serves to lubricate all moving parts of oil check unit mechanism.

Checking Fluid

Same as used with oil check unit of Type "B"—Side Arm Type—Operator.

Function of Oil Check Unit

The purpose of the oil check unit is to prevent slamming of doors in either opening or closing movement. Its operation is the same as for Type "B"—Side Arm Type—Operator, described on page 5.

Door Operating Arms

Made from heavy flat-section cold rolled steel bars of ample proportion to weight of doors. All pivot holes provided with removable bronze bushings. All pivots drilled for Alemite-Zerk grease lubrication.

SPECIFICATIONS FOR TYPE "B" OVERHEAD PNEUMATIC DOOR OPERATORS

For Doors Up to a Total Weight of 450 lbs.

Each single or two-speed center-opening elevator corridor door shall be equipped with a double-acting pneumatic door operator which shall consist of two opposed cylinders connected to a common valve chest, and shall employ pneumatic pressure to operate the doors in both the opening and closing movements. The door operator shall be directly connected to the door-operating arms which shall be made from flat cold rolled steel bars; all pivot holes subject to wear shall be provided with renewable bronze bushings, and all pivots shall be drilled with grease holes for Alemite-Zerk lubrication.

To prevent slamming of the doors in either direction there shall be provided a single double acting oil check unit directly connected by means of a rigid link to the door-operating arms. This oil check unit shall have all-metal plunger, free from flexible packing of any kind, and shall be designed to retain the check liquid without the use of stuffing boxes. The operating valve shall be of the rotary plate type and shall form an integral part of the pneumatic unit.

The above units comprising the pneumatic door operator shall be furnished completely mounted on a common support, to insure correct alignment of parts.

Notes: Enclosure and hatchway construction, clearances and support requirements for single center-opening and two-speed center-opening doors furnished on request.

For Hangers for Power Operated Doors, see page 12 to 16. For Electro Mechanical Interlocks, see page 11.

MANUALLY OPERATED DOOR CLOSERS

DOUBLE CUSHIONING TYPE

Description

This unit is of the same external dimensions and appearance as the single cushioning door closer, except that a cushioning adjustment is provided (as shown at "A" in the illustration on the next page) to prevent door from being slammed *open;* a most important improvement if noiseless operation is to be assured. The easy opening characteristic of the Single Cushioning Door Closer (*eight pounds pull for the average door*) has been preserved, as has the non-slam *closing* feature.

Other important features are, first, method of securing the closers in position adjacent to the doors to be operated; *second,* means for close adjustment of door operating arms; and *third,* provision for use of Zerk compression grease lubrication of all pivots.

Door Closer Support

Conventional angle iron supports which heretofore entailed additional expense to builder, are now a component part of ES door closer equipment. The closer and door arm pivot are shop-assembled upon an angle iron support bolted at its lower end to the saddle and at its upper end to the hanger support,—or to a splice plate furnished with hanger where ES Hangers are used.

A Two-speed Elevator Door in Closed Position

Showing the Double Cushioning Door Closer, ES Sheave Hangers and Type "C" Rotary Electric Interlock
(Arrows point to lubrication holes)

Adjustable Door Arms

To assure flush alignment of panels of two-speed doors when in full open position, door closer arms are provided with non-slip adjustment, by means of which the distance door travels may be adjusted to compensate for variations in width of enclosure frames.

Door Arm Hand Grip

The new pocket type grip for opening doors is surprisingly easy to use, is attractive in appearance, and affords maximum protection against injury to operator's fingers.

Pocket Type Door Arm Hand Grip

Pivots

All door closer pivots are ½ in. in diameter or larger, hardened and seated in bronze bearings that are renewable without replacing arms. All pivots lubricated with Zerk compression grease gun.

Door Closer Springs

Door closers are provided with cold drawn Swedish steel springs, stresses equalized by heat treatment after winding. Main spring is conical in form to prevent buckling, and telescoped within it is small auxiliary for quickly starting door on closing stroke.

Checking Fluid

Made from exclusive formula. Has extremely low rate of evaporation. Will not gum or change in density within ordinary range of temperature.

Car Trip and Striker Plate

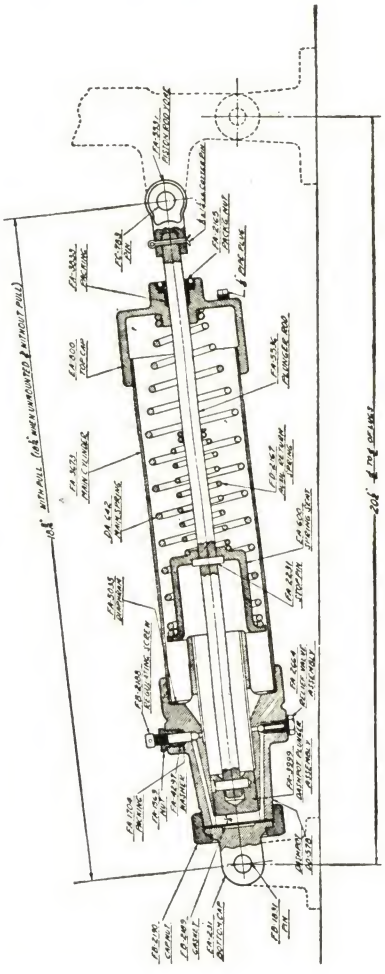
Device can be supplied for car platform which will engage striker plate mounted on ground floor door. This device will hold ground floor door in open position when car is ready to leave, operator releases door by means of foot pedal mounted in cab.

Double Cushioning Door Closer

SINGLE CUSHIONING TYPE

Description

Designed to automatically close and lock doors quietly, rapidly and without slamming. Similar in all respects to the double cushioning type (see illustration at left) except that it is equipped with one check instead of two. This one check is designed to prevent door from slamming during the *closing* motion only. It is adjustable at "B". The Single Cushioning Type Closer consists of an operating cylinder containing a piston connected to lever arms on the door. Upper part contains spring chamber; lower portion, the check. During opening motion of door, piston inside cylinder is drawn up and compresses spring. When operator releases door, it is closed automatically by energy stored in spring *during opening of door*. While door is being closed, piston is descending through liquid in check, thus slowing door during last few inches of travel and preventing it from slamming. When door has been closed, lever arms fall into a straight line and form positive toggle lock.



Sectional View of Single Cushioning Door Closer

Rotary Interlocks, Rack and Pawls

It is recommended that the ES Door Closers be installed with ES Rotary Interlocks, also ES Rack and Pawl as described on page 9.

Note: Door closer support, car trip and striker plate and dimensions are the same as for double cushioning type door closer.

SPECIFICATIONS FOR MANUALLY OPERATED DOOR CLOSERS

Double and Single Cushioning Types

Each elevator corridor door shall be equipped with an ES (Single Cushioning Type) (Double Cushioning Type) Elevator Door Closer. The door closer shall automatically close the door, lock it, and prevent all noise due to slamming, (when the door is being closed) (either when being *opened* or closed). It shall be a single removable unit with a cylindrical housing for enclosing the operating springs, and (a fluid single check) (a fluid two-way check) integral with said housing. The check plunger is to be directly connected to the door closer arms.

The door closer shall automatically lock the door by means of the straight line arrangement of door operating arms when in the closed position, thus making unnecessary the use of an independent lock.

On each car shall be installed a door trip and on each ground floor a striker plate, by means of which the doors at the ground floor shall be held open when the elevator is at rest. The door shall be released by pressure of a pedal in the car.

Notes: Send for details concerning proper space requirements for installation of above door closer equipment.

For Hangers, see pages 12 to 16. For Rotary Electric Interlocks, see page 9.

ES INTERLOCK EQUIPMENT

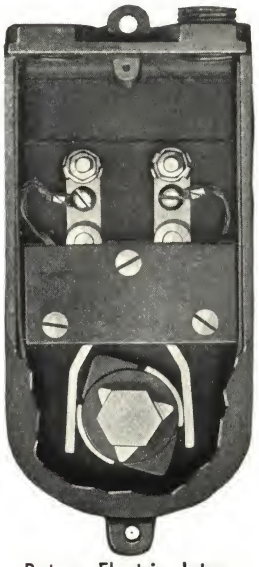
Interlocks prevent the movement of the elevator while any door is open, thereby reducing to a minimum the possibility of accidents to passengers entering or leaving car.

Our years of experience in the manufacture and installation of thousands of ES Interlocks under all manner of conditions are your assurance of the safety and efficiency of operation of the Interlocks described on the following pages.

ROTARY ELECTRIC INTERLOCK—TYPE "C"

For Electric, Pneumatic and Manually Operated Doors

Listed as standard by Underwriters' Laboratories of National Board of Fire Underwriters'; approved by United States Bureau of Standards; as a safety device, many insurance companies allow 10% reduction in insurance rate and an additional 4% reduction when installed with elevator car gates.



Rotary Electric Interlock—Type "C"—in Closed Position

Operation

When door is in closed position, circuit is closed through segments mounted on rotating shaft, permitting elevator operation. When door is opened, segments, being positively connected to arm of elevator door closer, are rotated, opening elevator control circuit and positively preventing any movement of elevator as long as door is in open position.

Rack and Pawl

This device permits interlock circuit to be closed before final closing of door, yet furnishes positive lock to the door, allowing elevator to leave floor safely before door is closed completely. This arrangement reduces running time and increases efficiency of service. Rack is so located that when pawl travels over last notch and falls free, door closer arms are in straight-line position and thus furnish lock for door. Pawl is designed so that, upon opening of door, it is carried freely across rack without engaging any of the teeth.

Emergency Release Switch

In every installation of ES Interlocks there is installed in each elevator an ES Emergency Release Switch mounted with "break-glass" cover. In case of emergency, interlock system is made inoperative by breaking glass and applying continuous pressure to button. Provided for use only in case of fire when it may be necessary to run elevator with doors open.

Rotary Electric Interlock—Type "C"—in Open Position

Sequence Relay

If desired, a sequence relay can be provided to prevent operator from what is known as "starting on the door"—that is, from first moving elevator control switch to the "Up" or "Down" position and then closing the door. The sequence relay makes it necessary for operator to first close the door and then move control switch to "Up" or "Down" position. Should he fail to comply with this sequence of operation, elevator will not start until after he moves switch to the stop position.

Emergency Release Switch

Voltage Relay

Used in all installations of ES Interlocks, when specified, in connection with 500-volt elevator control circuits to allow use of lower voltage in the interlock circuit, such as 240 volts or less. The ES Voltage Relay is specially designed for this service.

SPECIFICATIONS FOR ROTARY ELECTRIC INTERLOCK—TYPE "C"

There shall be mounted upon the elevator door closer support a Rotary Type Electric Interlock connected to the operating arms of the door closer, which shall be so designed that when door is opened the contact in the electric interlock shall be broken. All interlocks in each hatch shall be wired in series with the elevator control circuit. The electric interlock shall prevent movement of the elevator until the hatch doors are closed and locked.

Each door shall be equipped with the Rack and Pawl Device, which shall effectively lock the door during the last 3 inches of its closing movement, thus permitting the advancement of the contact in the electric interlock and allowing the operating circuit of the elevators safely to be made a few inches in advance of the fully closed position of the door.

There shall be installed in each elevator cab, an Emergency Release Switch of the "break-glass" type, containing a normally open switch operated by a button requiring continuous pressure to maintain the contact. The switch shall be so connected that pressure of the button shall permit emergency operation of the elevator.

Note: For Door Closers, see pages 1 to 8. For Door Hangers, see pages 12 to 16.

ELECTRO-MECHANICAL INTERLOCK

For Use with ES Type "B" Overhead Pneumatic Door Operators

Description

Mechanical interlocks prevent opening the hatchway doors from the corridor side. Electric interlocks prevent movement of elevator while any door is open. The ES Electro-Mechanical Interlock is an efficient combination of the two.

Mechanical Portion—Consists of heavy malleable iron pawl, secured to the pneumatic engine mounting bar, that positively locks engine in closed position, thereby preventing opening doors from corridor side.

Electrical Portion—The Type "C" Rotary Electric Interlock previously described. In combination with mechanical portion, this interlock is operated by intermediate lever directly connected to so-called false trip lever mounted in convenient place for operation by car cam. Intermediate lever is also connected to the valve-operating lever.

Operation

When car approaches stop, car cam is manually or mechanically advanced to position where it comes in contact with false trip lever which, in turn, actuates intermediate lever. First movement of the intermediate lever lifts pawl, releasing mechanical lock and, at same instant, operating the electric interlock and opening the electric circuit, thus rendering car inoperative. Then, as intermediate lever completes its movement, it opens pneumatic control valve which reverses air from closing to opening cylinder and thus opens the door.

Note: Rack and pawl, emergency release switch, sequence relay and voltage relay are same as described on page 9.

SPECIFICATIONS FOR ELECTRO-MECHANICAL INTERLOCK

There shall be mounted upon the elevator door closer support, a Rotary Type Electric Interlock connected to the valve-operating lever, which shall be so designed that when the operating valve is opened, the contact in this electric interlock shall be broken. There shall also be provided, a mechanical locking device which shall lock the operator in the closed position. This mechanical lock shall be so connected to the valve-operating lever that it will be so released by the same movement that opens the valve and breaks the electrical contact.

All interlocks in each hatch shall be wired in series with the elevator control circuit. The electric interlock shall prevent movement of the elevator until the hatch doors are closed and locked.

Each door shall be equipped with the Rack and Pawl Device, which shall effectively lock the door during the last 3 inches of its closing movement, thus permitting the advancement of the contact in the electric interlock and allowing the operating circuit of the elevators safely to be made a few inches in advance of the fully closed position of the door.

There shall be installed in each elevator cab, an Emergency Release Switch of the "break-glass" type, containing a normally open switch operated by a button requiring continuous pressure to maintain the contact. The switch shall be so connected that pressure of the button shall permit emergency operation of the elevator.

Note: For Door Closers, see pages 1 to 8. For Door Hangers, see pages 12 to 16.

MASTER ELECTRO-MECHANICAL INTERLOCK

For Use with Manually Operated Door Closers

Description

Designed to take place of individual interlocks at each elevator door, and is a development of Type "C" Rotary Electric Interlock, previously described.

Operation

One master interlock is installed for each 180 ft. of hatch height to be served. A steel tape mechanically connects all hatch doors with master interlock and causes it to open elevator control circuit whenever any hatchway door is opened, preventing movement of elevator until all hatch doors are closed and locked. Switch contains rotary circuit breaker arranged to open interlock circuit by gravity should mechanical connection between tape and Interlock mechanism be opened or held up.

Note: Rack and pawl, emergency release switch, sequence relay and voltage are same as described on page 9.

SPECIFICATIONS FOR MASTER ELECTRO-MECHANICAL INTERLOCK

There shall be installed in each hatch, a Master Electro-Mechanical Interlock (one for each 180 ft. of hatch to be served). The master interlock shall contain a rotary circuit breaker so arranged that it will open the interlock circuit by gravity in the event that mechanical connection between the tape and interlock mechanism is opened or held up.

A steel tape shall mechanically connect all closure doors with the master interlock and shall cause it to open the elevator control circuit whenever any hatchway door is opened and shall prevent movement of the elevator until all hatchway doors are closed and locked.

All interlocks in each hatch shall be wired in series with the elevator control circuit. The electric interlock shall prevent movement of the elevator until the hatch doors are closed and locked.

Each door shall be equipped with the Rack and Pawl Device, which shall effectively lock the door during the last 3 inches of its closing movement, thus permitting the advancement of the contact in the electric interlock and allowing the operating circuit of the elevators safely to be made a few inches in advance of the fully closed position of the door.

There shall be installed in each elevator cab, an Emergency Release Switch of the "break-glass" type, containing a normally open switch operated by a button requiring continuous pressure to maintain the contact. The switch shall be so connected that pressure of the button shall permit emergency operation of the elevator.

Note: For Door Closers, see pages 1 to 8. For Door Hangers, see pages 12 to 16.

POSITIVE ELECTRO-MECHANICAL INTERLOCK

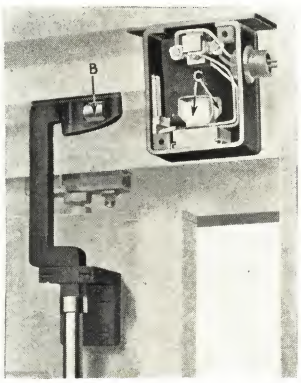
For Use on Sliding, Slide-and-Swing, and Swinging Doors

Description and Operation

Designed to prevent movement of elevator when any door in hatchway is open or unlocked.

In closing, door is mechanically locked before elevator control circuit is completed and, conversely, control circuit is opened before door is mechanically unlocked and can be opened. Mechanical lock is positive, being maintained in locked position by gravity; no springs are used.

The one moving part, the contact-making element, is attached to the hatchway door. Consequently, when door is opened, elevator control circuit is also positively open.



Positive Electro-Mechanical Interlock

Construction

Of exceptionally sturdy design, equipped with contact blades of floating type and with self-adjusting roller in head of lock. Interlock requires no lubrication, cleaning or any other attention once installed.

Note: Rack and pawl, emergency release switch, sequence, relay and voltage relay are same as described on page 9.

In cases where doors are of slide-and-swing type, it is essential that head of interlock be dropped below normal position. For this, a top bracket is provided, so arranged that the bar and head may be quickly released and dropped to a lower position. This permits swinging door out into corridor when necessary to use full opening provided in elevator car.

This interlock can be used on two-speed doors equipped with geared hangers or on center-opening doors equipped with chain drive or geared hangers.

SPECIFICATIONS FOR POSITIVE ELECTRO-MECHANICAL INTERLOCK

Equip each hatchway opening with ES Positive Electro-Mechanical Interlock. Interlock shall be designed to prevent the movement of the elevator if any door in the hatchway is open or unlocked. Device shall be so constructed that the door shall be mechanically locked before the elevator control circuit is completed and, conversely, when opening the door, the control circuit shall be opened before the door is mechanically unlocked. Interlock shall maintain its locked position without use of springs, being actuated solely by gravity. (Balance of specifications to be same as those of Rotary Electric Interlock on page 9.)

ELECTRO-MECHANICAL INTERLOCK—TYPE "P"

For Use on Sliding Doors Only

Compliance

Especially designed for use in connection with sliding doors of passenger elevators equipped with car switch control, to comply with the requirements of the Department of Labor and Industry of the State of Pennsylvania.

Purpose

(a) To prevent opening of elevator hatchway doors from corridor side.

(b) To prevent opening of elevator hatchway doors from hatch side unless car is at rest within 3 inches of the landing.

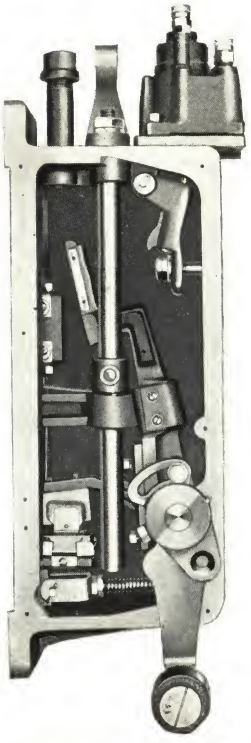
(c) To prevent starting or movement of car unless all hatchway doors are closed and locked.

Application

Directly connected to straight-line door operating levers furnished with Type "B" Pneumatic Door Operator or with Manually Operated Door Closers.

Description

Interlock is a single unit, enclosed in cast iron housing, accessible from either side by removing cover plate. Combination mechanical locking and electrical contact arm is mounted on common shaft with roller lever which is engaged by a cam on the car. An intermediate vertical member connects interlock mechanism with horizontal closer arms of door. Vertical member is engaged and positively locked when door is in closed position, preventing movement of door toward open position unless roller lever of lock is moved to release position by cam on car.



Interlock in Closed Position

Operation

Door is mechanically locked at all times while elevator control circuit switch is closed. As roller lever is moved by car cam, control circuit is first opened before doors are mechanically unlocked. Further movement of roller lever, after door is mechanically unlocked will operate air valve which, in turn, will cause automatic opening of door. All of the foregoing is in accordance with the requirements as specified by the Department of Labor and Industry of the State of Pennsylvania.

SPECIFICATIONS FOR ELECTRO-MECHANICAL INTERLOCK—TYPE "P"

Each hatchway door shall be inter-connected with an Electro-Mechanical Interlock at each opening. Interlock shall function as follows:

(a) Prevent opening of any hatchway elevator door from the corridor side.

(b) Prevent opening of any hatchway elevator door from the hatch side unless car is at rest within 3 inches of the landing.

(c) Prevent starting or movement of car unless all hatchway elevator doors are closed and locked.

Note: If slide-and-swing doors are used (in the State of Pennsylvania), door contractor is to arrange the slide-and-swing panels so that they will be mechanically inter-connected to prevent the swing panel from being opened separately.

ES ELEVATOR DOOR HANGERS

A careful study of the stresses set up in hangers used for *fast power operated doors* has resulted in the development of a complete line of hangers, especially designed to meet the requirements of such service. These hangers, designated as Type "A", are of similar design to our well-known Type "BB" Hangers, except that they are much larger. Type "A" Hangers may also be used for vault or other types of heavy doors.

TYPE "A" SHEAVE HANGER

Type "A" Hangers have hardened and ground sheaves, equipped with large, special *radial thrust* ball bearings housed between integral sheave plates. Owing to special features of housing ball bearings between plates, bearings are completely protected from loose plaster and other substances that accumulate during building construction. Through a small hole in one of the plates, bearings may be refilled with clean grease, and the old forced out by use of an Alemite-Zerk grease gun furnished with each installation. The bearings are provided with 7/16 in. *steel balls* and have side thrust capacity (at all door speeds up to 4 ft. per second) equal to their radical carrying capacity as hereinafter set forth for each respective hanger model.

Rails

Hanger sheaves are carried on *double radius rails* of same design as our Type "BB" rail, except that Type "A" rail is 2½ in. wide by ½ in. thick.

The rails are made of high carbon (.55-.60) steel, cold drawn to a smooth finish, and have semi-circular edges on top and bottom, but of different radii, both of which focus at the axis of the circles shown in dotted lines, of illustration below.

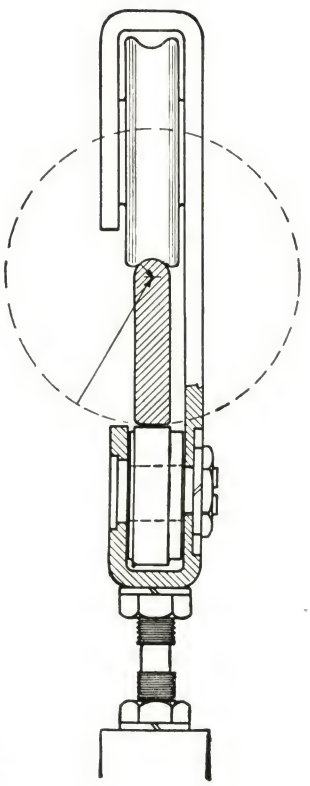
The purpose of this form of rail, which is well known in connection with Type "BB" Hangers, is to permit free radial motion of the hanger sheaves in the direction indicated by the dotted circle, even though the thrust rollers are adjusted in actual contact with the lower edge of the rail; this prevents any tendency of the hanger to bind or run hard, should the pendant bolts, for any reason, be out of vertical.

Thrust Wheels

Beneath each rail are two hardened and ground thrust wheels equipped with roller bearings, each of which is capable of withstanding vertical thrust equal to the carrying capacity of its adjacent sheave. To facilitate close adjustment to the rail, these wheels are mounted on eccentrically adjustable shafts, which are supported at both ends, and are locked in position after adjustment.

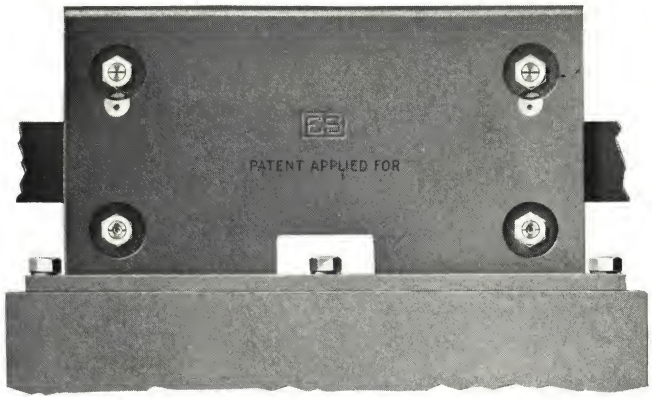
LEFT:
Component Parts of Type "A" Hanger, Model No. 3

Type "A" Hanger, Model No. 3



RIGHT:
Sheave Showing Double Radius Rail for ES Sheave Hangers

SINGLE AND DOUBLE SHEAVE MODELS OF TYPE "A" HANGER



Model No 1, Type "A" Double Sheave Hanger
Note provision for Alemite-Zerk lubrication.

Model No. 1
Type "A" Double Sheave Hanger

Carrying Capacity, 1,000 lbs. per Panel

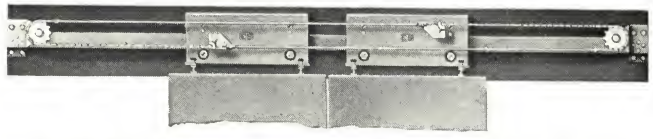
Sheave housing made in single unit about three-quarters the width of door panel. Bolted at each end and in center to reinforcement at top of door; two sheaves being provided for each housing. Constructed as previously described, sheaves are mounted on locked eccentric shafts which provide ⅛ in. vertical adjustment up or down for sill clearance. *(See illustration.)* Hanger is particularly well adapted for heavy vault doors.

Model No. 2
ES Type "A" Chain Drive Double Sheave Hanger, For Center-opening Doors

Carrying Capacity 500 lbs. per Panel

Has same type sheave housing as Model No. 1, except that housing is provided with adjustable pendant bolts for sill clearance of doors instead of eccentric shafts in sheaves, and sheave housings are connected by chain and sprockets with each other so that movement of one door *will cause its adjacent door to travel in opposite direction. (See illustration.)*

Hanger also made without chain and sprocket feature for power-operated doors equipped with overhead type of pneumatic engine.



Typical Set-up of Model No. 2, Type "A" Chain Drive Double Sheave Hanger For Center-opening Doors

Model No. 3
ES Type "A" Single Sheave Hanger

Carrying Capacity 500 lbs. per Panel

Model No. 3 Applied to Two-speed Door Installation

Type "A" Model No. 3 Hangers have one sheave to each housing and housings are provided with adjustable pendant bolts which permit vertical and lateral adjustment of doors. *(See illustration.)*

Model No. 4
ES Type "A" Single Sheave Hanger

Carrying Capacity 750 lbs. per Panel

Type "A" Model No. 4 Hangers, in addition to possessing greater carrying capacity than Model No. 3, require 1 inch less working clearance above doors. This feature is often important, as it is of great convenience in refitting old installations with heavier equipment.

As sheave housings are bolted directly to top of door, sheaves are carried on locked eccentric shafts, by means of which, doors may be raised or lowered ⅛ in. up or down for sill clearance.

Model No. 4

SPECIFICATIONS FOR TYPE "A" SINGLE AND DOUBLE SHEAVE DOOR HANGERS

Furnish ES Type "A" Single (or Double Sheave) Hangers, Model No. for all elevator doors.

Sheaves shall be of hardened steel ground to a true surface inside and outside, and shall be equipped with large special Radial-Thrust ball bearings house between integral sheave plates and shall be so designed that the old grease may be forced out and fresh grease substituted without disturbing hanger in any way. These bearings to be provided with steel balls not less than 7/16 in. diameter, and shall have a side thrust capacity *(at all door speeds up to four feet per second)* equal to their radial carrying capacity.

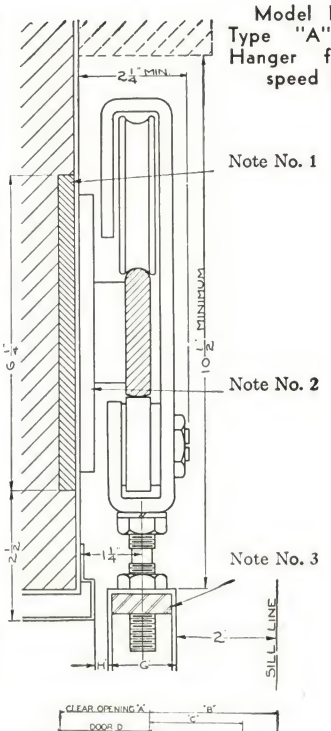
Beneath each sheave wheel there shall be provided a hardened and ground thrust wheel, equipped with roller bearings, which shall be capable of withstanding a vertical thrust equal to the carrying capacity of its adjacent upper sheave. To facilitate close adjustment to the rail, these thrust wheels shall be mounted on locked eccentric shafts which are supported at both ends. The track rail shall be made of high carbon (.55-.60) steel, be cold drawn to a smooth finish, and so shaped as to permit of free movement of the sheaves without regard to vertical alignment of the sheave housings.

All sheaves and thrust rollers shall be arranged for Alemite-Zerk grease lubrication.

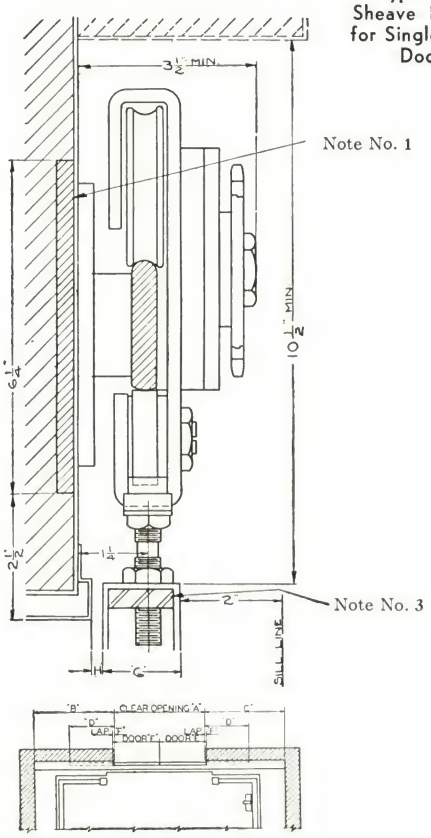
Note: For clearances and data required for manufacturing, see following page.

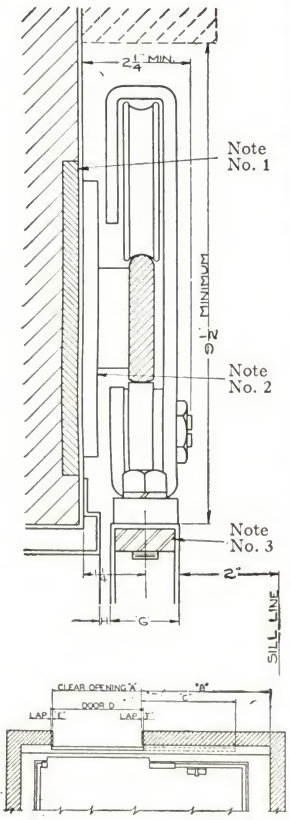
Space Required for Installation, Header Construction and Necessary Door Reinforcements for Type "A" Sheave Hangers

Model No. 3, Type "A" Sheave Hanger for Two-speed Doors

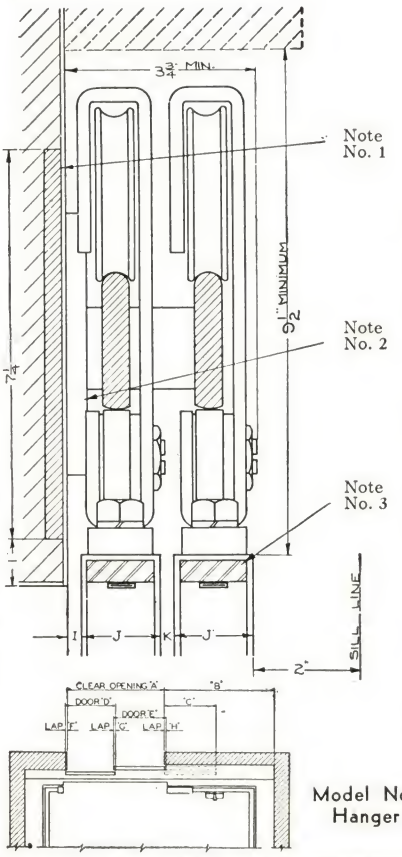


Model No. 1, Type "A" Sheave Hanger for Single-speed Doors

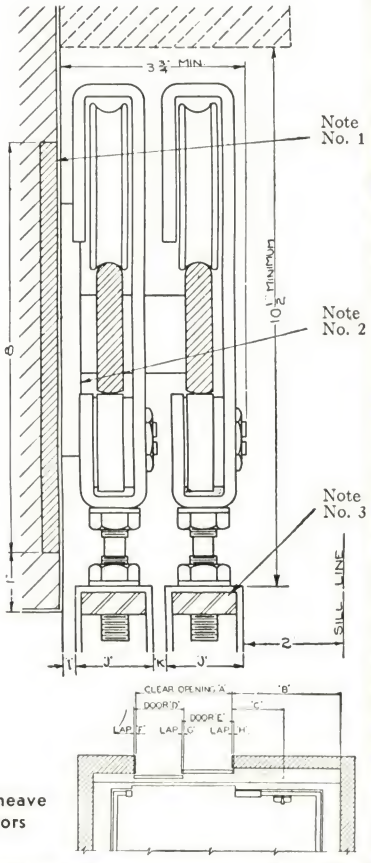




Model No. 2, Type "A" Double Sheave Chain Hanger for Center-opening Doors



Model No. 3, Type "A" Sheave Hanger for Two-speed Doors



Model No. 4, Type "A" Sheave Hanger for Two-speed Doors

Note No. 1—Hanger support by others; to run full width of hanger pocket.

Note No. 2—Bracket by Elevator Supplies Company, Inc.

Note No. 3—Hollow metal doors must be reinforced at top by others.

Data Required for Manufacturing

Whether doors are single, two-speed or center-opening type.

Whether doors open as shown, or opposite.

Whether doors are hollow metal, Kalamein or angle iron frame.

A drawing showing section through top of doors and hanger pocket.

Weight of each door panel.

Whether hangers can be installed as shown, and if not, an indication of the method.

Dimensions, A, B, C, D, E, F, G, H, I, J and K.

Note: Header construction shown is good for doors up to 250 lbs. in weight. Heavier doors require angle or channel iron hanger supports.

TYPE "BB" SHEAVE HANGERS

Description

Type "BB" Sheave Hangers can be furnished for single sliding doors, also two-speed doors where two-speed operating devices are not required, and center-parting doors with or without center-parting chain devices.

These hangers have carrying capacities up to 250 pounds per door panel. Although simple in design, they are quiet and smooth in operation and incorporate every essential feature required to withstand rigorous service, thus assuring efficient operation for many years.

Each door panel is suspended from two individual sheave blocks, each of which is fastened to the top of the door by two pendant bolts, by means of which the door may be adjusted vertically or transversely. Each sheave block is made of 3/16 in. pressed steel, and is equipped with a sheave, which carries the door panel along a track of special design, hereinafter described, and an adjustable thrust roller which is underneath the track.

Sheaves

Made of hardened steel ground to true surface inside and outside, and fitted with ball bearings of combined radial and thrust type. Ball bearings fully enclosed and, therefore, protected from grit, dirt or dust. Provision is made for pressure lubrication by means of Alemite system.

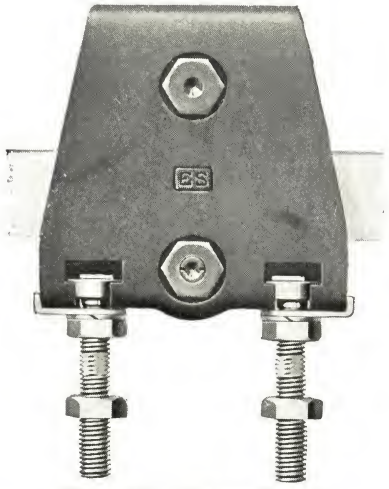
Reaction created by checking speed of doors is absorbed by hardened steel adjustable thrust roller which rolls under track. Thrust roller is mounted upon eccentric shaft supported at both ends in lower part of sheave block and is adjusted for track clearance by rotating eccentric shaft with a screw driver. After roller is properly adjusted, it is locked in position by means of lock nut and lock washer.

Track

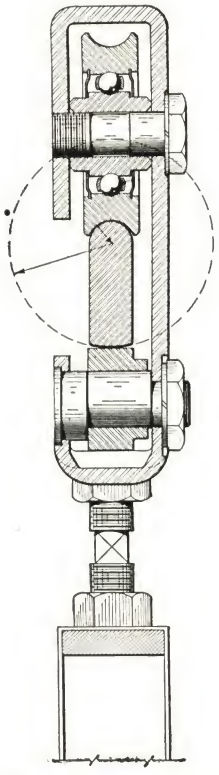
High carbon *(.55-.60)* steel provides a track of proper hardness on which sheaves roll. Properties of track are such that under constant use they retain a smooth and highly polished surface.

The accompanying sectional view of sheave hanger shows that the upper and lower edges of the track are in the form of arcs, the radii of which are focused at axis of circle indicated by dotted lines. This permits free motion of sheaves and thrust rollers in direction indicated by circle, and is necessary if pendant bolt holes in top of door should be tapped slightly off vertical.

Component Parts of Type "BB" Sheave Hanger



Type "BB" Sheave Hanger
Note Provision for Alemite Lubrication



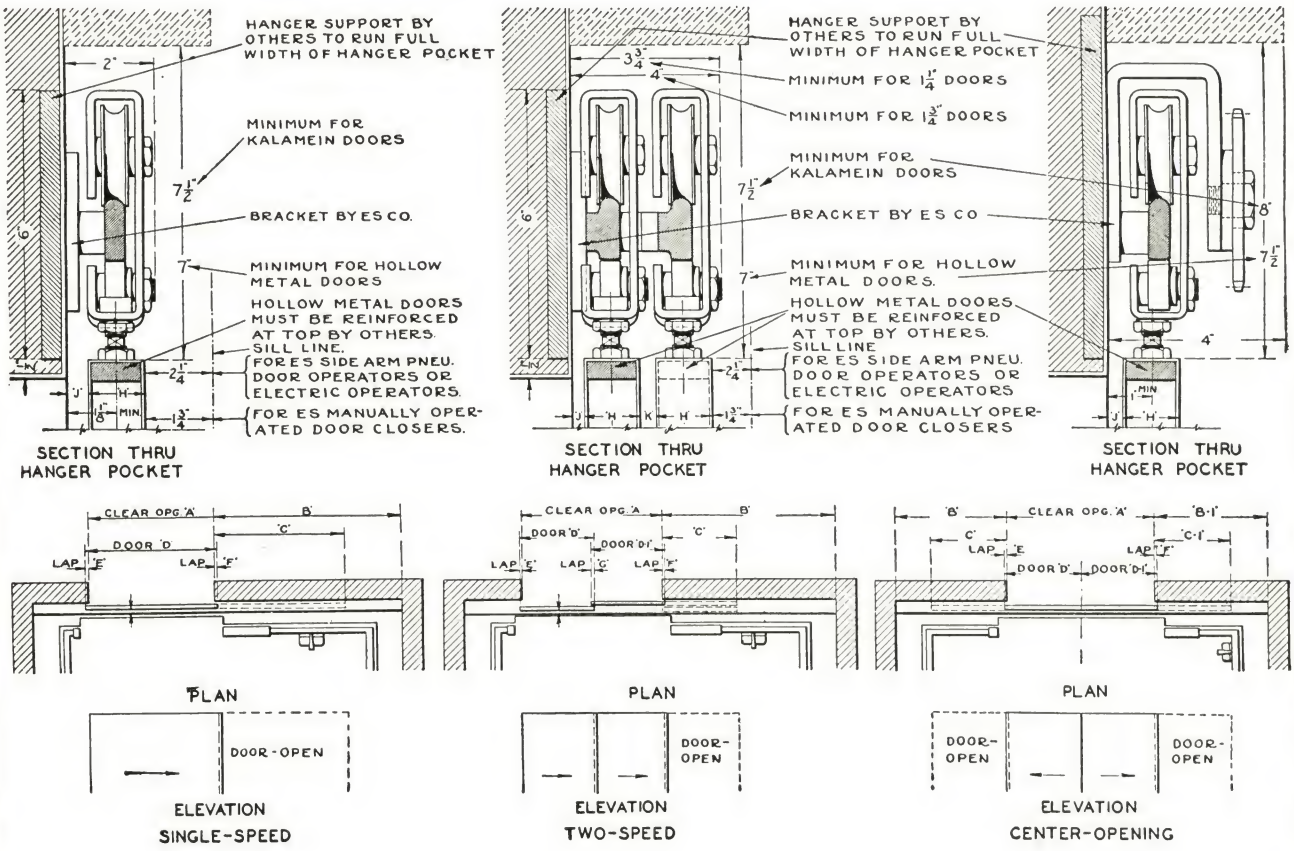
Sectional View of Type "BB" Sheave Hanger Showing Special Form of Track

SPECIFICATIONS FOR TYPE "BB" SHEAVE HANGERS

Furnish for all horizontal sliding hatchway elevator doors, ES Type "BB" Sheave Hangers with a carrying capacity up to 250 lbs. per door panel. Sheave blocks shall be made of 3/16-in. pressed steel, and each block shall be equipped with a hardened steel sheave, ground inside and outside and journaled on ball bearings of the combined radial and thrust type. The ball bearings shall be protected from dirt and grit. Hardened steel adjustable thrust rollers shall be provided to absorb the upthrust created by checking the door speed. Provision shall be made for pressure grease lubrication of the sheave bearings and upthrust rollers.

The track shall be of high carbon (.55-.60) steel shaped to permit free movement of the sheaves without regard to the vertical alignment of the sheave blocks.

Reinforcement and Space Required for Installation



Data Required for Manufacturing

Whether doors are single, two-speed or center-opening type.

Whether doors open as shown, or opposite.

Whether doors are hollow metal, Kalamein or angle iron frame.

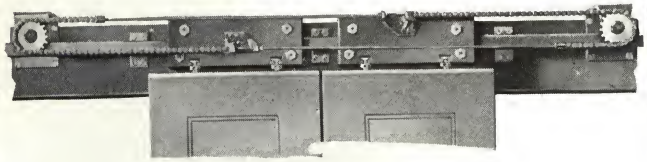
A drawing showing section through top of doors and hanger pocket.

Weight of each door panel.

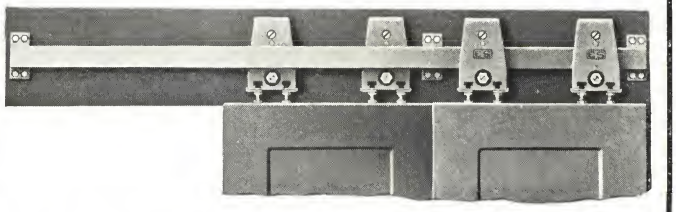
Whether hangers can be installed as shown and, if not, an indication of the method.

Dimensions A, B, B-1, C, C-1, D, D-1, E, F, G, H, J and K.

Note: Header construction shown is good for doors up to 250 lbs. in weight. Heavier doors require angle or channel iron hanger supports.



Type "BB" Sheave Hanger, Chain Driven, on Center-opening Doors
Rods Are Adjustable to Take Up Any Slack in Chain



Type "BB" Sheave Hanger, Chainless Drive, on Two-speed Doors

UNDERWRITERS' LABEL SERVICE EQUIPMENT

The following ES equipment has been passed by The Underwriters' Laboratories, Chicago, Ill., and is now available for Label Service Procedure:

Type "A" Sheave Hangers (Model Nos. 1, 3 and 4, for single, two-speed and three-speed hangers).

Type "BB" Sheave Hangers.

ES Manually Operated Door Closers (Single and Double Cushioning Types).

ES Pneumatic Door Operators (Side Arm Type).

ES Overhead Pneumatic Door Operators.

ES Electric Door Operators (Arms for Hatchway Doors).

ES MAJOR SIGNAL SYSTEMS

Since the height and character of a building, plus the degree of efficiency desired of the elevator service, determine which type of major elevator signal system shall be installed, the following brief descriptions of major elevator signal systems generally used are offered for the architect's guidance.

THE PRE-REGISTERING SIGNAL SYSTEM

Where Used

The Pre-registering Signal System is especially desirable for office buildings of any height where regular service is maintained throughout the day; and for hotels where it is not necessary to make the full travel after all passengers have been discharged at upper floors. The Pre-registering Signal System is absolutely necessary wherever solid car doors are used on moderate or high speed elevators.

Function

Elevators of the automatic landing, car-switch-controlled type, traveling at high speeds and usually equipped with solid doors, require a more elaborate and more accurate signal system than is ordinarily employed.

It is obvious, then, that signal equipment for this type elevator must be provided to accomplish the following:

First—To pre-register the stops to be made for passengers both inside the car and outside on the landings.

Second—To give sharply defined and accurate signals to the operator when a car enters a signal stop zone at maximum speed.

Third—To give auxiliary signals to the operator while the car is standing at the first of two successive floors at which stops are to be made.

Fourth—To automatically produce slow-down of the elevator from the registered stop signals if desired.

General Equipment

The system, as usually installed, consists of the necessary up-down hall lanterns over the enclosure doors; one or two risers of push buttons as required; a selector machine, or commutator, for each elevator; a floor button relay panel for each bank of elevators; in each car, just above the car switch plate, a panel containing a push button for each floor the car serves, together with car operating signal light and bell. These parts, and others, which make up the ES Pre-registering Signal System, are described separately on the following pages.

General Operation

Waiting passenger signals are registered by the push buttons provided at the floor landings. Floor stops are announced by passengers in the car and are registered by the operator on the push button panel within the car. Pressure of these buttons signals the car operator, at the proper time, that a stop is to be made at the floor for which the signal was set. The operator's signals are usually, a red light for a stop two floors away, and a green light for a stop one floor away from a standing position. The car operator, upon receipt of the signal, either from the lights, or bell, immediately centers the car switch handle. This action permits the car to enter the slow-down area and finally level with the floor. Or, the operation may be such that the stop signal automatically places the elevator control in position to slow down the car; and the operator, upon receipt of the stop signal, centers the car switch handle so that final leveling action will take place at the floor.

While the car is standing at a floor, say, on the "up" trip, either discharging or taking passengers, should a waiting passenger on the next floor above press the "up" button, a green light flashes on the car fixture, indicating a one-floor run. The operator starts the car as usual, but immediately centers the switch handle and the slow-down and leveling action ensues.

The operation of the signals is usually arranged for full selective control so that only one car will receive the stop signal from a hall button; other cars following the leading car and entering the "stop" zone will not receive the same stop signal.

The directional light in the corridor is displayed approximately one floor in advance of the car's arrival, and when the car stops at the landing, the corridor light indicates the direction of the car's movement.

Automatic transfer of signals provides that the operator may by-pass as many stop signals as necessary in case of a loaded car or emergency. The signals are automatically transferred to the car immediately following.

The car may be quickly reversed in mid-travel for a return trip without disturbing the proper functioning of the signal system.

Note: The position of the car in the hatchway is indicated at all times to the operator by the car position indicator (described on page 23). Where solid car doors are used, a car position indicator should always be specified.

Specification

Typical specifications of the ES Pre-registering Signal System for use with any make of elevator will be gladly furnished on request.

ES PRE-REGISTERING SIGNAL SYSTEM

The Component Parts and Their Function

Hall Push Buttons

Located in the corridor, push buttons are the means for waiting passengers to signal approaching cars. Up-Down buttons are installed at intermediate floors and single buttons at terminal floors. In

some cases, two or more push button stations are cross-connected so that pushing any button will register the same signal. Actuating the push button operates corresponding release magnet on master relay panel, closing contact.

When lamp annunciators are installed for night service, pushing the hall button rings buzzer in annunciator and night bell in pit as long as circuit is completed. Push button contacts are sterling silver, of the wiping type. Push buttons operate on 10-16 volts d-c. or 24 volts a-c.

Hall Lanterns

Located over each elevator door, hall lanterns indicate to waiting passenger which elevator is stopping to answer the call. Up-down lanterns are installed at intermediate floors and single lanterns at terminal floors. They illuminate in advance of elevator's arrival at floor, giving passenger ample time to reach car by time corridor doors are opened, and extinguish when car leaves floor. They also indicate direction of car's travel when car stops at a landing. Lanterns will not illuminate unless car is slowing down to make stop, nor will they illuminate when car operator opens the by-pass switch.

Typical Hall Lantern

ES Hall Lanterns are operated from relay circuits that close when car is at a determined distance from signaled floor. Single-stroke bells, when installed in conjunction with hall lanterns, call waiting passengers' attention to lantern signal.

Switchboard

This, containing necessary switches and transformers for low voltage, is located in elevator machine room with panel containing master relays. When supply voltage is A-C., switchboard usually contains duplicate transformers having two secondary voltages. One of these is 12 volts, for operation of small lamps in system, such as annunciators, position indicators, etc. Other secondary voltage is 24, for operation of release and reset relays of master control and night bell and buzzer (if furnished). Switch board usually has double-throw fused switch for changing from one transformer to the other. Also has switches for high voltage circuits and fuses for individual cars.

When supply voltage is D-C., board contains starting device for low voltage motor generator set.

Master Relay Control

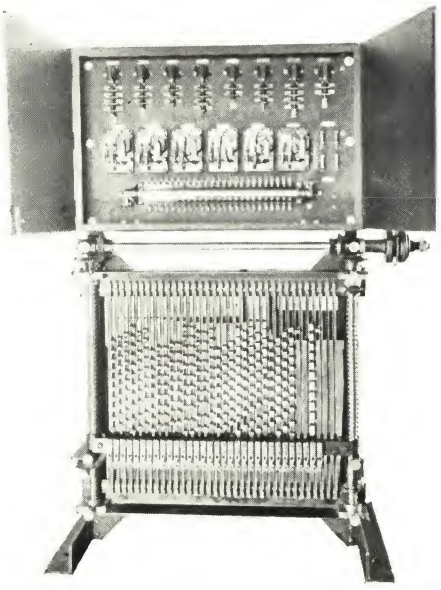
Master relays, two for each intermediate floor and one for each terminal floor, together with buzzer or night bell relay and night bell switch, are assembled on panel and mounted on control board with switchboard. Each relay unit consists of two coils with operating armatures so arranged that when release coil is energized, armature carrying contacts drop, completing circuit at that point. Contact remains closed until reset coil is energized when circuit is opened.

Release, or signal setting, coils are connected directly to corresponding hall push buttons. Signal reset coils are connected to corresponding reset segments on selector.

When signal installations have either tell-tale annunciator or night service annunciators, two independent contacts are mounted on each relay unit; one for high voltage circuits, the other for control of low voltage lamp circuits.

Selectors

Vertical selectors of the straight-line, double-screw type are used in all cases except where car speed is low and segment requirements are such that standard friction reversing selector can be used.



Front View of Pre-Registering Signal Selector,

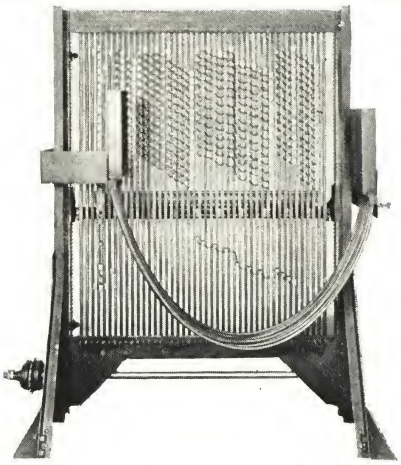
Showing drive shaft with sprocket and friction stud, double vertical screws, adjustable segments, adjustable brushes, reversal switch, with operating coils, slow-down relays and signal relays for one car.

Selector is driven from elevator secondary sheave by steel sprockets and chain. Installed either in secondary level or in machine room level. When installed in latter, drive shaft containing bevel gears and friction stud is assembled below, and when installed in secondary level, is assembled above.

Stop nuts are assembled and locked on screws; friction stud is assembled on drive shaft, correcting selector at either end of travel. Traveling nuts sufficiently long to furnish rigid guide for brush carriage. Segment insulating blocks arranged so that mounted metal contact

Rear View of Signal Selector,

Showing drive shaft with sprocket and friction stud, stationary and traveling junction boxes with cables, and rear of adjustable segments.



blocks are readily adjustable. Brushes, which pass over segments, are of the roller type, adjustable in and out and up and down with relation to segment. Brush is so designed that when engaging with segment it is rotated slightly so that entire periphery is used for contact. Connections are taken from brushes by flexible rubber-covered traveling cables to stationary terminal box on rear of selector.

Selectors contain segments for control of slow-down relays from hall and car button circuits, hall lanterns, master control reset relays and car button reset.

Circuits for auxiliary systems such as group or car position indicators (jump light type) and Type CB Dispatching System (see page 21) are readily operable from same selector.

Vertical selectors are readily accessible for lubrication, adjustments, inspection and maintenance.

Control Panel

Contains necessary relays for proper operation of car operator's flash, lanterns and rest circuits, and is installed at top of selector unit (when space permits).

Car Fixture

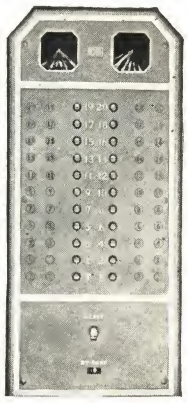
Face plate is ornamental bronze, harmonizing in width and design with car switch panel. This panel contains all apparatus necessary for proper control of system by operator. Standard equipment includes:

Tumbler type By-pass Switch, which, when operated, allows cars to by-pass hall signals without resetting hall lanterns; giving signals to operator; or giving slow-down impulses to elevator control.

Single Push Button, of mechanical latch-in type for each floor served. These, when depressed, remain in contact engagement and complete circuit to selector so that operator's signal or slow down impulse is given when stop is to be made. Push buttons give signals only for direction car is travelling and remain depressed until just prior to car reaching upper or lower terminal when all buttons are reset simultaneously.

Pre-Registering and Car Operator's Panel

Mechanical Push Button Reset Lever, for use in event car does not make complete trip to terminal. Operator can reset all buttons by depressing lever prior to changing car direction.



Car Fixture with Night Service Annunciator

Single or Double Car Operator's Flash Signal (as required) for warning operator to return car switch to "off" position so proper stop may be made. Circuits arranged so a single indication gives operator proper signal from either car or hall buttons.

Various auxiliary equipment such as Night Service Annunciator Indications, Despatching System Indications, etc., may be installed on same fixture.

COMPLETE OR FULL FLASHLIGHT SIGNAL SYSTEM

Where Used

Usually in office buildings having 3 or more elevators making round trips on regular schedules.

Equipment

This system generally includes push buttons for all floors; up-down lanterns for all corridor doors; car operator's fixture for each car, containing flashlight, single stroke bell and signal transfer switch for manual operation; duplicate motor generators or transformers; automatic signal transfer; signal reset; and directional light feature.

Operation

Waiting passenger presses push button, causing car operator's fixture to illuminate and bell to sound as car reaches 1½ to 2 floors from signaled floor, depending on elevator's speed. Passenger is notified of car's approach by illumination of hall lantern when car is 2½ to 3 floors away. Lantern is illuminated until car leaves floor. When car stops at signalled floor, signal is automatically reset about 1 ft. previous to actual stopping. This prevents following cars from picking up signal and stopping at same floor. Directional light, however, is maintained until doors close and car leaves floor.

Should loaded car or emergency run prevent operator from making a signalled stop, the automatic transfer device causes signal to be given to the nearest following car.

The direction of travel of any car standing at any floor is indicated to approaching passengers by maintenance of directional light as long as car is held at floor.

FLASHLIGHT ANNUNCIATOR SYSTEM

Where Used

Office buildings where elevators are run on "call" only, loft buildings, hotels, apartments, clubs.

Equipment

Push Buttons for all floors, one for each bank of three elevators; (Up-Down Lanterns for all corridor openings when specified); Flashlight Annunciator Fixture in each car, containing "Up" and "Down" indications (colored glass figures for each floor), buzzer and signal transfer switch; duplicate Motor Generators or Transformers; Automatic Signal Transfer; Signal Reset; (Directional Light feature, if lanterns are used).

Operation

Waiting passenger presses push button, causing lamp behind glass floor indication to illuminate an annunciator fixture in *all* cars. Sometimes a car operators' light is installed in the annunciator fixture. This gives the operator an additional signal for those stops already indicated on the annunciator, as the light automatically illuminates at a pre-determined distance prior to the car's arrival at its next signalled floor and automatically extinguishes approximately one-half floor before arrival.

If used, the hall lanterns illuminate when approaching car is 2½ to 3 floors from signalled floor. Signal reset, automatic signal transfer, and directional light feature (if lanterns are used) operate same as "Complete Signal System" previously described.

COMBINATION PUSH BUTTON AND ILLUMINATED SIGNAL PANEL SYSTEM

Where Used

Office and loft buildings having two to four elevators per bank and operating on regular round trips. Sometimes preferred to "Complete Signal System," due to lower cost of equipment.

Equipment

Same as "Complete Signal System" with the exception that jewels in the Push Button Fixture replace Up-Down Lanterns over corridor doors.

Push Button and Signal Panel

Operation

Same as "Complete Signal System" with the exception that jewels in Push Button Fixture are illuminated instead of Up-Down Lanterns.

DEPARTMENT STORE SIGNAL SYSTEM

Where Used

In establishments whose elevators regularly stop at each floor on each trip.

Equipment

Up-Down Lanterns over each elevator opening; duplicate Motor Generator; Signal controlling mechanism for each car.

Operation

Floor stop signals being unnecessary, object of this system is to decrease round trip time. Up or Down indications are illuminated 3 floors in advance of car's approach and remain lighted until car leaves floor. System thus has passengers waiting and ready to enter car upon its arrival. Passengers arriving while car is at landing, note directional light and act accordingly. No delay; no confusion.

LOCDROP ANNUNCIATOR

Where Used

In buildings having elevators of medium speed, with a rise of not more than 36 floors and not more than two cars in one group. The simplest and least expensive type of elevator signal system in use at the present time.

Equipment

An Up-Down Push Button Fixture at each floor; an Up-Down Indicator Panel having celluloid-covered openings on which figures for floors served as designated, arranged for manual or electric reset; a Locdrop Transformer for use on A-C. for stepping down current to low voltage necessary. Where single row indicators are used, a single Push Button is installed at each floor.

Operation

Waiting passenger pushes Up or Down Button and proper target is displaced behind celluloid floor indicator corresponding to floor signaling. All displayed targets are simultaneously reset manually when one car is involved or by cross-connected electric resets when two cars are located in one group.

Note: Locdrop Annunciators are available in range of sizes for use in elevators having 3 to 36 floors to serve.

FLASH-SET ANNUNCIATOR SYSTEM

Where Used

Apartment houses, small hotels and buildings having elevators of medium speed with a rise of not more than 30 floors and with not more than two elevators in a group. Slightly higher in cost than Locdrop Annunciators.

Equipment

An Up-Down Push Button Fixture at each floor; Car Panel Fixture containing an Up and a Down row of glass numeral floor or jewel indications with a low voltage lamp behind each indication. Behind each lamp is a small Relay connected to proper push button at each floor; Transformer for furnishing low voltage current.

Operation

Waiting passenger pushes Up or Down Button and lamp is illuminated corresponding to floor from which signal was given. Lamps remain illuminated until manually reset if installed in single car, or by cross-connected electric resets if installed in two cars comprising one group.

Note: Flash-set Annunciator Panel Fixtures are available with bronze panel plates for use in elevators serving from 3 to 30 floors.

SUPPLEMENTARY SIGNAL DEVICES

The Major Signal Systems described on the preceding pages are generally supplemented by auxiliary signal devices. Descriptions of the more favored of these supplementary devices for furthering the efficiency of elevator service, follow.

Automatic Dispatching

Advantages

Automatic Dispatching is essential to modern office buildings with their fluctuating flow of passenger traffic. It relieves the starter of the practically impossible task of trying to maintain the definite schedules that are necessary to fast and efficient service. It avoids spotty, erratic service—too many cars passing a given point and not enough at another—by automatically maintaining a pre-determined schedule of all cars at all positions in the hatchway. Its installation will increase the efficiency of service over that of manual or verbal dispatching. It permits equal spacing of the cars in the hoistway, preventing cars from getting ahead of each other and from running empty unnecessarily. It provides for holding the parking time at terminals to a minimum, and keeps cars in operation a maximum of time. This naturally allows of handling greater traffic with the same number of elevators than is possible with manual dispatching, or the same traffic may be taken care of with a smaller number of cars in service.

TYPE "K" AUTOMATIC DISPATCHING SYSTEM

Description

Designed to furnish individual terminal starting light indications to operate in each car in pre-arranged rotation and to give also an auxiliary signal light indication in each car, adjustable to either starting signal light. When other signal fixtures are installed in car, dispatching lights may be incorporated in these fixtures.

Car Fixture—Contains red, green and white, or red and green signal indications. Green light gives signal for starting up; red light gives signal for starting down; white light (which can be omitted if desired) gives either preliminary starting signal or notification to operator that he is (or is not) on schedule.

Car Fixture

Starting signal lights are illuminated as long as it takes timing arm to pass over stationary contacts.

Dispatching Room Equipment—For details, see following page.

Operation

Assume that elevator bank consists of 5 cars; that round trip time, including waiting time at terminals, has been established at 150 seconds. Speed control adjustment (see Dispatching Room Equipment on next page) is then set at 150 seconds; each timing arm will require 150 seconds to make one complete revolution. With 5 cars in operation, cars will receive starting signals to leave bottom and top terminal every 30 seconds. After car No. 1 receives up starting signal, car No. 2 receives its up starting signal 30 seconds later. In another 30 seconds, car No. 3 receives its signal, etc.

With up and down timing arms set at 180° apart, a car receives down starting signal 75 seconds after it receives the up starting signal. This setting is satisfactory during non-rush hours, when traffic up and down is approximately the same. During rush hours, however, when up traffic is heavy (early morning and noon), down timing arm can be retarded with relation to up arm to give longer up running time than down. *Round trip time* usually need not be altered. During rush hours when down traffic is heavy (early noon and later afternoon) down timing arm can be advanced with relation to up arm to give longer down running time than up. Intermediate timing arm can be adjusted to give auxiliary white light signal at whatever relation to up and down signals is desired.

Double Schedule—When cars in one bank do not have same travel, or where 2 banks of cars are in close proximity, contacting equipment, switches, time adjustment, etc., for both groups, may be installed in one cabinet.

Specifications

Furnished on request.

TYPE "CB" AUTOMATIC DISPATCHING SYSTEM

Description

Designed to furnish individual starting light indications in each car. When other signal fixtures are installed in car, dispatching lights may be incorporated in these fixtures. Cars are automatically signalled to start from either terminal landing at regular pre-determined intervals. Type "CB" differs from Type "K" Automatic Dispatching System in that Type "CB" does not require cars to be dispatched in fixed rotation. The first car to arrive at a terminal is the first to receive the starting signal. Other cars arriving before first car is signalled to leave will not receive starting signal until first car is dispatched. Then, starting signal is automatically given to next car to be dispatched. Starting signal interval is adjustable, as is the interval between up and down starting signals.

Signal lanterns at terminals are so connected into the system circuits that only the lantern above the car about to be dispatched will be illuminated.

Car Fixture—Contains red, green and white signal light indications. Green light gives up starting signal; red light gives down starting signal; white light signals that car is next to be dispatched. Starting signal lights are illuminated when timing arm makes circuit with stationary contacts and remain lighted until signalled car leaves terminal floor.

Starter's Panel—Usually located on first floor adjacent to elevator bank. Contains duplicate up and down starting light indications, switches for cutting cars in and out of service, control for varying starting interval and means for changing interval between up and down starting signals.

Dispatching Cabinet—For details, see following page.

Control Panel—Contains necessary relays for selecting cars to receive starting signal, controlling starting signals and hall lanterns for each car. Located in elevator machine room.

Commutator—When system is installed in conjunction with a major signal system in which a commutator is used, several segments are added to the commutator for control of top and bottom relays of dispatching. When commutator is not used, switches are provided in hatchway, contact being made by engagement with cam located on car.

Operation

When car arrives at lower terminal (assuming there is no other car there), hall lantern and next-car signal (white, in car) are illuminated, indicating to operator and waiting passengers that this is next car to be dispatched. Should other cars arrive at lower terminal before this car receives starting signal, their hall lanterns and next-car signals will not illuminate. After expiration of waiting interval, set by starter, car receives up starting (green) signal indication, which is extinguished when car leaves terminal floor. As soon as up starting signal is received in first car, hall lantern and next-car signal is transferred to next car to be dispatched. At expiration of second interval, second car receives up starting signal, and hall lantern and next-car signal are transferred to third car, etc.

The speed control adjustment having been set same as described under Type "K" operation, assume that starting interval is 30 seconds. Should a second car arrive at terminal floor before first car receives starting signal, then starting signal is given to second car 30 seconds after signal is given to first car. Should second car arrive, say 10 seconds after first car receives starting signal, then second car must wait the balance of interval, or 20 seconds, before receiving starting signal. Should second car be delayed and arrive at terminal 10 seconds after expiration of second interval, or 40 seconds after first car received starting signal, the signal is held and given immediately to the second car on its arrival at the terminal.

During rush hours when traffic is heavy in up direction, down timing arm may be *retarded* from its 180° position to give longer up time than down. When traffic is heavy in down direction, down timing arm may be advanced to give longer down time than up.

Double Schedule—When cars in one bank do not have same travel, or where two banks are in close proximity, the contact equipment, switches, time adjustment, etc., for both groups may be installed in one cabinet.

Specifications

Furnished on request.

DISPATCHING CABINETS FOR TYPES "K" AND "CB" SYSTEMS

Note: The Dispatching Cabinets used for both Type "K" and Type "CB" Automatic Dispatching Systems being essentially the same, the following description applies to both systems, unless otherwise noted.

Location

Usually placed near starters' station on ground floor. When not placed as to be readily visible from starters' station, duplicate starting lights may be incorporated in the position indicator panel or in a separate fixture located for visibility.

Construction

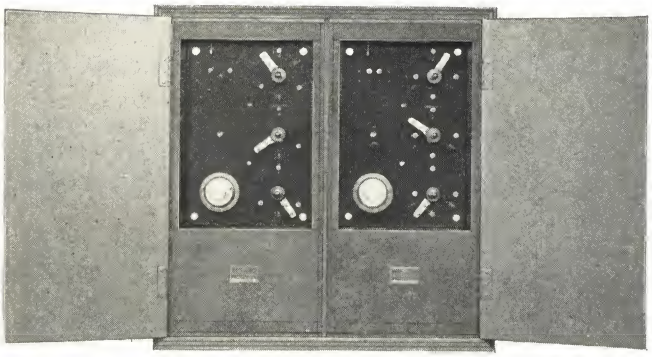
Consists of steel box and bronze frame, arranged for flush mounting. Has hinged door for ready access to dispatching elements, provided with lock and key.

Component Parts

Signal Mechanism—Motor driven, for flashing light signal at pre-determined intervals.

Synchronizing Lights—Located on top of cabinet are duplicate red and green lights that flash, operating in synchronism with lights in each car.

Starters' Call Back Buttons—These may be placed beneath the synchronizing lights when Call Back feature is included in signal system.



Type "K" Dispatching Cabinet, Arranged for Double Schedule Left Panel, for 3 Local Cars; Right Panel, for 4 Express Cars

Timing Arms Motor—Small motor drives the timing contact arms through a gear reduction.

Timing Contact Arms—These pass over stationary contacts in panel. Contacts are evenly spaced, depending on number of cars in service. Timing arms are adjustable in relation to each other, to give signal indications suitable for traffic conditions. During non-rush periods, up and down contact arms are adjusted to be 180° apart, equalizing time for up and down travel. In rush periods, time for up travel may be made greater than time allowed for down travel, or vice versa, by adjustment of down timing arm in advance or behind its 180° position with respect to the up timing arm. Timing arm for white light signal may be adjusted to make contact just in advance of up contact to give car operator preliminary warning to be ready to start when green up signal is received. In Type "K" System, this timing arm may be adjusted to flash white light signal at any pre-determined point in hatchway so that operator may know whether or not he is traveling according to schedule.

Provisions are made with contacts so that cars may be switched out of service and remaining cars properly spaced to leave at equal intervals from terminal floors.

Speed Control Adjustment—Properly calibrated and marked so that timing interval is easily and quickly changed.

Combination Type "CB" and "K" Dispatching Cabinet

Tumbler Switch—Provides that dispatching machine may be started and stopped at starter's station.

Inspection Light—Provided inside cabinet, with pull chain socket, to permit proper illumination of entire interior when making adjustments or inspections.

Specifications

Furnished on request.

Note: A combination of Type "K" and Type "CB" Dispatching Machine is available for buildings wherein it is desired to use Type "K" System for elevators operating during the non-rush hour periods, and Type "CB" System, during the rush hour periods.

Additional Supplementary Signal Devices

POSITION AND MOTION INDICATOR

Consists of panel containing column of lights for each car—all rows parallel. Behind a glass numeral provided for each floor, a lamp illuminates as cars pass their respective floors. A glance thus reveals the relative position of each car. To indicate direction of car travel, a green and red jewel is placed below each vertical row of lights. Green jewel illuminated indicates upward motion of car; red jewel illuminated, indicates downward motion. Progressive light indications for each column of lights may be specified. In this case, the green and red jewel indicators are omitted as the progressive light system indicates both direction and floor position of car. Panel is usually located in most convenient spot within quick visibility of starter, and often contains fixtures for other supplementary signal systems. Designs and specifications on request.

TELL-TALE ANNUNCIATOR

Informs starter where passengers are waiting and shows whether cars stop for signals. Consists of double row of glass numerals, one for the "Up" and one for the "Down" indications of each floor. These illuminate and remain illuminated, upon pressure of any floor Push Button, until a car stops at floor signalled. Can be incorporated in Position and Motion Indicator (see above).

CAR POSITION INDICATOR

By individual illumination of jewels or glass numerals in a fixture located in car, this system gives to the car operator and passengers, the position of the car in the hatchway at all times. Invaluable where solid doors or high speed of cars prevent operator from seeing floor numbers.

MECHANICAL INDICATOR

As the least expensive, the Circular or Semi-circular Mechanical Dial has become the most popular indicator of the purely mechanical type. Installed over each elevator opening on ground floor and sometimes on all floors, it shows the position of each elevator in the hatchway.

VERTICAL MECHANICAL INDICATORS

Similar in principle to Circular or Semi-Circular Mechanical Indicators. The exception is that arrow moves *up and down* a vertical indicator column with the motion of the car. Usually installed where vertical biparting doors are used and mechanical indication is desired.

FADELITE INDICATOR

Consists of ornamental circular dial containing glass figures for each floor. Behind the glass figures is a rotating arm moving in synchronism with car travel. At end of arm is a continuously illuminated lamp enclosed in small housing and arranged so that each floor figure is illuminated as the car passes by or stops at a floor.

ELECTRIC POSITION INDICATORS

Made in circular dial or horizontal panel types and arranged with a stationary lamp behind each floor figure. Lamps are separated by partitions and are individually illuminated for each floor as car moves up or down the hatchway. Operated from a commutator, usually located at bottom of hatchway.

STARTER'S CALL BACK SYSTEM

Consists of panel in which a push button for each car is mounted. Push buttons sound buzzer in respective cars, thus providing signal system from starter to each operator. Generally located near starter's station.

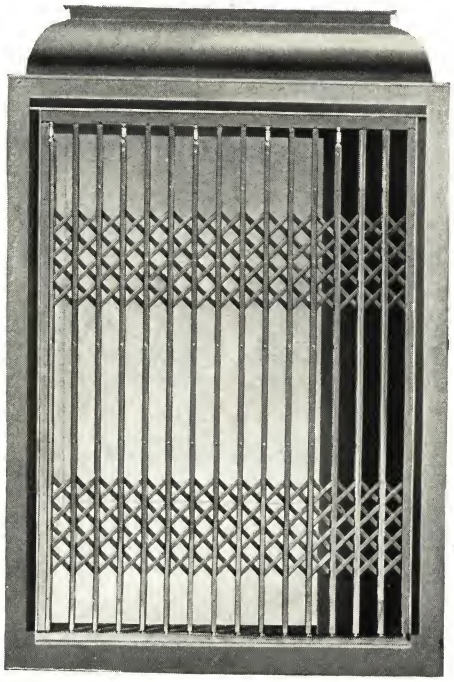
TELEPHONES

Telephones are often installed in each car, at starter's station and engineers' room, providing means of intercommunication between these points. Main station is generally at starter's station, and can be incorporated in Position Indicator Panel.

ES ELEVATOR CAR GATES

Description

The ES Elevator Car Gate is a sturdy, quiet-operating gate, capable of withstanding the severe stresses imposed by pneumatic or other power operation. Although similar in general appearance to the usual collapsible gate, it is different in the design and construction of its parts.

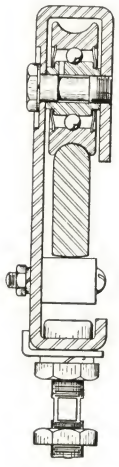


ES Car Gates Will Not Sag, Buckle or Rattle

Construction

Vertical Members—Consist of two round-edge channel sections, specially rolled and drawn to give straight inside surface instead of tapered surface of conventional channel. This permits close fit of rollers in collapsible lattice sections of gate, and eliminates rattle and clash of gate members.

Every Third Vertical Member—Every third member is supported by ball bearing sheaves operating on a steel track. Sheave is arranged for pressure lubrication. Each of the sheave hanger members is equipped with a vertical adjustment by means of which gate may be raised or lowered while in operating position to permit proper threshold clearance.



Ball Bearinged Sheave with Vertical Adjustment

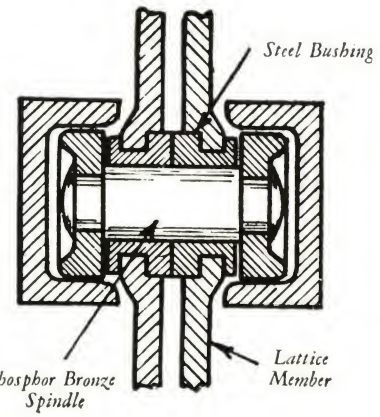
All Intermediate Vertical Members—All vertical members are provided with guides at bottom closely fitting car threshold grooves.

Vertical End Member—A drawn metal tube of square section reinforced to take gate-operating arm connection.

Collapsible Lattice—Connects vertical members and is made of oval-edge flat bars reinforced at all perforated points so that strength of lattice bars is not impaired by perforations for pivot used in gates. All pivot and roller bearing holes are further reinforced with steel bushings, pressed in and spun over. All joints in lattice having combined turning and straight line motion are provided with bearings which roll on inside flanges of vertical members, substituting rolling for sliding contact. This reduces friction and consequent wear.

Material and Finish

Gates are made of solid architectural bronze material throughout with natural brushed bronze finish. Electroplated finish can be provided when specified, but the natural brushed bronze finish is generally preferred.



Section Through Collapsible Lattice Roller Joint

Showing how perforated points are strengthened by upsetting metal and inserting steel bushings

TABLE OF SIZES

Single Slide Gate			Center Opening Gates		
Number Members	Clear opening, in.	Space gate collapsed, in.	Number Members, each side	Clear opening, in.	Space gate collapsed, in.
12	30 7/8 to 33 5/8	11 1/2	7	33 5/8 to 39 1/8	7 3/4
13	33 5/8 to 36 3/8	12 1/4	8	39 1/8 to 44 5/8	8 1/2
14	36 3/8 to 39 1/8	13	9	44 5/8 to 50 1/8	9 1/4
15	39 1/8 to 41 7/8	13 3/4	10	50 1/8 to 55 5/8	10
16	41 7/8 to 44 5/8	14 1/2	11	55 5/8 to 61 1/8	10 3/4
17	44 5/8 to 47 3/8	15 1/4	12	61 1/8 to 66 5/8	11 1/2
18	47 3/8 to 50 1/8	16	13	66 5/8 to 72 1/8	12 1/4
19	50 1/8 to 52 7/8	16 3/4	14	72 1/8 to 77 5/8	13
20	52 7/8 to 55 5/8	17 1/2			
21	55 5/8 to 58 3/8	18 1/4			
22	58 3/8 to 61 1/8	19			
23	61 1/8 to 63 7/8	19 3/4			
24	63 7/8 to 66 5/8	20 1/2			

Note: Specifications and data requirements will be furnished on request.

ES AUTOMATIC RELEASE GATE CLOSER

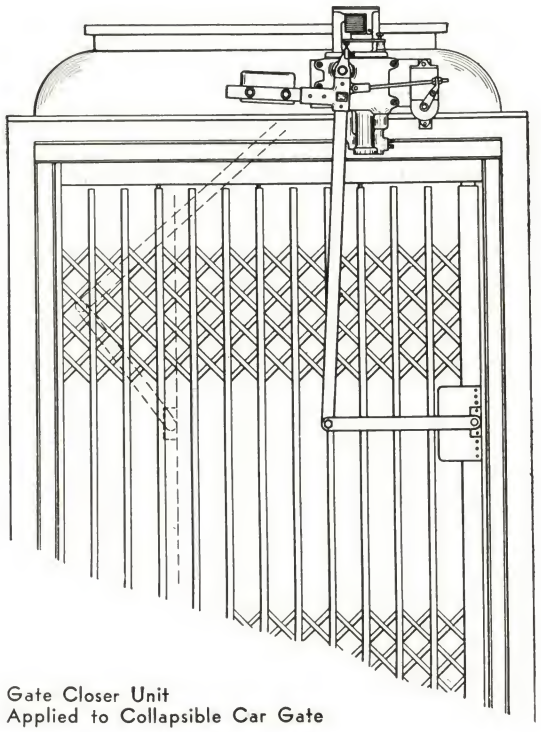
Description

This device is a small, compact unit, mounted on top of the car at the front end, and, through an operating arm, closes collapsible car gates of push button elevators (after manual opening).

Operation

The Gate Closer is arranged for two methods of operation:

(1) To *quickly* close the gate (after manual opening) when a button is operated either in the car or at a landing. This requires electrical connection to the elevator control.



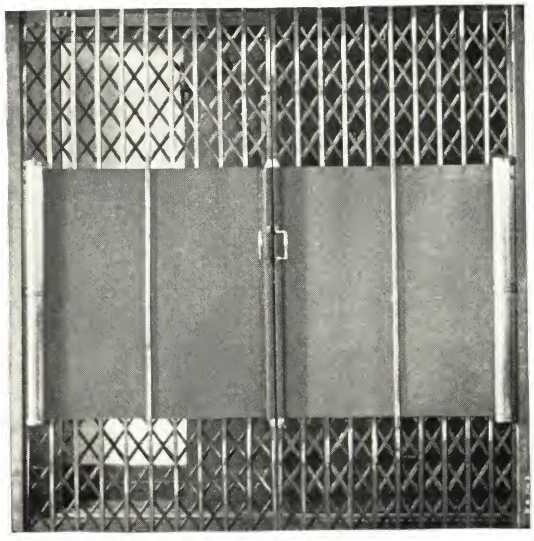
Gate Closer Unit
Applied to Collapsible Car Gate

(2) To *slowly* close the gate (after manual opening), the rate of closing being adjustable as desired. This arrangement is sometimes used where the elevator is not in constant use. No electrical connection to the elevator control is required.

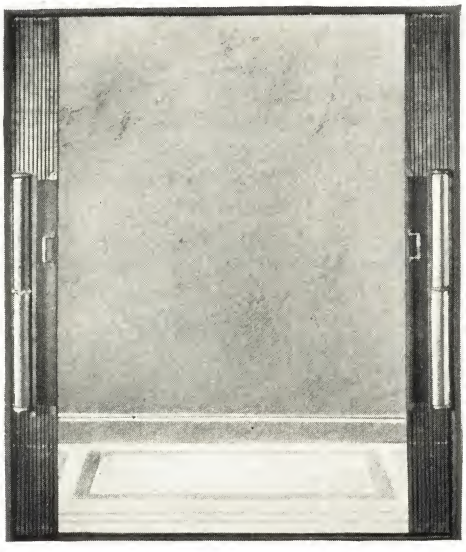
Construction

Simple in design and ruggedly built for push button elevator service. The unit housing, which also contains the checking fluid, is designed to prevent leakage and overflowing.

ES SAFETY CURTAINS FOR COLLAPSIBLE CAR GATES



Safety Curtains, Shown on Center-opening Type of Gate, in Closed Position



Safety Curtains, on Center-opening Type of Gate, in Open Position

Purpose

Designed to prevent possibility of injury to the fingers of passengers and car operators where collapsible car gates are used. Especially recommended for use in department store elevators.

Description and Operation

Curtains are made of special DuPont Fabrikoid to withstand great amount of wear. They are attached to the gate, as illustrated. Opening and Closing of gates operates curtain somewhat in same manner and principle as a window shade, the difference being in the general construction and application. Being of unit construction, the curtain may be applied to any form of standard elevator car gate. It is compact, of substantial design and sturdy construction. Instructions for installation are furnished with each order.

ES ELECTRIC DUMBWAITERS

Applications

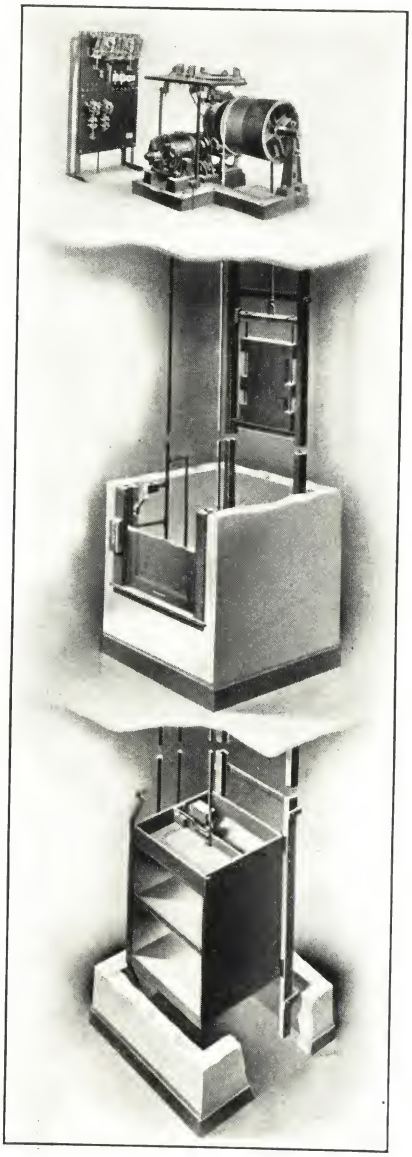
Because of the safety, speed, and economy with which ES Electric Dumbwaiters transport goods from floor to floor, handling loads of practically any description up to 500 lbs., they are being more and more extensively used for the vertical transportation of merchandise, food, clothing, money, documents, mail, etc. They are particularly applicable to the distribution problems met with in hospitals, department stores, hotels, restaurants, libraries, banks, etc. For instance:

In Hospitals—Used for transportation of medical supplies, sterilized surgical instruments, as well as for food service. Frequently eliminate diet kitchens on all floors, by making possible serving of meals from central kitchen, thus reducing cooking odors and number of attendants ordinarily required for food distribution.

In Hotels—Practically indispensable in modern hotels for rapid transportation of food from central kitchen for room service. Also used for distribution of mail, house supplies, package delivery, etc.

In Public Buildings—Used for carrying books, records, and valuables to and from vault room; for interdepartment message service; for distribution of stationary and supplies, etc.

In Large Business Organizations—Especially those businesses occupying several floors in one building and requiring extensive inter-department message service. Far quicker than messenger boys and reduce congestion otherwise present in passenger elevator service. Automatic distribution of mail is made possible by provision for dumbwaiters unloading mail trays and picking up empty trays at each floor.



Typical ES Electric Dumbwaiter Installation

Features

Simplicity of Design—Designed for operation on D.C. or polyphase A.C., machines are available in the winding drum, as well as in the traction sheave type.

All machines are of the 4-bearing type, the motor being connected to the worm gear reduction unit by a flexible coupling, making possible the removal of motor without necessity of dismantling rest of equipment.

Electro - Magnetic Brakes—Electro-Magnetic type brakes are standard and are provided with two leather-lined shoes. Quiet in operation, with all parts readily accessible and easily replaced.

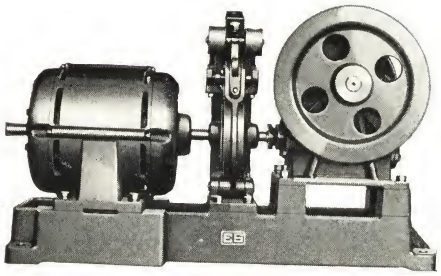
Worm and Gear—Each machine equipped with drop-forged steel worm and a bronze gear. Worm gear shafts equipped with roller or ball-bearing thrust bearings to take thrust stresses in each direction.

Lubrication—Special system, providing continuous flow of oil for worm and worm gear bearings, oil level being easily inspected.

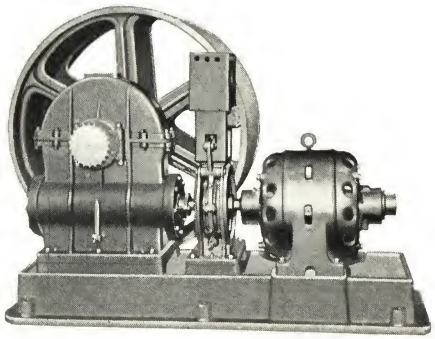
Smooth, Vibrationless Operation—All rotating and moving parts machined to accurate limits, eliminating vibration in operation. When necessary, dumbwaiters will be equipped with slow-down device which automatically provides smooth stopping. Thus equipped, liquids in open containers may be carried without danger of spilling or upsetting.

Steel Tape Drive for Limited Space Conditions—When dumbwaiter machine demands location overhead or in basement where space is limited and will not permit use of winding drum, Type "U" machines can be equipped with a multiple flat-grooved sheave, using steel tapes instead of cables.

Wide Range of Selection—Standard car sizes, rises, ratings and other characteristics are given in the table of particulars on page 28. Dumbwaiters for unusual service with special types of control are also available. Competent engineers will be glad to consult with you, without obligation on your part, and will assist in any manner possible in the preparation of plans and specifications.



Type "U" Dumbwaiter Machine



Type "H" Dumbwaiter Machine

DUMBWAITER CONTROLS

Selection of proper-type of control is of great importance. The vital factor to be taken into consideration is that the control should function with maximum efficiency and with minimum effort on part of operator. It should be arranged so that car will not be called away from a floor before load has been delivered. ES Controls have been designed for practically any application and several types are briefly described below. Should any of these controls fail to answer your purpose, engineers are at your service to suggest the proper control to meet your particular requirements.

One-Point Direct Service

Car is operated from one floor only, through control station, by which car may be sent from any floor to any other floor. Station is of the indicating type, showing floor to which car was last sent. At control station is a toggle switch marked "Return" on one side, and "Remain" on the other. With switch on "Return", car will automatically return to dispatching floor when door is closed at floor to which car was sent. With switch on "Remain", the "Return" feature is cut out; operator can dispatch car direct to any other floor without returning car to dispatching floor. This permits inter-floor service. At each floor, a push button is installed and connected to the Call Annunciator at dispatching floor. This indicates where car is wanted. Buzzer is installed in car to give audible signal on its arrival at any floor, and continues to ring until door is opened.

To show operator that car has arrived at destination, thereby eliminating guess work, a signal light may be incorporated at the control station, adjacent to the hatchway door opening. This light functions as follows: "Bright Light" signifies car is running; "Dim Light" means that car has stopped and all doors are still closed. When light goes out, it indicates that the enclosure door is open.

One-Point With Signals

Car is operated from one floor only, through control board by which car may be sent from any floor to any other floor. Operating panel on control board is of indicating type, showing floor to which car was last sent. Signal lamps on control board show if car is in motion, also if any door is open. At each floor, a push button is installed and connected to Call Annunciator on control board. This indicates where car is wanted. In the car, a set of push buttons is installed and connected to the "Send" Annunciator on control board. This Annunciator indicates floor to which car is to be sent. A bell at each floor and a set of signal buttons on the control board enables operator to signal any floor to which car has been dispatched. Bell is also used to notify any floor delaying car by lack of attention.

Full Automatic

A set of control buttons, marked to correspond to floors served, is provided at each landing, allowing full control of car from any floor. Pressure of button calls car or sends it to any desired floor, where it will automatically stop.

Call and Send

A set of control buttons, marked to correspond to floors served, is provided at dispatching floor. At all other floors, two push buttons are installed; one to *call* car, the other to *send* car to dispatching floor. Pressure of buttons operates car, which stops automatically at proper floor.

Half Automatic

Same as "Call and Send", with the exception that at all floors but the dispatching floor, a single push button is installed. Pressure of this button sends car to dispatching floor.

Car and Call

A set of *"Send"* control buttons, marked to correspond to floors served, is provided in car, and a single *"Call"* control button is installed at each landing. Car can be called to a floor by pressure of "Call" button at landing, and can then be sent to any other floor by pressure of proper "Send" button in car and closing the door. Car stops automatically at proper floor.

Note: Equipped with any of foregoing controls, car cannot be operated while any door is open. Also, control buttons are inoperative while car is in motion.

DUMBWAITER SIGNALS

Automatic

Type No. 1—Pilot light installed adjacent to each opening, the light illuminating on arrival of car and remaining illuminated until door is opened.

Type No. 2—Combination fixture, containing pilot light and single stroke bell, installed adjacent to each opening. Pilot light operates as described above; bell strikes once on arrival of car.

Type No. 3—Bell, or buzzer, installed at each opening, rings, or buzzes, on arrival of car and continues in operation until door is opened.

Type No. 4—Mechanical indicator, installed at each opening, is marked to correspond to floors served and indicates position of car in hatchway at all times.

Type No. 5—Automatic buzzer, mounted in car, operates whenever car stops at floor and continues to buzz until door is opened.

Non-Automatic

Type No. 1—Bell, or buzzer, installed in car and connected to push button at each opening.

Type No. 2—Bell, or buzzer, at each opening, connected to bank of push buttons in car.

Type No. 3—Bell, or buzzer, at each opening, connected to bank of push buttons at each floor, permitting signalling to any floor from any other floor.

Communication

Any desired system of telephone or speaking tubes.

DUMBWAITER CARS

Construction

Standard car furnished with Type "U" and "H" Dumbwaiters is constructed of No. 18 gauge sheet steel on sides and back, and No. 16 gauge on top and bottom. Firmly riveted or welded and amply reinforced. If wooden car is preferred, construction is of 7/8 in. Oak or Ash and properly reinforced with steel. Car and counterweight shoes made of cast steel or bronze with grooves machined to uniform depth and width to assure smooth and quiet operation.

Standard Equipment

One shelf, either stationary, removable, or hinged.

One slack cable switch furnished on car where winding drum or steel tape equipment is used.

One car lamp that illuminates when car comes to rest at landing and acts as signal at receiving floor to indicate car's arrival. (Not included with Type "U" machines, Series A and B. May be added at extra cost.)

Note: Enclosure doors should be furnished with glass window so lamp can be seen.

Finish

ES Standard Gray paint, unless otherwise specified. For hospitals, restaurants, hotels and other institutions requiring absolute sanitary conditions where food is handled in open containers, cars may be made of "Monel Metal". Cars may also be furnished made of alumnium, Super-Ascoloy steel, bronze, or Parkerized finish on steel.

Car Accessories

Bi-parting type sliding doors.

Vertical type sliding doors.

Collapsible gates.

Note: Door lock and door switch equipment functions in conjunction with the enclosure doors usually provided by others. Flimsy construction of these doors prevents proper operation of contacts and locking devices. Side play should be limited to 1/8 in., and clearance, front to back, to 1/16 in.

The most satisfactory results are obtained through close co-operation between door manufacturer and dumbwaiter manufacturer. To this end, complete details and layouts, regarding enclosure door construction, showing typical construction of bi-parting as well as sliding and swinging doors to which door equipment is adaptable will be forwarded on request.

Locking Bars for Cars

Electric Heaters—For use in cars where food is conveyed and necessary to keep at even temperature during delivery. Solid, sliding type bi-parting doors are usually used to retain heat within car.

DUMBWAITER DATA

Rating Load Lbs.	Rating Speed Ft. per minute	Travel	Car Size	Machine Location	Types of Control	Machine	Car	Counter weight	Guide Shoes	Guide Rails	Cables	Safety Devices
TYPE "U"—SERIES "A"												
25 50 75 100 150 200	50, 75, 100 50, 75, 100, 150 50, 75, 100, 150, 200 50, 75, 100 50, 75 50	2 to 12 ' floors, or a maximum of 150 ft.	Not to exceed 12 cu. ft. volume. (Weight of car approx. 125 lbs.) 26 in. wide x 26 in. deep x 30 in. high is average car size	Overhead or below	All those listed and described on page 27	Single worm gear, reduction, magnetic brake, ½ to 1 H. P. motor connected with worm through a flexible coupling. Entire machine assembled on single cast iron or steel base. Machines furnished with traction sheave, tape sheave or winding drum as conditions require	No. 16 and No. 18 gauge sheet steel, angle reinforced, one removable shelf	Built-up type, consisting of channel iron frame with tie rods, containing proper number of cast iron weights	Cast steel or cast bronze with machined grooves	Cold rolled steel channels, weighing 6 lbs. per ft.	Traction sheave type machine use 1 steel cable, ¼ in. diameter. Tape sheaves furnished with steel tape as per code requirements. Winding drum type machines use 2 steel cables, ¼ in. diameter, (1 car cable and 1 counterweight cable)	Door Locks and Switches
TYPE "U"—SERIES "B"												
100 150 200 250 300 400	150,200, 250 100,150, 200 75,100, 150 50,75,100 50,75 50	2 to 18 floors, or a maximum of 225 ft.	Not to exceed 20 cu. ft. volume (Weight of car approx. 175 lbs.) 30 in. wide x 30 in. deep x 36 in. high is average car size	Overhead or below	Same as above	Same as above, with 1½ or 2 H.P. motor	Same as above	Same as above	Same as above	Same as above	Same as above, except cable sizes are 5-16 in. diameter	Same as above
TYPE "U"—SERIES "C"												
100 150 200 250 300 400 500	300 250,300 200,250, 300 150,200, 250,300 100,150, 200,250, 300 75,100,150 50,75,100, 150	Any desired number of floors up to 30, approximately	Not to exceed 9 sq. ft. area and 4 ft. in height. This is maximum car size allowed in cities and states where rules and regulations exist regarding dumbwaiter construction	Overhead or below	Same as above	Same as above, with proper size motor	Same as above	Same as above	Same as above	Same as above	Same as above, except cable sizes are 5-16 or ⅜ ins. diameter, depending on conditions	Same as above
TYPE "H"												
200 to 500 Used principally for high-rise and high speed installations	350	Any desired number of floors, usually furnished in buildings of 20 floors or over	Same as Type "U" Series "C"	Overhead	Same as above	Same as above, with proper size motor, but furnished in winding drum type only	Same as above	Same as above	Same as above	Same as above	Two steel cables of ⅜, 7-16, or ½ ins. diameter (1 car cable and 1 counterweight cable) depending on requirements	Same as above

Note: Limit Switches furnished in all two-stop and three-stop installations; in other cases, only when specified.
Slow down Relays furnished when car speed exceeds 150 ft. per minute.
Slack Cable Switches furnished on all installations where winding drum and steel tape equipment is used.

DUMBWAITER ACCESSORIES

Car Leveling Device

Where car is designed to carry trucks, it is necessary to have car stop directly opposite floor level. Device for this purpose consists of push button box, in car, marked "Up-Down". Pressure on buttons raises or lowers car to exact floor level.

Retiring Cam

On high-speed installations, an electrically actuated retiring cam is essential so that cam will not strike door-lock rollers while car is moving through hatch. Device also makes it impossible for door to be opened while car is moving past the door. Recommended also for moderate-speed installations in banks, brokerage and insurance offices where loads must not be tampered with while in transit.

Electric Contact

When car door or gate is equipped with Electric Contact, which completes electrical circuit to dumbwaiter control, it is necessary for attendant to close the door or gate *fully* before car can be dispatched to another floor.

Positive Type Combination Door Lock and Switch

A positive interlock for use only with sliding or bi-parting doors. Simplifies installation of door equipment and is an exclusive ES Dumbwaiter feature.

Advantages—(1)—Allows for play in enclosure doors (sideways or front to back), and always leaves same margin of safety in the catching of the locks.

(2)—Interlocking is absolutely positive, that is, a door must be mechanically locked before contact is made; it is impossible to operate dumbwaiter before door is *closed and locked.* (3)—Unit cannot be operated by hand, pencil or screw driver from an open door, thus preventing accidents caused by impatient attendants forcing open a hatch door while car is in travel.

Non-Interference Relay

After car arrives at floor to which it is dispatched, this device prevents car from being called to another floor within a predetermined period.

"Stop" Buttons

If operator dispatches car to wrong floor, he can stop car before it reaches that floor by pressing the "Stop" button provided in push button box. Then, by pressing button for correct floor, car may be sent to the proper landing.

Miscellaneous Accessories

Reverse phase relays
No voltage release
Overload relay
Sequence relay
Watt-hour meter
Compensating cables for high rise dumbwaiters
Tracks in car for trucks
Special flooring in car
Copper or Galvanized drip pans
Car safeties
Counterweight safeties
Spring bumpers
Guide lubricators
Fibre or wood-lined car and and counterweight shoes

Specifications

Complete specifications of ES Electric Dumbwaiters and accessories will be gladly sent on request.

Information Required for Estimates

A printed questionnaire listing all points of information required for dumbwaiter estimates will be gladly sent on request.

TELEVEYORS

Description

Televeyors are continuous duty electric tray conveyors, entirely self-contained in portable telescopic cabinets. Like Televators, they combine in a single unit the complete mechanical and electrical equipment, and the enclosure for service between two connecting floors, thus offering the same advantages of portability, quick installation and elimination of building operations, as outlined in the description of Televators on the following page.

Also made in demountable sections to serve two or three floors where telescopic feature is not desired or required.

Where Used

Designed for service in restaurants, hotels, factories and industrial establishments, or wherever it is desired to carry trays or uniform size boxes from one floor to the next in either direction.

Construction

Steel Cabinet Enclosure—Same as Televator enclosure described on following page.

Televeyor Fully Extended, Showing Conveyor System and Automatic Horizontal Take-off

Mechanical and Electrical Equipment—A complete, easily accessible, fully enclosed power unit, consisting of motor, reduction gear unit and control panel, is securely mounted at base of cabinet. Steel roller chains with ultimate strength of 7000 lbs., are used for the drive and carrier system. Extremely smooth and quiet operation is provided. Simple take-up adjustment, requiring no mechanical skill, is provided at top of Televeyor to keep entire conveyor system in perfect alignment.

A 6-ft. flexible extension is provided for power attachment. Light duty Televeyors are operated by plugging into any ordinary light socket or base outlet, the current available being ample to drive all Model "L" (light duty) equipment. Model "H" (heavy duty) Televeyors require power from a motor power circuit.

Finish

All models finished in battleship gray paint. Special finishes at slight extra cost.

Automatic Take-off Conveyor

Where it is desired to have trays or boxes carried *from* the Televeyor on a horizontal plane on the lower floor, a portable automatic horizontal belt conveyor section, easily adjusted to the Televeyor, can be furnished.

Standard conveyors extend 5 ft. beyond front face of the Televeyor enclosure, but where conditions require a longer horizontal travel, special lengths up to 10 ft. can be provided at no additional cost.

Capacities

Light duty Televeyors are powered to carry an average load of 10 lbs. per tray. Where the average load per tray is likely to exceed 10 lbs., heavy duty Televeyors should be installed. The various models listed below conform to the dimensions required to carry popular size trays.

Information Required for Estimates

Same as for Televators, but state whether automatic Take-off is desired, with length of horizontal travel.

Standard Models

MODEL NO. 35-21

Tray	13⅞ x 10¾ ins.
35 L-21	Light duty
35 LT-21	Light duty with Take-off
35 H-21	Heavy duty
35 HT-21	Heavy duty with Take-off
Cabinet enclosure and floor opening	2 ft. 11 ins. x 1 ft. 9 ins.

MODEL NO. 37-22

Tray	16½ x 12¼ ins.
37 L-22	Light duty
37 LT-22	Light duty with Take-off
37 H-22	Heavy duty
37 HT-22	Heavy duty with Take-off
Cabinet enclosure and floor opening	3 ft. 1½ ins. x 1 ft. 10½ ins.

MODEL NO. 39-24

Tray	17¾ x 13⅞ ins.
39 L-24	Light duty
39 LT-24	Light duty with Take-off
39 H-24	Heavy duty
39 HT-24	Heavy duty with Take-off
Cabinet enclosure and floor opening	3 ft. 3 ins. x 2 ft.

All standard models motored and geared to operating speed that will receive trays in either direction at rate of 12 per minute.

TELEVATORS

Description

Televators are complete electric push button dumbwaiters, entirely self-contained in portable telescopic steel cabinets, combining in a single unit the complete mechanical and electric equipment and the enclosure for service between two connecting floors, *delivered ready for service.* Also made in demountable sections to serve two or three floors where telescopic feature is not desired or required.

Where Used

Designed for use wherever food or merchandise is to be carried between two connecting floors. Especially recommended for restaurants, cafeterias, bakeries, stores, soda fountains, banks, hotels, residences, factories, hospitals and industrial establishments.

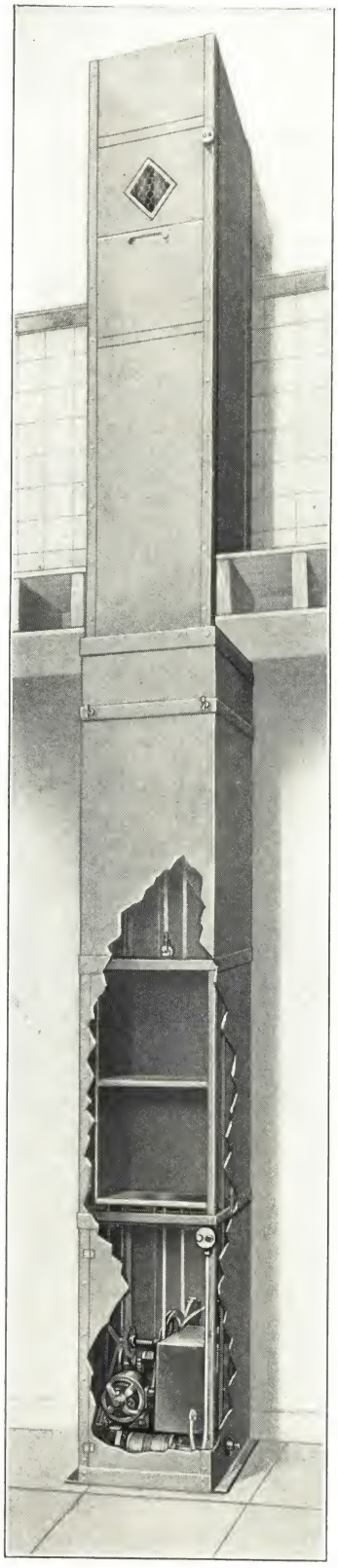
Advantages

Televators are manufactured complete, ready for installation. Each unit is assembled, carefully mounted and tested before shipment.

Quick Installation—The enclosure and the mechanical and electrical equipment all being contained in the one unit, one man may have the Televator in operation within a few hours. With upper door-opening previously prepared, he raises interior telescopic section to proper level at upper floor by means of an easily operated detachable lever supplied for this purpose. This being done, the two sections are securely bolted together with specially designed toggle bolts, and tension of the raising device and cable is released. Electric attachment in Models A and A/B is then plugged into any convenient outlet; in Models B and C, into a motor power circuit; and equipment is ready for service.

Building Operations Eliminated—No fuss, no bother. No skilled mechanics required. No building of fire-proof walls or partitions. No fitting and installation of doors and bucks. No plastering, painting, providing space for machine room, or any of the other details of a dumbwaiter building operation. The only preparation necessary is to cut a square opening through the upper floor.

Portability—Televators can be removed as readily as furniture or office fixtures might be, and re-installed elsewhere without difficulty. This feature also establishes a re-sale value that is out of the question where a shaft, or enclosure, has been constructed as part of the building.



Televator Completely Extended and Ready for Operation, Showing Power Unit and Car

Construction

Televators consist of a rigid, telescopic steel cabinet in two sections, the upper section telescoping within the lower. In the cabinet is securely bolted and ready for operation a complete power unit, including control panel; a steel car; telescopic steel guides; steel cables; counterweight; raising mechanism; and other miscellaneous equipment. At base of cabinet are fitted four ball-bearing pivot castors for rolling unit into position before raising.

Steel Cabinets—Built of sheet steel, with two openings for access to car and one opening for access to mechanical and electrical equipment, all of which is mounted at base of cabinet and easily accessible for lubrication. Access openings are fitted with counter balanced sliding doors having electrically operated contacts so arranged that when either door is open, circuit is broken and car stops. As car cannot be moved unless both doors are closed, absolute safety is assured. Each door has glass insert, through which the car can be seen as it reaches landing. A two-button station is provided near each door for calling or sending car.

Finish—All cabinets and cars of standard models are finished with battleship gray paint. Special finishes furnished at slight additional cost.

Standard Models

Model No.	Capacity lbs.		Floor Opening ins. (to be previously prepared)	Steel Enclosure, ins. (Outside Dimensions)	Steel Car, ins.		
	L	H			Wide	Deep	High
A-24	25 or 50		24 x 24	24 x 24	20	18	36
A/B-27	50 or 100		24 x 27	24 x 27	20	20	36
B-30	150 or 250		30 x 30	30 x 30	24	24	36
C-36	300 or 500		36 x 36	36 x 36	30	30	36

Standard models motored and geared to deliver car speed of 100 ft. per minute for lighter capacity given above under L, and 60 ft. per minute for heavier capacity shown under H.

Special sizes and capacities can be furnished if desired.

Information Required for Estimates

(1) Model, capacity, and whether A.C. or D.C. is to be used, also voltage, phase and cycles.

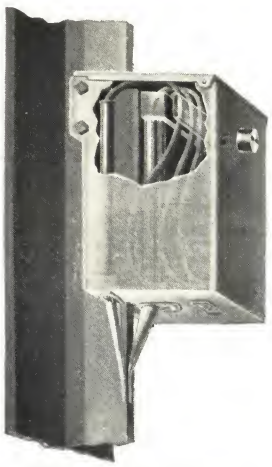
(2) Ceiling height on both floors.

(3) Thickness between finished ceiling of lower floor and finished floor of upper floor.

ES GUIDE RAIL LUBRICATORS

Triple Feed Lubricator

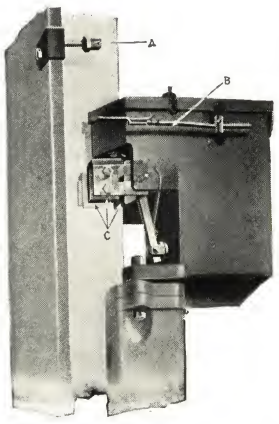
Consists of an aluminum container or reservoir holding one quart of oil and is attached to the guide rail by means of set screws. Inside the reservoir are three vertical tubes which are fastened to the bottom of the reservoir. A wick is drawn through each of these tubes, one end terminating in the rail feed spouts about one inch below bottom of reservoir, and the other end, which passes out of the top of the tube, is extended down and through a feed adjusting clamp to the bottom of the reservoir. Flow of oil may be regulated at any time to whatever quantity is desired by means of a regulating knob. A slight adjustment increases or decreases the flow of oil as desired. After installation, the elevator rails will be properly lubricated without further attention other than to fill the lubricator with oil at regular intervals.



Triple Feed Lubricator Attached to Elevator Guide Rail

Positive Guide Lubricator

This lubricator is mounted on the car, instead of on the guide rail. It is attached adjacent to the guide shoe on the car or counterweight and, as the elevator starts from the terminal floor, the attachment "A", which is clamped on the rail, engages with the lubricator pump arm, "B". This arm is thus depressed and operates a plunger which pumps one charge of oil through a feed pipe to an auxiliary reservoir from which the oil drips to the lubricating fibre distributing blocks, "C". These are held in contact with the rail, spreading the oil uniformly as the elevator travels up and down the hatchway. Quantity of oil to be pumped is adjustable and these lubricators are adaptable to all types of elevators.



Positive Guide Lubricator Attached to Top of Guide Shoe on Car or Counterweight

ES FIREPROOF RIGID STEEL THEATRE CURTAIN

The ES Fireproof Rigid Steel Theatre Curtain has been installed in the majority of Class V Theatres in Chicago, where only the rigid type of fireproof curtain is permitted by local ordinance. It was approved for use in Washington, D. C., after actual fire tests which were conducted by the Bureau of Standards in 1923. For cities that do not have local ordinances covering the curtain for the proscenium opening of theatres, the ES Curtain fully meets the requirements outlined in Section 237 of the Building Code recommended by the National Board of Fire Underwriters.

We shall be glad to send on request, the complete and interesting details, as well as specifications of the ES Fireproof Rigid Steel Theatre Curtain to any interested architect or contractor.

ES ORCHESTRA PLATFORM AND/OR ORGAN CONSOLE LIFT

This ingenious device permits the entire floor of the orchestra pit or the organ console platform to be raised or lowered at will. This is accomplished by means of the platform being attached to four elevating screws of the worm driven type. Where the Organ Console Lift is used alone, the platform is raised by only one elevating screw. Both of these lifts are operated by individual electric motors having push button control at three points: one on the motor control panel, one at the switchboard on the stage, and one near the orchestra leader's station or on the organ console proper. Operation is safe, silent and speed is regulated. Full details and specifications will be promptly furnished to any interested architect or contractor on request.

THE ROTOSCOPE

A Mechanical Visual Announcer for Passenger Elevators

The Rotoscope is a unique device that flashes upon a square screen the floor to which the elevator is approaching. It consists essentially of a film projector unit and a screen, together with operating mechanisms. The projector may be installed inside or outside of the car, but always on the side of the car opposite the screen. The screen, 11 ins. square or smaller, is placed in plain view of passengers as well as the operator. Through the medium of the projector, the floor numbers, names of departments, advertisements, special announcements, etc., are flashed on the screen.

The projector is capable of flashing one indication per floor for an elevator traveling up to 36 consecutive floors per trip, and can also be timed for express service. When car reverses its travel, the Rotoscope will also reverse and flash the correct indications on the screen. Projection is so timed that the next floor number is flashed on the screen soon after the car starts, thereby permitting the passenger to receive the message and be prepared to leave the car, without delay, at his destination.

The Rotoscope is readily installed in either old or new elevators. Send for the complete and interesting details of this time-saving, service-improving device.

GRANT ELEVATOR EQUIPMENT CORP.

33-36 57th Street, WOODSIDE, LONG ISLAND, N. Y.

CALIFORNIA REPRESENTATIVE: Grant Products & Hardware Co., 912 E. Third Street, LOS ANGELES, CAL.

AGENCIES IN PRINCIPAL CITIES

Products

GRANT ELEVATOR EQUIPMENT, consisting of:
Grant Cold Drawn Steel Door Hangers.
Grant Elevator Door Closers and Electric Interlocks.
Grant Bar Interlocks.
Grant Self Closing Elevator Door Hangers.
Grant Self Closing Bank Gate Operators.

Also Grant Elevator Signals; Grant Special Sliding Devices.

For Sash Pulleys, Pivot Lifts and Window Fixtures, and Antifriction and Ball Bearing Drawer Slides, see the pages of Grant Pulley and Hardware Company in Manufacturers' Index.

Grant Quality

All of the Grant devices listed above are constructed of the best material obtainable, accurately and carefully made to insure satisfaction, service and long life. Grant products have been favorably received and have enjoyed a good reputation for the past 30 years.

A few instances of Grant quality are given herewith.

Grant Door Hanger

A pioneer in the use of cold drawn steel shapes.

Three-way adjustments. Vertical, lateral and plumbing without removing door from hanger.

Grant Door Closer

Strong two-spring closer, leakproof and with full bronze bushed joints on all closer arms.

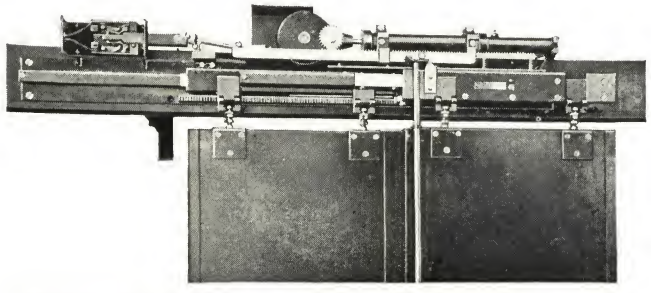
Grant Interlocks

Non-short-circuiting switches encased in Bakelite and fully approved by the Associated Casualty Companies.

Grant Self-closing Hangers

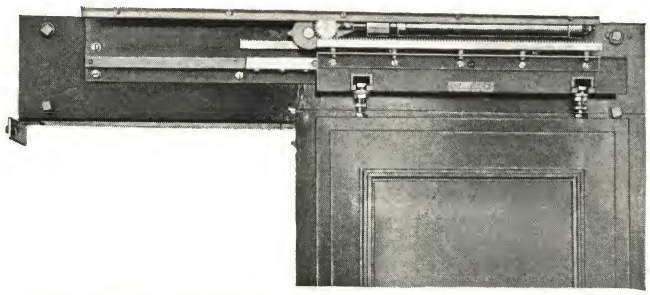
The latest addition to our line. These combined hangers and closers are designed to effect economies in price and labor. They are complete factory built devices which offer many worthwhile advantages, viz.:

No toggle arms.
No detailing.
No erection difficulties.
No sill projection (push button type).
No special reinforcement required in doors.
No structural support required.



This Type for Hollow Metal or Kalamein in Single, Two-speed or Bi-parting Doors

With or without locks and interlocks for car switch or push button elevators



This Type for Any Wood or Kalamein Door Not Over 100 Lbs.

Single slide only. No lock or interlock

Grant Gate Operator (Self-closing)

For gates in bank and other partitions.
Cantilever Type—For low partitions.
Overhead Type—For high partitions.

Gates may be up to 3 ft. in width and 100 lbs. in weight. Guaranteed not to sag or fail to close and lock.

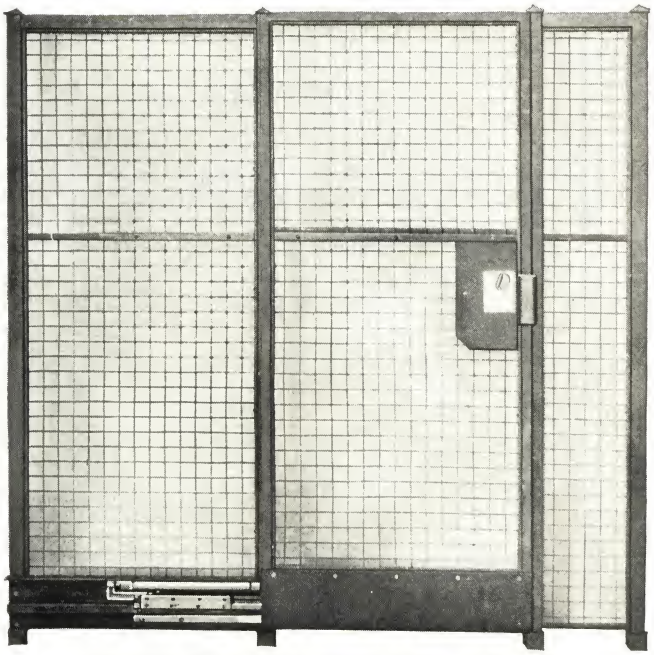


Illustration Shows Double Action Cantilever Operator

Bottom mounted, with cover plate removed

Further Information

Prices and detail data on request.

RICHARDS-WILCOX MANUFACTURING CO.

INCORPORATED

Manufacturers of Elevator Door Equipment and Signal Systems

AURORA, ILL.

For R-W Other Products, see Manufacturers' Index

R-W Elevator Door Equipment

R-W elevator door equipment gives excellent service in every type of building. In office and loft buildings, it is selected because of its ability to stand up under long, hard usage. In hotels, clubs and apartment houses it is preferred for its noiselessness and dignified appearance.

Its perfect operation not only contributes to the comfort and safety of guests and tenants, but Richards-Wilcox equipment is economical, requiring only periodical lubrication.

Rich-Wil Elevator Door Hangers

Quietness and smoothness of operation is gained by the high quality of materials and workmanship, and the splendid design incorporating the use of large size perfectly round .750 ± .0001-in. ball bearings of best grade of steel, which are spaced at not over 3-in. centers and contained in a ball retainer consisting of two ⅞-in. channels back to back, separated by spacers, which keep the balls in perfect alignment. The balls roll in a heavy section hard cold rolled steel track, into which a perfectly smooth runway has been machined.

The hanger is composed of three main parts:

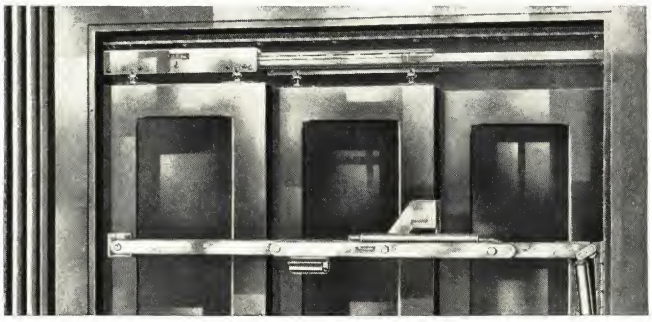
(1) Steel angle wall plate to which is attached the stationary track with its limit stops.
(2) Ball retainer.
(3) Running track.

Rich-Wil Elevator Door Closers

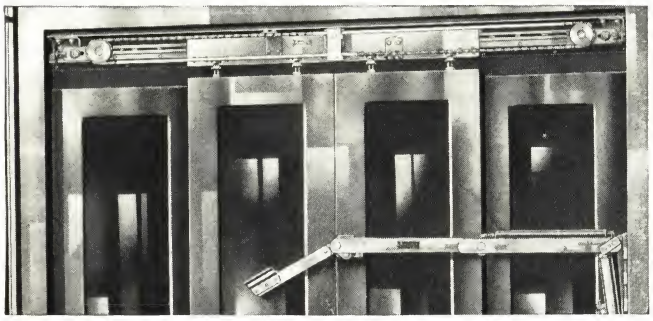
Rich-Wil Elevator Door Closers incorporate the patented feature of having separate closing and checking mechanisms which are regulated independently of each other to suit varying conditions of doors. This feature not only permits very accurate regulation of manner of operation of doors, but also reduces to ¾ in. the space required in back of the doors in the open position to the closer support.

Closers are made for all types of openings for both car switch and push button elevators. All bearing points of these closers are large size and where necessary are fitted with hardened steel bushings to prevent excessive wear. Bars are 1½ in. wide, strong and heavy, and made to withstand long and rigorous service. Each type is made in two sizes—1 and 2 of the same construction, for lighter or heavier doors. Device to unlock from corridor side furnished.

The standard finishes for all types are: Dead black with polished brass handles, and brass plated. Special finishes may be had on application. Closers are shipped packed with screws.



Two-speed Doors No. 828 Hangers
With No. 743 Type H Closer



For Bi-parting Doors No. 830 Hangers
With No. 743 Type H Closers

Design HE1 Electric Indicator

Design P.B. 4

Design P.S. 4A

Design P.B. 2

Rich-Wil Electric Interlocks

Many types of interlocks which have been approved by the leading authorities are manufactured by us. The Bureau of Standards, Underwriters' Laboratories, State of Pennsylvania and State of California have all inspected and passed one or more of our interlocks, and we are able to supply an approved interlock for virtually any project. Technical data on request.

PowR-Way Electric Door Operators

Only one of these machines is required in each elevator hatch. It is mounted on the elevator car directly above the door opening. With it the doors are opened and closed electrically at a higher and more constant speed, in a more sure, safe and uniform manner, and with less noise than if manually operated. Permits of faster and more satisfactory elevator service, as no time is lost at various floors while the attendent reaches for the door handle, which is oftentimes difficult in crowded cars. This saved time is very appreciable wherever high speed elevators are concerned.

No. 1400 equipment will operate any number of sliding doors—single; two-speed; biparting single as well as biparting two-speed doors.

R-W Signal Systems

All R-W signal systems are setting a record for low maintenance costs and reliability, as well as attracting favorable comment due to distinctive fixture designs. Electrically, the elimination of brushes and cut segments by the superior and advanced method employed of utilizing wiping silver to silver contacts have minimized cleaning requirements; mechanically, the use of sprockets with roller chain, and liberal use of ball bearings has reduced wear and maintenance tremendously.

WAGNER MANUFACTURING COMPANY

MAIN OFFICE AND WORKS
CEDAR FALLS, IOWA

SALES AND SERVICE OFFICES

CLEVELAND, OHIO, 459 Hippodrome Annex
CHICAGO, ILL., 1418 Engineering Building, 205 West Wacker Drive
NEW YORK, N. Y., Room 1102, 114 East 32nd Street
LOS ANGELES, CALIF., 1461 Griffith Avenue
ST. LOUIS, MO., 2135 Railway Exchange Building

MELBOURNE, AUSTRALIA, R. S. Ward Company, 5 Bank House, Bank Place

SALES AGENCIES IN ALL LARGE CITIES

Wagner Ball Bearing Elevator Door Hangers

Hanger tracks are machined from a one-piece high carbon special steel I-beam section insuring a strong, rigid, long wearing hanger. Hanger bars are made from high carbon rolled steel channel sections.

Ball raceways in tracks and hanger bars, and guide roller rails are machine milled (not rolled), insuring perfectly true surfaces and straight raceways; 5/8-in. diameter chrome nickel steel balls, spaced to provide at least a five-point bearing under the hanger bar at any point of its travel, are held in place by a heavy steel floating retainer bar and firmly riveted ball holders.

Flanged adjustable guide rollers prevent derailing and absorb upthrust.

Guide thrust roller treads and guide roller rails are machined to a radius to coincide with distance from ball centers, which permits the hanger to adjust itself to slight irregularities in the enclosure construction without binding.

Catalogue, etc.—Hanger catalogue and set of cross sections showing clearances required for each type of hanger will be furnished upon request.

Single Sliding Hangers—Type 100—For doors up to 200 lb.
Type 103—For doors from 200 to 400 lb.
Type 104—For doors from 400 to 600 lb.
Can also be furnished for doors up to 3000 lb.

Two-speed Hangers—Type 200 (with two-speed device)—For doors up to 150 lb.
Type 201 (with two-speed device)—For doors 150 to 300 lb.
Type 202 (without two-speed device)—For doors up to 150 lb.
Type 203 (without two-speed device)—For doors 150 to 300 lb.

Center Parting Hangers—
Type 500 (silent chain drive)—For doors up to 200 lb.
Type 501 (silent chain drive)—For doors 200 to 400 lb.
Type 503 (without bi-parting device)—For doors up to 200 lb.
Type 506 (without bi-parting device)—For doors 200 to 400 lb.
Type 504 (without bi-parting device)—For doors 400 to 800 lb.

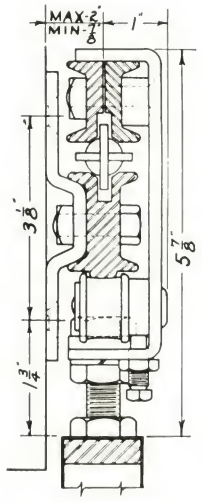
Pivoting Devices—Pivoting devices can be furnished with Types 100, 200 and 202 for use in connection with swinging panels.

Hanger cover plates can be furnished for any type of hanger.

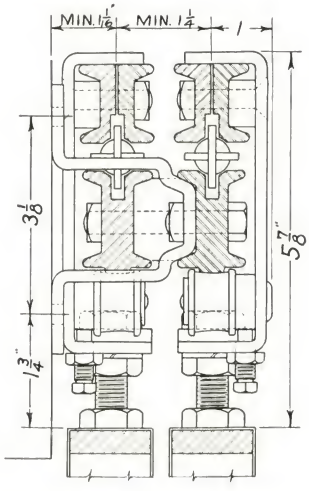
Atlas Sheave Type Hangers

Type A—These hangers are intended for use in connection with power door operation. Track is smooth drawn from a special analysis high carbon steel. Both sheave and stay roller are high grade ball bearings with provisions for pressure gun lubrication. Type A sheave hangers can be furnished in continuous sheave housings requiring only two pendant bolts per door and insuring correct alignment when applied to doors.

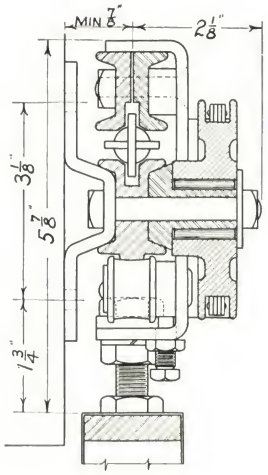
Type B—These hangers are intended for use in connection with manually operated door closers and other uses where the heavier type is not required. Both sheave and sheave bearing balls are large to insure easy operation as well as long life. The smooth drawn high carbon steel track is also extra heavy. Pressure gun lubrication is provided for on sheaves and stay rollers. Type B hangers can also be provided with continuous sheave housings requiring only two pendant bolts per door.



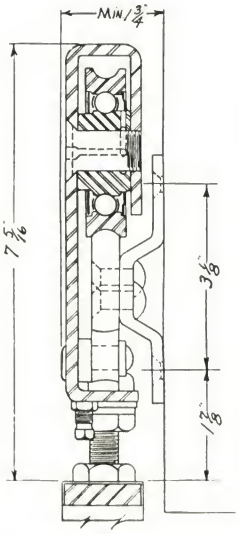
Type 100 Section
Single Sliding Hanger



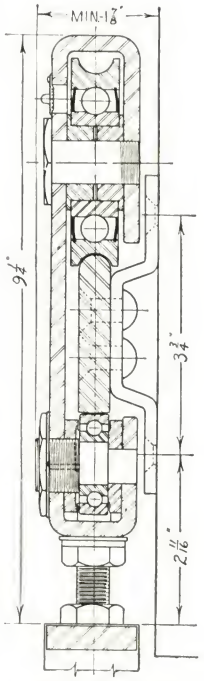
Types 200, 202 Door Hangers



Type 500 Section
Center Parting Door Hanger



Atlas Type "B" Sheave
Hanger



Atlas Type "A"
Sheave Hanger

Wagner Electric Mechanical Barlock Interlock

The Wagner Electric Mechanical Barlock Interlock provides positive locking of sliding elevator doors where a door closer is not required. Doors must be locked before interlock circuit is closed and one car can be started.

Wagner Elevator Door Closer and Check

The Wagner Elevator Door Closer insures automatic, noiseless and positive closing and locking of sliding elevator doors.

Wagner Electric Safety Interlocks, used in conjunction with Wagner Closers, insure the closing and locking of elevator enclosure doors before the car can be started.

Wagner Door Closers and Interlocks can also be provided with cam operated mechanical lock for push button operation.

Wagner Power Elevator Door Operators

Vertical Type—Air opening, spring closing.

Overhead Type—Air opening and closing.

Master Pneumatic Operator—Master air power unit on car, enclosure doors and car doors operated simultaneously, power opening, spring closing.

Master Electric Operator—Master electric power unit on car, enclosure doors and car doors operated simultaneously, power opening, spring closing, high speed or slow speed operation.

Electric Car Gate or Door Operators—For push button elevators.

Underwriters' Labeled Hardware

Elevator door hangers, closers and power operators can be furnished with Underwriters' Laboratories labels.

Wagner Elevator Signal Equipment

Flashlight signal systems.

Flashlight annunciator signal systems.

Restrictive signal systems.

Preregistering restrictive signal systems.

Mechanical reset target type annunciator signal systems.

Mechanical reset flashlight annunciator signal systems.

Waiting passenger lanterns, mechanical and electric indicators.

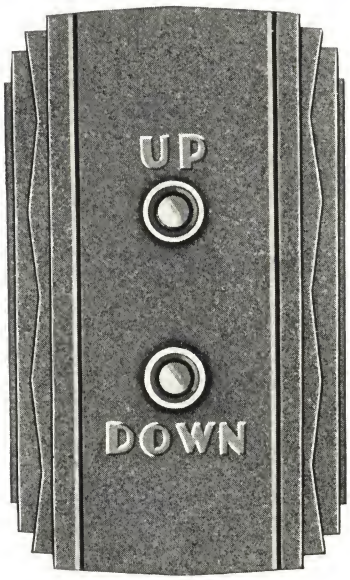
Group Position Indicator with Telltale Annunciator Design PIM-7

Boardman Elevator Traffic Control

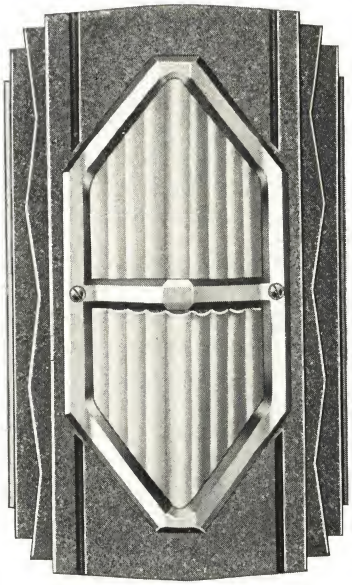
The Boardman Elevator Traffic Control is an elevator dispatching system of the selective type, which, when applied to an elevator system, greatly increases its efficiency from the standpoint of both building owners and tenants.

Wagner-Boardman Traffic Engineers make a specialty of elevator traffic control and the results of years of study and experience are available to building owners and builders.

Waiting Passenger Lantern Design L-23



Push Button Design P-16



Waiting Passenger Lantern Design L-19

Electric Indicator—Design EIM-7R

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

Manufacturers of Wire Rope

SALES OFFICES

CHICAGO, 208 So. La Salle Street
CLEVELAND, Rockefeller Building
DETROIT, Buhl Building
CINCINNATI, Union Trust Building
MINNEAPOLIS—ST. PAUL, Merchants National Bank Building, St. Paul
MILWAUKEE, Bankers Building
ST. LOUIS, 506 Olive Street
KANSAS CITY, 417 Grand Avenue
OKLAHOMA CITY, Ramsey Tower
BIRMINGHAM, Brown-Marx Building
MEMPHIS, Sterick Building
DALLAS, Praetorian Building
DENVER, First National Bank Building
SALT LAKE CITY, Walker Bank Building
NEW YORK, Empire State Building
BOSTON, Statler Building
PITTSBURGH, Frick Building
PHILADELPHIA, Widener Building
ATLANTA, 101 Marietta Street
WORCESTER, 94 Grove Street
BALTIMORE, First National Bank Building
BUFFALO, 670 Ellicott Street
WILKES-BARRE, Miners Bank Building

PACIFIC COAST DISTRIBUTORS, COLUMBIA STEEL COMPANY

SAN FRANCISCO, Russ Building
LOS ANGELES, 2087 E. Slauson Avenue
PORTLAND, 777 Nicolai Street
SEATTLE, 4th Avenue So. and Connecticut Street
HONOLULU, Castle & Cooke Building

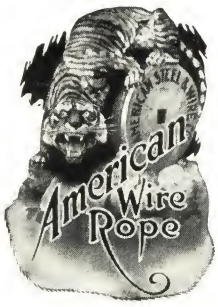
EXPORT DISTRIBUTORS, United States Steel Products Company, 30 Church Street, NEW YORK, N. Y.

Products

All constructions of WIRE ROPE in the following qualities: Iron, Cast Steel, Traction Steel, Extron Steel, Plow Steel and Monitor Steel Silver Strand.

Also a full line of Wire Rope Fittings: Slings, Thimbles, Clips, Sockets, Hooks, Turnbuckles, Shackles, etc.

For our catalogues on Concrete Reinforcement, Triangle Mesh for Stucco Base, and Electrical Wires and Cables, see Manufacturers' Index.



Qualities of Wire Rope and Their Uses

Wire Rope is made in the following six qualities:

Iron Rope—The wires are made from the best quality iron, being soft, tough and flexible. Iron is most generally used for elevator hoisting, where the strength is sufficient. It is almost universally employed for counterweight ropes, except on traction elevators.

Traction Steel—The wires are made from the best quality steel. Traction Steel is most generally used for elevator hoisting and it is especially adapted to traction type elevators.

Cast Steel Rope—This is a medium strength material, tough and pliable, of moderate cost and general utility. Weighs only about one-half as much as iron for same strength; is harder, therefore better resists external wear. The rope is applicable to a great variety of uses, these uses being where great strength is not necessary. It is used to a great extent in the oil fields for drilling, casing, bailing lines, etc.

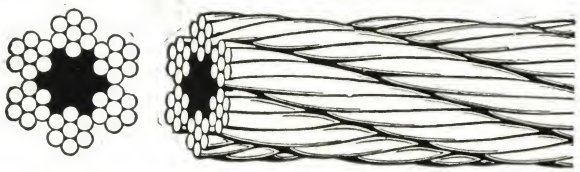
Extron Steel Rope—Of higher tensile strength than the cast steel and is tough, pliable, a little lighter for the same strength as Cast Steel and about two and one-half times the strength of iron. It is found particularly useful for oil, water and gas well drilling lines. Its other general uses are similar to those of cast steel, except that it may be used where loads are somewhat heavier. (This grade was formerly known as Extra Strong Cast Steel.)

Plow Steel Rope—Combines lightness and great strength; is somewhat stiffer than cast steel and nearly three times as strong as iron rope. Used particularly for mine hoisting, derricks, inclined planes, dredges, cableways and similar uses when the loads are not very great.

Monitor Steel Silver Strand Rope—This is the highest strength rope made. It is somewhat stiffer in the same diameter than plow and cast steel grades, but for strength it is equally flexible. Very useful where great strength, lightness and abrasive resisting qualities are required. Principally used today on a large percentage of the equipment where formerly plow steel was used. Change being necessary because of the heavier type of equipment. It is identified by having one galvanized strand throughout the entire length.

Transmission, Haulage or Standing Rope

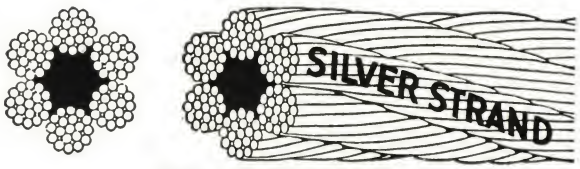
The coarsest rope *i.e.*, 6x7 construction, a relatively stiff rope with large wires, capable of resisting external wear or abrasion; but it is the least flexible.



Transmission, Haulage or Standing Rope (6x7)

Hoisting Rope

Composed of 6 strands of 19 wires each, with hemp core. Used for elevators, mine hoisting, derricks, dredges, cableways, logging, inclined planes, coal hoists, conveyors, ballast unloaders, skip hoist, oil well drilling and tubing lines.

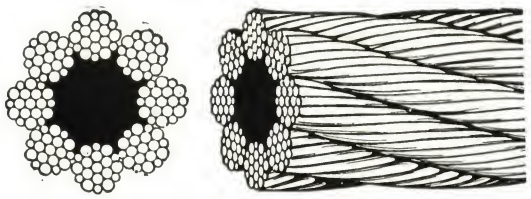


Hoisting Rope (6x19)
Silver Strand marker appears only in the Monitor Grades

Extra Flexible Hoisting Rope

This rope is composed of 8 strands of 19 wires each, laid around a hemp core. The addition of these two strands over the standard hoisting rope increases the flexibility and permits the rope being used over comparatively smaller sheaves and drums.

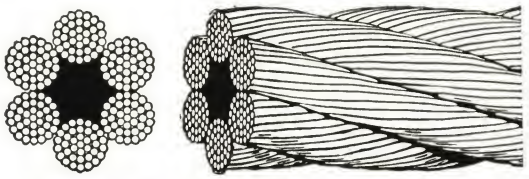
Adaptable for derricks, steam dredges, coal and ore handling machinery, pile drivers, and also for logging purposes, as well as tubing lines for oil wells.



Extra Flexible Steel Hoisting Rope (8x19)

Special Flexible Hoisting Rope

This rope usually composed of 6 strands of 37 wires each, laid around a hemp core, is also manufactured in 6x29 and 6x33 constructions. These special constructions are specially adapted for dredging, clamshell bucket work, locomotive cranes, shovels, etc. For details of these special constructions, see nearest Sales Office.



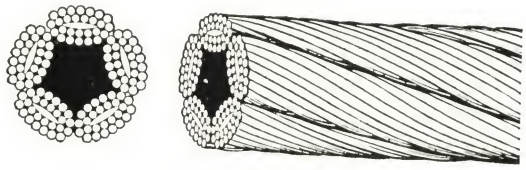
Special Flexible Steel Hoisting Rope (6x37)

VARIOUS CONSTRUCTIONS AND GRADES OF WIRE ROPE

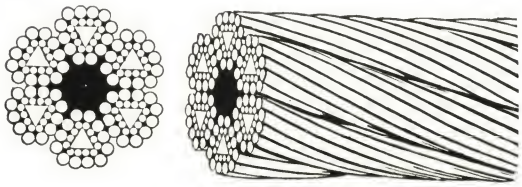
Diameter, inches	Weight per foot, pounds	Iron		Cast Steel		Extron Cast Steel		Plow Steel		Monitor Steel, Silver Strand	
		Breaking strength in tons of 2000 pounds, each	List price per foot	Breaking strength in tons of 2000 pounds, each	List price per foot	Breaking strength in tons of 2000 pounds, each	List price per foot	Breaking strength in tons of 2000 pounds, each	List price per foot	Breaking strength in tons of 2000 pounds, each	List price per foot
Transmission, Haulage or Standing Rope—6 Strands, 7 Wires to Strand, 1 Hemp Core											
1½	3.38	29.7	$0.51	62.5	$0.60	68.7	$0.75	75	$0.90	86.5	$1.05
1⅜	2.84	25.2	.43	53	.51	58.2	.64	63.5	.76	73.5	.88
1¼	2.34	21	.36	44.5	.43	48.7	.53	53	.62	61	.72
1	1.90	17.2	.30	36.4	.36	40	.44	43.6	.51	50	.58
1	1.50	13.7	.24	29	.29	31.9	.35	34.8	.41	40	.48
⅞	1.15	10.5	.18½	22.4	.23	24.6	.27	26.8	.32½	30.8	.37
¾	.84	7.86	.14	16.5	.18½	18.1	.22	19.8	.26	22.8	.28½
⅝	.59	5.52	.10	11.5	.13½	12.6	.16	13.8	.19	16	.20½
9/16	.48	4.49	.08¼	9.4	.11½	10.3	.13¾	11.3	.16¼	13	.17
½	.38	3.57	.06½	7.5	.09	8.2	.10½	9	.12½	10.3	.13½
7/16	.29	2.76	.05½	5.8	.07	6.3	.08½	6.9	.10½	7.9	.11½
⅜	.21	2.05	.04½	4.3	.05¾	4.7	.06¾	5.15	.08	5.9	.08¾
5/16	.15	1.43	.03¾	3.1	.04½	3.35	.05½	3.65	.06½	4.2	.08¼
9/32	.12	1.17	.03¼	2.52	.04¼	2.72	.05¼	2.95	.06¼	3.4	.07½
¼	.....	.....	.....	2	.04	2.15	.05	2.35	.06	2.7	.07
Hoisting Rope—6 Strands, 19 Wires to Strand, 1 Hemp Core											
2¾	12.1	95	$1.70	212	$2.10	234	$2.55	256	$3.00	294	$3.45
2½	10	79.1	1.40	176	1.75	195	2.10	214	2.50	246	2.80
2¼	8.1	64.8	1.17	144	1.44	160	1.70	176	2.00	202	2.50
2	6.4	51.8	.95	114	1.16	127	1.34	140	1.58	161	1.85
1⅞	5.63	45.8	.88	100	1.02	112	1.25	123	1.46	142	1.75
1¾	4.9	40.1	.80	88	.90	98	1.10	108	1.30	124	1.60
1⅝	4.23	34.8	.65	76	.77	85	.94	94	1.08	108	1.30
1½	3.6	29.7	.57	65	.66	72.5	.80	80.5	.93	92.5	1.10
1⅜	3.03	25.2	.49	55	.56	61.5	.68	68	.79	78.5	.90
1¼	2.5	21	.40	46	.46	51	.56	56.5	.65	65	.75
1⅛	2.03	17.2	.33	37	.38	41.5	.46	46	.54	53	.62
1	1.6	13.7	.26	29.5	.31	33	.37	36.5	.43	42	.50
⅞	1.23	10.6	.21	22.8	.25	25.4	.29	28	.34½	32.2	.39
¾	.9	7.86	.17	16.8	.20½	18.7	.24	20.6	.28	23.7	.31
⅝	.63	5.52	.13½	11.8	.15¾	13.1	.18	14.4	.21	16.6	.22½
9/16	.51	4.49	.11½	9.6	.13¾	10.6	.15¾	11.7	.18¼	13.5	.19
½	.4	3.57	.09½	7.7	.12	8.5	.13¾	9.4	.16	10.8	.17
7/16	.31	2.76	.08½	6	.10½	6.6	.12	7.3	.14	8.4	.15½
⅜	.23	2.05	.07½	4.5	.09½	5	.11	5.5	.13	6.3	.14½
5/16	.16	1.43	.06¾	3.2	.09¼	3.5	.10¾	3.9	.12¼	4.5	.13½
¼	.1	.97	.06½	2.1	.09	2.3	.10½	2.5	.12	2.9	.13
Extra Flexible Hoisting Rope—8 Strands, 19 Wires to Strand, 1 Hemp Core											
1½	3.26	.....	.....	57.5	$0.73	63.3	$0.88	69	$1.06	79.5	$1.19
1⅜	2.74	.....	.....	48.6	.62	53.4	.75	58.3	.90	67	.98
1¼	2.27	.....	.....	40.4	.51	44.4	.62	48.4	.75	55.7	.82
1⅛	1.84	.....	.....	32.8	.42	36	.51	39.4	.62	45.2	.68
1	1.45	12.2	$0.29	26	.34	28.6	.41	31.2	.50	35.8	.55
⅞	1.11	9.4	.23	20	.28	22	.34	24	.41	27.6	.43
¾	.82	6.95	.19½	14.8	.23	16.3	.27¼	17.8	.32½	20.5	.34
⅝	.57	4.86	.15½	10.4	.17½	11.4	.20½	12.5	.24	14.4	.25
9/16	.46	4.06	.13	8.5	.15½	9.4	.18	10.3	.21	11.8	.22
½	.36	3.28	.11	6.8	.13½	7.5	.15½	8.2	.18¼	9.5	.19
7/16	.28	2.40	.09½	5.3	.12	5.8	.14¼	6.3	.17	7.3	.17½
⅜	.2	1.60	.08½	3.94	.10½	4.33	.12½	4.7	.15	5.45	.16½
5/16	.14	1.10	.074	2.79	.10¼	3.07	.12¼	3.34	.14½	3.85	.16
¼	.09	.80	.07	1.79	.10	1.97	.12	2.15	.14¼	2.47	.15¾
Special Flexible Hoisting Rope—6 Strands, 37 Wires to Strand, 1 Hemp Core											
3½	19	.....	.....	323	$3.75	357	$4.60	392	$5.35	451	$6.10
3¼	16.37	.....	.....	281	3.25	311	3.95	341	4.65	392	5.25
3	13.95	.....	.....	241	2.75	267	3.35	293	3.95	337	4.50
2¾	11.72	.....	.....	204	2.30	226	2.80	248	3.30	285	3.75
2½	9.69	.....	.....	170	1.92	188	2.35	206	2.75	237	3.15
2¼	7.85	.....	.....	139	1.60	153	1.90	168	2.20	194	2.75
2⅛	7	.....	.....	125	1.48	138	1.70	151	2.00	174	2.40
2	6.2	.....	.....	111	1.35	123	1.55	135	1.80	155	2.10
1⅞	5.45	.....	.....	98	1.20	108.5	1.40	119	1.65	137	1.90
1¾	4.75	.....	.....	86	1.05	95	1.28	104	1.50	119.5	1.75
1⅝	4.09	.....	.....	74.3	.89	82	1.07	89.8	1.25	103.3	1.45
1½	3.49	.....	.....	63.5	.79	70	.95	76.7	1.15	88.2	1.25
1⅜	2.93	.....	.....	53.5	.65	59	.78	64.6	.93	74.3	1.05
1¼	2.42	.....	.....	44.3	.55	48.9	.65	53.5	.78	61.5	.86
1⅛	1.96	.....	.....	36	.46	39.7	.55	43.5	.66	49.9	.75
1	1.55	.....	.....	28.6	.37	31.5	.44	34.4	.52½	39.5	.59
⅞	1.19	.....	.....	22	.30	24.2	.36	26.5	.43	30.5	.46
¾	.87	.....	.....	16.4	.24	18.1	.28½	19.8	.34	22.8	.36
⅝	.61	.....	.....	11.6	.18½	12.8	.21½	14	.25	16.1	.27
9/16	.49	.....	.....	9.5	.16½	10.5	.19¼	11.5	.22½	13.2	.23
½	.39	.....	.....	7.7	.14	8.4	.16¼	9.2	.19	10.6	.20
7/16	.3	.....	.....	6	.12½	6.6	.15	7.2	.17¾	8.3	.18½
⅜	.2	.....	.....	4.4	.12	4.9	.14¼	5.3	.17	6.1	.17½

Flattened Strand Hoisting Ropes

These ropes compare in flexibility with the standard hoisting rope, but possess about 150% greater wearing surface than the round strand ropes of same diameter and have been used generally in the same places. Made in all grades.



Type A (5x28)

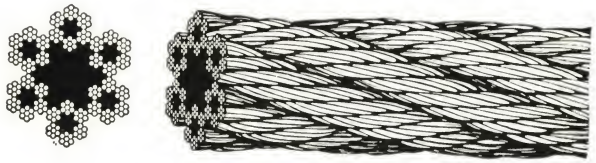


Type B (6x25)

Flattened Strand Hoisting Ropes

Tiller or Hand Rope

Used principally for signal pull purposes in mines and factories, and in connection with the operating or controlling device on passenger and freight elevators. Also used to limited extent for steering lines on yachts and motor boats.



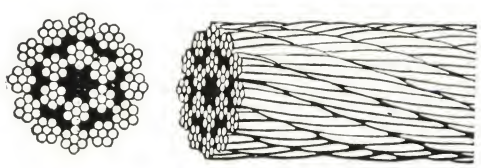
Tiller or Hand Rope

6 strands of 42 wires, each, 7 hemp cores

Diam., in.	Weight per ft., lb.	Breaking strength in tons of 2000 lb., each		List price per ft.	
		Iron	Cast steel	Iron	Cast steel
1	1.10	8.6	16.7	$0.33	$0.43
7/8	.84	6.6	13.	.27	.36
3/4	.62	5.1	9.7	.22	.30
5/8	.43	3.5	6.9	.17	.24
9/16	.35	3.02	5.6	.14	.20
1/2	.28	2.39	4.46	.11½	.17
7/16	.21	1.91	3.44	.10	.15
3/8	.16	1.40	2.54	.09	.14
5/16	.11	.977	1.77	.08	.12½
1/4	.07	.625	1.14	.07½	.11
3/16	.042	.35	.65	.07	.10

Non-spinning Hoisting Rope

This type of rope is so constructed that it prevents the rotating of a free load suspended on the end of a single line. It is recommended for "back haul" or single line derricks.

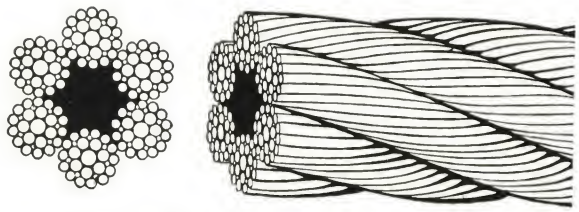


Non-spinning Hoisting Rope (18x7)

American Special Hoisting Rope Type "P"

Six strands, 29 wires to a strand, 1 hemp core, made in 2 grades, plow steel and monitor steel.

This is an excellent rope for clamshell buckets, steam shovels, and general hoisting purposes requiring a greater degree of flexibility than standard 6x19 construction.

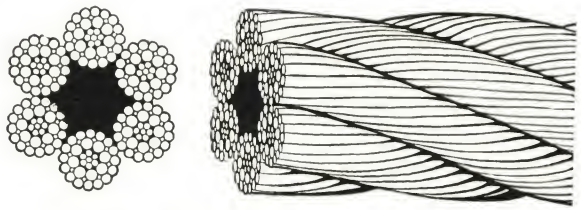


American Special Hoisting Rope Type "P"

American Special Hoisting Rope Type "R"

Six strands, 33 wires to a strand, 1 hemp core, made in 2 grades, plow steel and monitor steel.

For use on coal cutting machines, this rope, 5/8-in. diameter, Monitor grade, will be found superior to other constructions. It will also give good service on cranes, where abrasion is too severe for 6x37 construction.

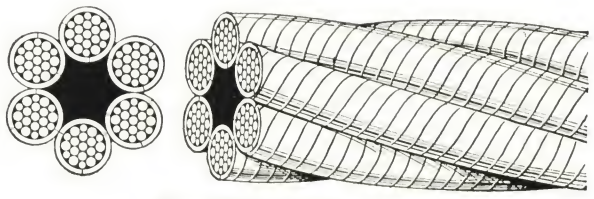


American Special Hoisting Rope Type "R"

Steel Clad Hoisting Rope

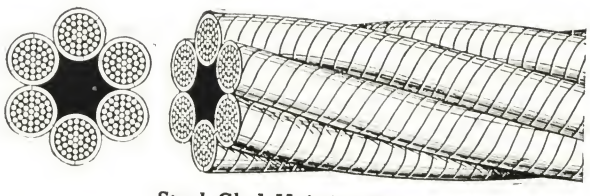
Each strand is spirally wound with flat steel strips, which gives considerable wearing surface over the ordinary type. When the flat strips of a steel clad rope have worn through, there still remains the complete hoisting rope with unimpaired strength. Where ropes wear out quickly, this feature is a distinct advantage.

Made in 3 construction: 6x19 wires each; and special flexible, 6 strands of 37 wires each.



Steel Clad Hoisting Rope

6 strands, 19 wires to strand



Steel Clad Hoisting Rope

6 strands, 37 wires to strand

Sash Cord

Made "dead soft" unless ordered to the contrary. Used principally for window weights, bell cords, automobile brakes and whistles. $\frac{3}{32}$-in. diameter galvanized sash cord is used on electric open car curtain fixtures; $\frac{1}{16}$-in. galvanized sash cord is used on car curtain fixtures.

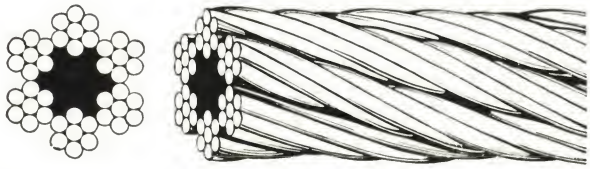
Sash Cord (6x7)

SASH CORD
6 strands of 7 wires each, 1 cotton core

Trade No.	Diam., in.	Weight per ft., lb.		Breaking strengths, lb.			List price per ft.		
		Iron	Copper	Bright iron	Annealed iron	Bright copper	Iron annealed or bright	Tinned or galvanized iron	Copper
26	1/4	.094	.108	2040	1225	1225	$0.03	$0.04	$0.09
27	7/32	.072	.083	1570	940	940	.02¾	.03½	.07½
27½	3/16	.053	.061	1150	688	688	.02½	.03	.06
27¾	5/32	.038	.044	840	478	478	.02	.02¾	.05¼
28	1/8	.023	.026	560	306	306	.01¾	.02¼	.04½
28½	3/32	.013	.015	315	172	172	.01½	.02	.03½
29	1/16	.006	.007	140	77	77	.01¼	.01¾	.03

Galvanized Iron or Steel Guy Rope

For supporting derricks, and for general standing rope service; it is not designed to run over drums or sheaves.



Galvanized Iron or Steel Guy Rope (6x7, 1 Hemp Core)

Perfected Steel Strand

Used for guying smokestacks, telephone, telegraph and overhead transmission line poles; for supporting telephone, signal and transmission cables in overhead work and trolley wire in catenary construction; also as a ground wire in protecting transmission lines from lightning.

PERFECTED STEEL STRAND
Standard galvanized or extra galvanized 7 steel wires twisted into a single strand

Diam., in.	Approx. weight per 1000 ft., lb.	Approx. strength, lb.
3/4	1,200	16,700
5/8	813	11,600
9/16	671	9,600
1/2	517	7,400
7/16	399	5,700
3/8	273	4,250
5/16	205	3,200
9/32	164	2,570
1/4	121	1,900
7/32	98.3	1,540
3/16	72.9	1,150
5/32	51.3	870
9/64	40	700
1/8	31.8	540
7/64	25	450
3/32	20	400
5/64	13	300

Perfected Steel Strand

Standard galvanized or extra galvanized 7 steel wires twisted into a single strand

Extra Galvanized Special Strands—Three special grades which meet all requirements for durability, strength, toughness and light weight; Siemens-Martin strand, High Strength (cast steel) strand, and Extra High Strength (plow steel) strand.

Galvanized Mast Arm or Arc Light Ropes

Furnished in sizes ¼ to ½-in. diameter.

Galvanized Mast Arm or Arc Light Rope

Tiger Wire Rope Clips, Drop Forged

These are not recommended for permanent fastenings on hoist rope, but are universally used on ropes supporting screens, loading booms, etc.

Tiger Wire Rope Clips

Size clip corresponding to rope, diameter, in.	Size of U-bolts (standard), in.	Approximate weight per 100 clips, lb.	Size clip corresponding to rope, diameter, in.	Size of U-bolts (standard), in.	Approximate weight per 100 clips, lb.
3	1¼	2335	1⅛	¾	350
2¾	1¼	2100	1	¾	288
2½	1⅛	1570	⅞	¾	240
2¼	1⅛	1330	¾	⅝	140
2	1	1015	⅝	9/16	93
1¾	1	800	⅞	½	70
1⅝	⅞	680	7/16	½	65
1½	⅞	570	⅜	⅜	38
1⅜	⅞	510	5/16	⅜	32
1¼	⅞	450	¼	⅜	29

Hot galvanized finish (Western Union specifications) can also be furnished.

High Strength Bronze Tiger Wire Rope Clips

High strength bronze clips are designed for use in places where the life of galvanized steel clips is short, due to electrolysis or corrosion. They are much stronger than copper clips and because of their greater hardness are much more dependable. Their strength is approximately 75% that of steel so that four bronze clips may be used in place of three steel clips.

Galvanized Oval Thimbles

Our oval thimbles are heavily coated with zinc and made in various sizes.

Oval Thimbles

EVANS ELEVATOR EQUALIZER CO.

BEDFORD, IND.

SALES OFFICES

NEW YORK, Chanin Building, 122 East 42nd Street CHICAGO, Daily News Building, 400 West Madison Street

Evans Elevator Equalizer

Elevator cables, even when all possible care has been taken in cutting them to equal lengths, will vary considerably in stretch, and it is generally recognized that unequal loading of the hoisting cables occurs due to this variation in cable stretch. This results in shortened life of the group as the entire load is often carried by one or more cables. Cables are condemned by municipal or insurance inspectors when one or more cables have begun to show broken wires in their strands.

The Evans Equalizer is designed to overcome the difficulties encountered due to unequal stretch of the cables and the differential travel caused by the uneven wear of the sheave grooves, and the Evans Equalizer automatically distributes the load evenly over all the cables, thus wearing each and every cable alike, and each and every sheave groove alike.

Unequal loading due to this variation in stretch of the hoisting ropes on traction elevators not only reduces traction, but causes differential sheave groove wear, which forces a differential travel of the ropes. A rope that passes over a higher or lower sheave groove than the others travels either faster or slower as the driving sheave revolves, the load on this rope is increased or diminished accordingly, thus some of the ropes are forced to slip. This slippage not only wears the ropes, but also the sheave grooves until it becomes necessary to regroove or replace the sheaves. The loss of traction due to unequal loading and the forced slippage due to unequal depths of sheave grooves causes false stops, as the traction on the ropes varies, making it difficult to stop the elevator level with the floor during regular service. These false stops increase power consumption, operating time, and again decrease cable life, due to the increased flexing in sections corresponding to the position of the car at the floor landings.

The Evans Equalizer hangs all the hoisting cables on to an equalizing assembly instead of the rigid structure of the car. You will note that the bottom plate has a cable dead ended at one end which passes over the floating sheaves and the fixed sheaves, and is again dead ended on the bottom plate which places all the stress on the bottom of the car's crosshead. The tension of the ropes of any pair is equalized by the swing of the equalizer bar to which each pair is attached, and each equalizer bar is attached by a drop forged pull bar to a floating sheave that floats within the compoundings of the equalizing cable, thus each and every cable automatically carries its portion of the weight regardless of the differential stretch of the cables, and the equalizer constantly compensates for the differential travel of the cables due to uneven sheave wear.

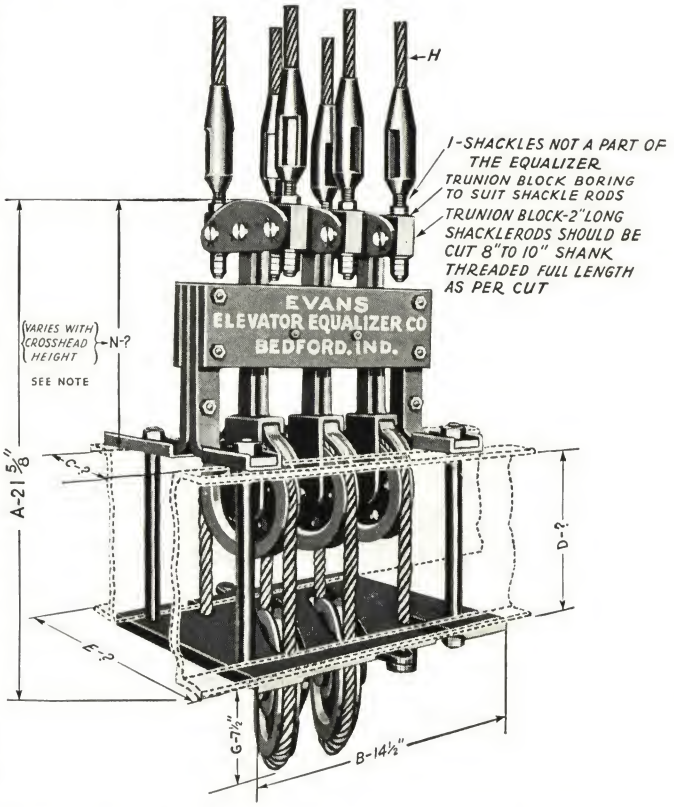
Other Types of Equalizers

When elevators are equipped with compensating cables the Evans Compensating Cable Equalizer should be used, and when building heights are in excess of 400 ft. the Evans Counterweight Equalizer should be included in the specifications.

Tested and Listed by Underwriters' Laboratories, Inc.

Evans Equalizers have been tested and listed by the Underwriters' Laboratories, Inc., approved and installed in the home office buildings of liability and insurance companies, and passed by State and city engineers.

They are recommended by many of the leading elevator manufacturers from coast to coast, and wire rope manufacturers generally approve of their use on elevator cables.



Dimensions of the Evans Elevator Cable Equalizer

Dimension "B" for 4-8-10 and 12-rope equalizers, 11¾ in., 1 ft. 5¾ in., 1 ft. 9½ in. and 2 ft. ¾ in.

Dimensions of equalizers in excess of 12-rope furnished on request.

Note: N-plus-D = 1 ft. 9⅝ in.

Note: In cases of 2-to-1 roping equalizer is mounted in place of hitchplate in the overhead.

ESTABLISHED 1889

JOHN W. KIESLING & SON, INC.

INCORPORATED 1923

Manufacturers of Elevator Cable Equalizers

1797-1803 Atlantic Avenue

BROOKLYN, N. Y.

TELEPHONE:
HAddingway, 3-8070, 8071

For Hand Power Platform Ash Hoists and Sidewalk Elevators, Dumbwaiters and Elevators, See Manufacturers' Index

KIESLING "ALL-STEEL" ELEVATOR CABLE EQUALIZER

Scope and Use

Designed for the purpose of automatically equalizing the pull or tension on multiple elevator cables connecting the car and counterweight, when cables are of unequal length caused by sheave groove wear, stretching of cables or where the diameters of said cables are either slightly undersize or oversize.

Equalization

Its incomparable equalization (up to thirteen inches) makes it possible for this *"All-Steel"* Automatic Equalizer to take care of any defects pertaining to stretching of cables, sheave groove wear, etc., irrespective of car travel.

The Kiesling *"All-Steel"* Automatic Equalizer, by overcoming the foregoing disadvantages, renders it possible for the operator to easily control starting and stopping with the assurance of better landings and greater safety.

Construction

The Kiesling *"All-Steel"* Automatic Equalizer is of all-steel construction, no cables to wear out, no continual lubrication of sheaves and cables. As this Equalizer is adjustable, it can accommodate various channel widths.

Installation

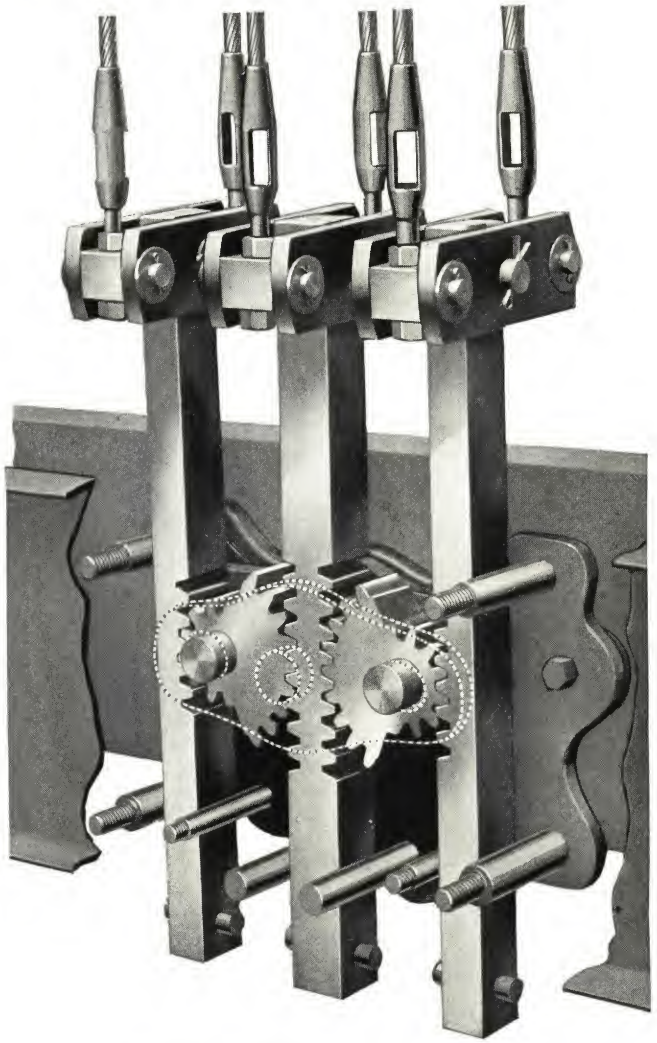
The Kiesling *"All-Steel"* Automatic Equalizer is assembled and shipped as one complete unit, is easily inserted between the cross-head channels of the elevator sling, thence securely bolted thereto.

Elevators Now in Use

This *"All-Steel"* Automatic Equalizer can be readily installed to accommodate present cables. Elevators thus equalized can have cables replaced singly or in pairs, according to wear.

Guarantee

This Kiesling *"All-Steel"* Automatic Equalizer is guaranteed for *five years,* against defective material and workmanship.



Kiesling "All-Steel" Elevator Cable Equalizer
The only *"All Steel"* Automatic Equalizer which has equalization up to thirteen inches, requiring but nine inches head-room

How to Specify

The Elevator Contractor is to equip the Elevator [Elevators], and Counterweight, [Counterweights], with Kiesling *"All-Steel"* Automatic Equalizer, [Equalizers], in accordance with manufacturer's specifications and drawings, as manufactured by JOHN W. KIESLING & SON, INC., 1797-1803 Atlantic Avenue, Brooklyn, N. Y.